

**California Department of Education Assessment Development & Administration Division**



# California Assessment of Student Performance and Progress California Alternate Assessment for Science 2022–‍23 Technical Report

**Submitted March 11, 2024**

**By ETS**



**Contract #CN220002**

Table of Contents

[Chapter 1: Introduction 1](#_Toc158631554)

[1.1. Background 1](#_Toc158631555)

[1.2. Purposes of the Assessment 2](#_Toc158631556)

[1.3. Test Content and Design 2](#_Toc158631557)

[1.3.1. Assessment Model 3](#_Toc158631558)

[1.3.2. Science Connectors 3](#_Toc158631559)

[1.3.3. Test Components for the 2022–23 Administration 4](#_Toc158631560)

[1.4. Intended Population 5](#_Toc158631561)

[1.5. Intended Use and Purpose of Test Scores 5](#_Toc158631562)

[1.6. Testing Window 6](#_Toc158631563)

[1.7. Significant Developments for the CAA for Science 2022–23 Administration 6](#_Toc158631564)

[1.7.1. Crisis Alert Response System Process 6](#_Toc158631565)

[1.7.2. *Preparing for Administration* Documents 6](#_Toc158631566)

[1.7.3. Additional Student Score Report Language 6](#_Toc158631567)

[1.7.4. Accessibility Resources 7](#_Toc158631568)

[1.8. Groups and Organizations Involved with the CAA for Science 7](#_Toc158631569)

[1.8.1. California State Board of Education 7](#_Toc158631570)

[1.8.2. California Department of Education 7](#_Toc158631571)

[1.8.3. California Educators 7](#_Toc158631572)

[1.8.4. Contractors 7](#_Toc158631573)

[1.9. Systems Overview and Functionality 9](#_Toc158631574)

[1.9.1. Test Operations Management System 9](#_Toc158631575)

[1.9.2. Test Delivery System 9](#_Toc158631576)

[1.9.3. Practice and Training Tests 10](#_Toc158631577)

[1.9.4. California Educator Reporting System 10](#_Toc158631578)

[1.9.5. Test Results for California’s Assessments Website 10](#_Toc158631579)

[1.10. Overview of the Technical Report 11](#_Toc158631580)

[References 12](#_Toc158631581)

[Chapter 2: Overview of CAA for Science Processes 13](#_Toc158631582)

[2.1. Item Development 13](#_Toc158631583)

[2.1.1. Selection of Science Core Content Connectors for Embedded Performance Task Development 13](#_Toc158631584)

[2.1.2. Embedded Performance Task Development 13](#_Toc158631585)

[2.1.3. Item Format 13](#_Toc158631586)

[2.1.4. Item Specifications 14](#_Toc158631587)

[2.2. Test Assembly 14](#_Toc158631588)

[2.2.1. Test Blueprint 14](#_Toc158631589)

[2.2.2. Test Length 15](#_Toc158631590)

[2.3. Test Administration 15](#_Toc158631591)

[2.3.1. Test Security and Confidentiality 15](#_Toc158631592)

[2.3.2. Procedures to Maintain Standardization 16](#_Toc158631593)

[2.4. Fairness and Accessibility 17](#_Toc158631594)

[2.4.1. Overview 17](#_Toc158631595)

[2.4.2. Student Accessibility Resources 17](#_Toc158631596)

[2.4.3. Individualization 18](#_Toc158631597)

[2.4.4. Description of Differential Item Functioning Analyses 18](#_Toc158631598)

[2.5. Scores 18](#_Toc158631599)

[2.5.1. Estimating Ability Scores 18](#_Toc158631600)

[2.5.2. Score Reporting 19](#_Toc158631601)

[2.5.3. Aggregation Procedures 19](#_Toc158631602)

[2.6. Psychometric Analyses 19](#_Toc158631603)

[2.6.1. Description of the Classical Item Analyses 19](#_Toc158631604)

[2.6.2. Description of Item Response Theory Analyses 20](#_Toc158631605)

[References 21](#_Toc158631606)

[Chapter 3: Item Development and Review 22](#_Toc158631607)

[3.1. Guidelines 22](#_Toc158631608)

[3.1.1. Overview 22](#_Toc158631609)

[3.1.2. Item Specifications 22](#_Toc158631610)

[3.1.3. Five-Year Plan 23](#_Toc158631611)

[3.1.4. Item Format 23](#_Toc158631612)

[3.1.5. Item Types 24](#_Toc158631613)

[3.1.6. Item Banking 26](#_Toc158631614)

[3.1.7. Recruitment and Selection of Item Writers 26](#_Toc158631615)

[3.1.8. Item Writer Training 26](#_Toc158631616)

[3.2. ETS Item Review Process 27](#_Toc158631617)

[3.2.1. Overview 27](#_Toc158631618)

[3.2.2. ETS Content Review 28](#_Toc158631619)

[3.2.3. ETS Accessibility Review 28](#_Toc158631620)

[3.2.4. ETS Editorial Review 28](#_Toc158631621)

[3.2.5. ETS Sensitivity and Fairness Review 29](#_Toc158631622)

[3.3. California Department of Education Review 29](#_Toc158631623)

[3.4. California Educator Review 29](#_Toc158631624)

[3.4.1. California Educators as Content Experts 29](#_Toc158631625)

[3.4.2. Composition of Item Review Panels 30](#_Toc158631626)

[3.4.3. Meeting for Review of CAA for Science Items 31](#_Toc158631627)

[3.5. Data Review Meeting 32](#_Toc158631628)

[References 34](#_Toc158631629)

[Chapter 4: Test Assembly 35](#_Toc158631630)

[4.1. Overview 35](#_Toc158631631)

[4.2. Test Blueprint and Other Content Specifications 35](#_Toc158631632)

[4.2.1. Test Blueprint 35](#_Toc158631633)

[4.2.2. Other Content Specifications 35](#_Toc158631634)

[4.3. Test Design 36](#_Toc158631635)

[4.4. Test Production Process 36](#_Toc158631636)

[4.4.1. Identification of Eligible Items 36](#_Toc158631637)

[4.4.2. Selection of Items 36](#_Toc158631638)

[4.4.3. Test Forms 37](#_Toc158631639)

[4.4.4. Psychometric Review 37](#_Toc158631640)

[4.4.5. Content Review of Forms 38](#_Toc158631641)

[4.4.6. California Department of Education Forms Review 39](#_Toc158631642)

[4.4.7. Configuration of the Test Delivery System 39](#_Toc158631643)

[4.4.8. Test Form Delivery 40](#_Toc158631644)

[4.5. Science Connector Coverage 40](#_Toc158631645)

[References 41](#_Toc158631646)

[Appendix 4.A: Five-Year Coverage Plan 42](#_Toc158631647)

[Appendix 4.B: Statistical Specifications for 2022–23 Assessment Development 46](#_Toc158631648)

[Statistical Properties of Individual Items 46](#_Toc158631649)

[Chapter 5: Test Administration 47](#_Toc158631650)

[5.1. Overview 47](#_Toc158631651)

[5.1.1. Student Test-Taking Requirements 47](#_Toc158631652)

[5.2. User Roles and Standardization 48](#_Toc158631653)

[5.2.1. Local Educational Agency CAASPP Coordinator 48](#_Toc158631654)

[5.2.2. CAASPP Test Site Coordinator 48](#_Toc158631655)

[5.2.3. Test Examiners 49](#_Toc158631656)

[5.2.4. Instructions for Test Administration 50](#_Toc158631657)

[5.2.5. Resources for Administration (Including Planning Guides) 51](#_Toc158631658)

[5.3. Local Educational Agency Training 52](#_Toc158631659)

[5.3.1. Synchronous and Asynchronous Training 52](#_Toc158631660)

[5.3.2. Videos and Guides 53](#_Toc158631661)

[5.3.3. Training for Proper Identification and Assignment of Designated Supports and Accommodations 53](#_Toc158631662)

[5.3.4. Feedback for Continuous Improvement Survey 54](#_Toc158631663)

[5.4. Administering the CAA for Science 55](#_Toc158631664)

[5.4.1. Orienting Activities 55](#_Toc158631665)

[5.4.2. Embedded Performance Tasks 55](#_Toc158631666)

[5.4.3. Test Examiner Survey 55](#_Toc158631667)

[5.5. Accessibility Resources 55](#_Toc158631668)

[5.5.1. Individualization 56](#_Toc158631669)

[5.5.2. Accessibility Resource Categories 60](#_Toc158631670)

[5.5.3. Identification and Selection 63](#_Toc158631671)

[5.5.4. Assignment 63](#_Toc158631672)

[5.5.5. Delivery 64](#_Toc158631673)

[5.5.6. Usage of Designated Supports and Accommodations 64](#_Toc158631674)

[5.6. Practice and Training Tests 70](#_Toc158631675)

[5.7. Test Security and Confidentiality 70](#_Toc158631676)

[5.7.1. ETS’ Office of Testing Integrity 71](#_Toc158631677)

[5.7.2. Procedures to Maintain Standardization of Test Security 71](#_Toc158631678)

[5.7.3. Test Security Monitoring 72](#_Toc158631679)

[5.7.4. Security of Electronic Files Using a Firewall 73](#_Toc158631680)

[5.7.5. Transfer of Scores via Secure Data Exchange 73](#_Toc158631681)

[5.7.6. Data Management in the Secure Database 73](#_Toc158631682)

[5.7.7. Statistical Analysis on Secure Servers 74](#_Toc158631683)

[5.7.8. Student Confidentiality 74](#_Toc158631684)

[5.7.9. Student Test Results 74](#_Toc158631685)

[5.7.10. Security and Test Administration Incident Reporting System Process 75](#_Toc158631686)

[5.7.11. Appeals 77](#_Toc158631687)

[5.8. Processing and Scoring 78](#_Toc158631688)

[References 79](#_Toc158631689)

[Appendix 5.A: Accessibility Resource Assignment 81](#_Toc158631690)

[Chapter 6: Standard Setting 91](#_Toc158631691)

[6.1. Background 91](#_Toc158631692)

[Reference 92](#_Toc158631693)

[Chapter 7: Scoring and Reporting 93](#_Toc158631694)

[7.1. Student Test Scores 93](#_Toc158631695)

[7.1.1. Scoring of Incomplete Cases 93](#_Toc158631696)

[7.1.2. Theta Scores 95](#_Toc158631697)

[7.1.3. Scale Scores for the Total Assessment 95](#_Toc158631698)

[7.1.4. Achievement Levels 96](#_Toc158631699)

[7.2. Overview of Score Aggregation Procedures 97](#_Toc158631700)

[7.2.1. Student Score Distributions and Summary Statistics 97](#_Toc158631701)

[7.2.2. Demographic Student Group Summaries 99](#_Toc158631702)

[7.3. Reports Produced and Scores for Each Report 101](#_Toc158631703)

[7.3.1. Online Reporting 101](#_Toc158631704)

[7.3.2. Special Cases 102](#_Toc158631705)

[7.3.3. Types of Score Reports 102](#_Toc158631706)

[7.3.4. Score Report Applications 103](#_Toc158631707)

[7.3.5. Criteria for Interpreting Test Scores 104](#_Toc158631708)

[7.3.6. Criteria for Interpreting Score Reports 104](#_Toc158631709)

[References 105](#_Toc158631710)

[Appendix 7.A: Distribution of Raw Scores—Total Score for Each Embedded Performance Task 106](#_Toc158631711)

[Appendix 7.B: Theta Scores (Estimated Ability Values) of Students Taking Each Assessment 160](#_Toc158631712)

[Appendix 7.C: Raw Score and Scale Score Distributions 161](#_Toc158631713)

[Appendix 7.D: Scale Scores of Assessments 186](#_Toc158631714)

[Appendix 7.E: Demographic Student Group Summaries 193](#_Toc158631715)

[Chapter 8: Psychometric Analyses 206](#_Toc158631716)

[8.1. Overview 206](#_Toc158631717)

[8.1.1. Summary of the Analyses 206](#_Toc158631718)

[8.1.2. Samples Used for the Analyses 206](#_Toc158631719)

[8.1.3. Test-Taking Rates 208](#_Toc158631720)

[8.2. Classical Item Analyses 209](#_Toc158631721)

[8.2.1. Classical Item Difficulty Indices (*p*-value and Average Item Score) 209](#_Toc158631722)

[8.2.2. Item-Total Correlation 210](#_Toc158631723)

[8.2.3. Distribution of Item Scores 211](#_Toc158631724)

[8.2.4. Omit Rates 211](#_Toc158631725)

[8.2.5. Completion Rates 211](#_Toc158631726)

[8.2.6. Distractor Analyses 211](#_Toc158631727)

[8.2.7. Summary of Classical Item Analyses Flagging Criteria 212](#_Toc158631728)

[8.2.8. Classical Item Analyses Results 212](#_Toc158631729)

[8.3. Differential Item Functioning Analyses 216](#_Toc158631730)

[8.3.1. Differential Item Functioning Procedure for Dichotomous Items 216](#_Toc158631731)

[8.3.2. Differential Item Functioning Procedure for Polytomous Items 217](#_Toc158631732)

[8.3.3. Classification 218](#_Toc158631733)

[8.3.4. Differential Item Functioning Analysis Results 220](#_Toc158631734)

[8.4. Item Response Theory Analyses 220](#_Toc158631735)

[8.4.1. Item Response Theory Model 220](#_Toc158631736)

[8.4.2. Data Preparation 221](#_Toc158631737)

[8.4.3. Equating 221](#_Toc158631738)

[8.4.4. Calibration and Linking for the Field Test Items 225](#_Toc158631739)

[8.4.5. Parameter Estimates 225](#_Toc158631740)

[8.4.6. Scaling the Scores 228](#_Toc158631741)

[8.5. Response Time Analyses 230](#_Toc158631742)

[8.6. Reliability Analyses 233](#_Toc158631743)

[8.6.1. Sample for Reliability Analyses 233](#_Toc158631744)

[8.6.2. Reliability Measures 234](#_Toc158631745)

[8.6.3. Standard Error of Measurement 234](#_Toc158631746)

[8.6.4. Reliability and Standard Error of Measurement Results 235](#_Toc158631747)

[8.6.5. Conditional Standard Errors of Measurement 238](#_Toc158631748)

[8.6.6. Decision Classification Analyses 241](#_Toc158631749)

[8.7. Validity Evidence 242](#_Toc158631750)

[8.7.1. Design of the CAA for Science 243](#_Toc158631751)

[8.7.2. Content 244](#_Toc158631752)

[8.7.3. Response Processes 244](#_Toc158631753)

[8.7.4. Internal Structure 245](#_Toc158631754)

[8.7.5. Relations to Other Variables 246](#_Toc158631755)

[References 247](#_Toc158631756)

[Accessibility Information 250](#_Toc158631757)

[Alternative Text for Equation 8.1 250](#_Toc158631758)

[Alternative Text for Equation 8.2 250](#_Toc158631759)

[Alternative Text for Equation 8.3 250](#_Toc158631760)

[Alternative Text for Equation 8.4 250](#_Toc158631761)

[Alternative Text for Equation 8.5 250](#_Toc158631762)

[Alternative Text for Equation 8.6 250](#_Toc158631763)

[Alternative Text for Equation 8.7 250](#_Toc158631764)

[Alternative Text for Equation 8.8 250](#_Toc158631765)

[Alternative Text for Equation 8.9 251](#_Toc158631766)

[Alternative Text for Equation 8.10 251](#_Toc158631767)

[Alternative Text for Equation 8.11 251](#_Toc158631768)

[Alternative Text for Equation 8.12 251](#_Toc158631769)

[Alternative Text for Equation 8.13 251](#_Toc158631770)

[Alternative Text for Equation 8.14 251](#_Toc158631771)

[Alternative Text for Equation 8.15 251](#_Toc158631772)

[Alternative Text for Equation 8.16 251](#_Toc158631773)

[Alternative Text for Equation 8.17 251](#_Toc158631774)

[Alternative Text for Equation 8.18 251](#_Toc158631775)

[Alternative Text for Equation 8.19 252](#_Toc158631776)

[Alternative Text for Equation 8.20 252](#_Toc158631777)

[Appendix 8.A: Test-Taking Rates 253](#_Toc158631778)

[Appendix 8.B: Classical Item Analyses 259](#_Toc158631779)

[Appendix 8.C: Omission and Completion Rates 281](#_Toc158631780)

[Appendix 8.D: Differential Item Functioning Analyses 294](#_Toc158631781)

[Appendix 8.E: Item Response Theory Analyses Results 297](#_Toc158631782)

[Grade Five Graph and Table 297](#_Toc158631783)

[Grade Eight Graph and Table 299](#_Toc158631784)

[High School Graph and Table 301](#_Toc158631785)

[Appendix 8.F: Response Time Analyses 323](#_Toc158631786)

[Appendix 8.G: Reliability Analyses 328](#_Toc158631787)

[Test Information Function for Grade Five 358](#_Toc158631788)

[Test Information Function for Grade Eight 362](#_Toc158631789)

[Test Information Function for High School 366](#_Toc158631790)

[Appendix 8.H: Validity Analyses 372](#_Toc158631791)

[Chapter 9: Quality-Control Procedures 385](#_Toc158631792)

[9.1. Quality Control of Item Development 385](#_Toc158631793)

[9.2. Quality Control of Test Assembly and Delivery 385](#_Toc158631794)

[9.2.1. Quality Control of Test Assignment 386](#_Toc158631795)

[9.3. Quality Control of Test Materials 387](#_Toc158631796)

[9.3.1. Test Administration Manuals 387](#_Toc158631797)

[9.3.2. Collecting Test Materials for Computer-based Assessments 387](#_Toc158631798)

[9.3.3. Processing Test Materials for Computer-based Assessments 387](#_Toc158631799)

[9.4. Quality Control of Test Administration 387](#_Toc158631800)

[9.5. Quality Control of Scoring 388](#_Toc158631801)

[9.5.1. Machine-Scoring Procedures 388](#_Toc158631802)

[9.5.2. Development of Scoring Specifications 388](#_Toc158631803)

[9.6. Quality Control of Psychometric Processes 389](#_Toc158631804)

[9.6.1. Scoring Verification 389](#_Toc158631805)

[9.6.2. Psychometric Analyses 389](#_Toc158631806)

[9.7. Quality Control of Reporting 390](#_Toc158631807)

[9.7.1. Exclusion of Student Scores from Summary Reports 391](#_Toc158631808)

[9.8. Quality Control of End-to-End Testing 391](#_Toc158631809)

[9.8.1. Computer-based Assessments 391](#_Toc158631810)

[References 392](#_Toc158631811)

[Chapter 10: Test Examiner Survey 393](#_Toc158631812)

[10.1. Test Examiner Survey Design and Development 393](#_Toc158631813)

[10.1.1. Test Examiner Survey on the Test Administration 393](#_Toc158631814)

[10.2. Test Examiner Survey Results for Students Who Were Responsive 395](#_Toc158631815)

[10.3. Test Examiner Survey Results for Students Who Were Nonresponsive 396](#_Toc158631816)

[Appendix 10.A: Distribution of Test Examiner Survey Responses for Students Who Were Responsive 397](#_Toc158631817)

[Appendix 10.B: Distribution of Test Examiner Survey Responses for Students Who Were Nonresponsive 409](#_Toc158631818)

[Chapter 11: Continuous and Systematic Improvement 429](#_Toc158631819)

[11.1. 2022–23 Feedback for Continuous Improvement Survey 429](#_Toc158631820)

[11.1.1. Recommendations for Improvement 429](#_Toc158631821)

[11.2. ETS Administration and Delivery 430](#_Toc158631822)

[11.2.1. Scripts for Orienting Activities 430](#_Toc158631823)

[11.3. Research-based Operational Work 430](#_Toc158631824)

[11.4. Student Score Reports Redesign 430](#_Toc158631825)

[11.5. Test Delivery 431](#_Toc158631826)

[11.5.1. Changes to the Test Administrator Interface 431](#_Toc158631827)

[11.5.2. Changes to Ending the Assessment in the Test Delivery System 431](#_Toc158631828)

[11.6. Accessibility Resources 431](#_Toc158631829)

[Reference 432](#_Toc158631830)

List of Tables

[Acronyms and Initialisms Used in the *California Alternate Assessment for Science Technical Report* xv](#_Toc158631831)

[Table 1.1 Terminology Associated with the CAA for Science Content Standards 3](#_Toc158631832)

[Table 3.1 Number of Items and Points for Each Embedded PT 24](#_Toc158631833)

[Table 3.2 CAA Item Types 24](#_Toc158631834)

[Table 3.3 Number of Item Reviewers with Each Qualification 30](#_Toc158631835)

[Table 3.4 Item Data Review Results 33](#_Toc158631836)

[Table 4.1 Number of Science Connectors for the 2022–23 CAA for Science Forms 37](#_Toc158631837)

[Table 4.2 Number of Forms and Items Reviewed Psychometrically 38](#_Toc158631838)

[Table 4.3 Science Connectors Assessed on the CAA for Science—All Grade Levels 40](#_Toc158631839)

[Table 4.A.1 Five-Year Coverage Plan—Grade Five 42](#_Toc158631840)

[Table 4.A.2 Five-Year Coverage Plan—Grade Eight 44](#_Toc158631841)

[Table 4.A.3 Five-Year Coverage Plan—High School 45](#_Toc158631842)

[Table 5.1 Individualizations—Grade Five 57](#_Toc158631843)

[Table 5.2 Individualizations—Grade Eight 58](#_Toc158631844)

[Table 5.3 Individualizations—High School 59](#_Toc158631845)

[Table 5.4 Summary of Accommodations and Designated Supports Used by Students 66](#_Toc158631846)

[Table 5.5 Types of Appeals 76](#_Toc158631847)

[Table 5.6 Number of Appeals Requested in STAIRS in the 2022–23 Administration 77](#_Toc158631848)

[Table 5.7 Number and Types of Incidents Submitted in STAIRS in the 2022–23 Administration 78](#_Toc158631849)

[Table 5.A.1 Accessibility Resource Assignment—Grades Five and Eight for Earth and Space Sciences 81](#_Toc158631850)

[Table 5.A.2 Accessibility Resource Assignment—Grades Five and Eight for Life   
Sciences 83](#_Toc158631851)

[Table 5.A.3 Accessibility Resource Assignment—Grades Five and Eight for Physical Sciences 84](#_Toc158631852)

[Table 5.A.4 Accessibility Resource Assignment—High School for Earth and Space   
Sciences 85](#_Toc158631853)

[Table 5.A.5 Accessibility Resource Assignment—High School for Life Sciences 87](#_Toc158631854)

[Table 5.A.6 Accessibility Resource Assignment—High School for Physical Sciences 89](#_Toc158631855)

[Table 7.1 Rules for Incomplete Assessments 94](#_Toc158631856)

[Table 7.2 Scale Score Ranges for Achievement Levels 97](#_Toc158631857)

[Table 7.3 Mean and SD of Theta Scores and Scale Scores 97](#_Toc158631858)

[Table 7.4 Number and Percentage of Students Classified by Achievement Level 98](#_Toc158631859)

[Table 7.5 Demographic Student Groups to Be Reported 100](#_Toc158631860)

[Table 7.A.1 Distribution of Total Score and PT Scores—Grade Five, Form One 106](#_Toc158631861)

[Table 7.A.2 Distribution of Total Score and PT Scores—Grade Five, Form Two 108](#_Toc158631862)

[Table 7.A.3 Distribution of Total Score and PT Scores—Grade Five, Form Three 110](#_Toc158631863)

[Table 7.A.4 Distribution of Total Score and PT Scores—Grade Five, Form Four 112](#_Toc158631864)

[Table 7.A.5 Distribution of Total Score and PT Scores—Grade Eight, Form One 114](#_Toc158631865)

[Table 7.A.6 Distribution of Total Score and PT Scores—Grade Eight, Form Two 116](#_Toc158631866)

[Table 7.A.7 Distribution of Total Score and PT Scores—Grade Eight, Form Three 118](#_Toc158631867)

[Table 7.A.8 Distribution of Total Score and PT Scores—Grade Eight, Form Four 120](#_Toc158631868)

[Table 7.A.9 Distribution of Total Score and PT Scores—Grade Ten, Form One 122](#_Toc158631869)

[Table 7.A.10 Distribution of Total Score and PT Scores—Grade Ten, Form Two 124](#_Toc158631870)

[Table 7.A.11 Distribution of Total Score and PT Scores—Grade Ten, Form Three 126](#_Toc158631871)

[Table 7.A.12 Distribution of Total Score and PT Scores—Grade Ten, Form Four 128](#_Toc158631872)

[Table 7.A.13 Distribution of Total Score and PT Scores—Grade Eleven, Form One 130](#_Toc158631873)

[Table 7.A.14 Distribution of Total Score and PT Scores—Grade Eleven, Form Two 132](#_Toc158631874)

[Table 7.A.15 Distribution of Total Score and PT Scores—Grade Eleven, Form Three 134](#_Toc158631875)

[Table 7.A.16 Distribution of Total Score and PT Scores—Grade Eleven, Form Four 136](#_Toc158631876)

[Table 7.A.17 Distribution of Total Score and PT Scores—Grade Twelve, Form One 138](#_Toc158631877)

[Table 7.A.18 Distribution of Total Score and PT Scores—Grade Twelve, Form Two 140](#_Toc158631878)

[Table 7.A.19 Distribution of Total Score and PT Scores—Grade Twelve, Form Three 142](#_Toc158631879)

[Table 7.A.20 Distribution of Total Score and PT Scores—Grade Twelve, Form Four 144](#_Toc158631880)

[Table 7.A.21 Distribution of Total Score and PT Scores—High School, Form One 146](#_Toc158631881)

[Table 7.A.22 Distribution of Total Score and PT Scores—High School, Form Two 148](#_Toc158631882)

[Table 7.A.23 Distribution of Total Score and PT Scores—High School, Form Three 150](#_Toc158631883)

[Table 7.A.24 Distribution of Total Score and PT Scores—High School, Form Four 152](#_Toc158631884)

[Table 7.A.25 Raw Score Summary for Each Embedded PT—Grade Five 154](#_Toc158631885)

[Table 7.A.26 Raw Score Summary for Each Embedded PT—Grade Eight 155](#_Toc158631886)

[Table 7.A.27 Raw Score Summary for Each Embedded PT—Grade Ten 156](#_Toc158631887)

[Table 7.A.28 Raw Score Summary for Each Embedded PT—Grade Eleven 157](#_Toc158631888)

[Table 7.A.29 Raw Score Summary for Each Embedded PT—Grade Twelve 158](#_Toc158631889)

[Table 7.A.30 Raw Score Summary for Each Embedded PT—High School 159](#_Toc158631890)

[Table 7.B.1 Frequency Distribution of Theta for Overall Scores 160](#_Toc158631891)

[Table 7.C.1 Raw-Score-to-Scale-Score Distribution—Grade Five, Forms One and Two 162](#_Toc158631892)

[Table 7.C.2 Raw-Score-to-Scale-Score Distribution—Grade Five, Forms Three and   
Four 164](#_Toc158631893)

[Table 7.C.3 Raw-Score-to-Scale-Score Distribution—Grade Eight, Forms One and Two 166](#_Toc158631894)

[Table 7.C.4 Raw-Score-to-Scale-Score Distribution—Grade Eight, Forms Three and   
Four 168](#_Toc158631895)

[Table 7.C.5 Raw-Score-to-Scale-Score Distribution—Grade Ten, Forms One and Two 170](#_Toc158631896)

[Table 7.C.6 Raw-Score-to-Scale-Score Distribution—Grade Ten, Forms Three and   
Four 172](#_Toc158631897)

[Table 7.C.7 Raw-Score-to-Scale-Score Distribution—Grade Eleven, Forms One and   
Two 174](#_Toc158631898)

[Table 7.C.8 Raw-Score-to-Scale-Score Distribution—Grade Eleven, Forms Three and   
Four 176](#_Toc158631899)

[Table 7.C.9 Raw-Score-to-Scale-Score Distribution—Grade Twelve, Forms One and   
Two 178](#_Toc158631900)

[Table 7.C.10 Raw-Score-to-Scale-Score Distribution—Grade Twelve, Forms Three and   
Four 180](#_Toc158631901)

[Table 7.C.11 Raw-Score-to-Scale-Score Distribution—High School, Forms One and   
Two 182](#_Toc158631902)

[Table 7.C.12 Raw-Score-to-Scale-Score Distribution—High School, Forms Three and   
Four 184](#_Toc158631903)

[Table 7.D.1 Percentiles of Scale Scores 186](#_Toc158631904)

[Table 7.D.2 Frequency Distribution of Overall Scale Scores, Grade Five 187](#_Toc158631905)

[Table 7.D.3 Frequency Distribution of Overall Scale Scores, Grade Eight 188](#_Toc158631906)

[Table 7.D.4 Frequency Distribution of Overall Scale Scores, Grade Ten 189](#_Toc158631907)

[Table 7.D.5 Frequency Distribution of Overall Scale Scores, Grade Eleven 190](#_Toc158631908)

[Table 7.D.6 Frequency Distribution of Overall Scale Scores, Grade Twelve 191](#_Toc158631909)

[Table 7.D.7 Frequency Distribution of Overall Scale Scores, High School 192](#_Toc158631910)

[Table 7.E.1 Demographic Summary for Grade Five 193](#_Toc158631911)

[Table 7.E.2 Demographic Summary for Grade Eight 196](#_Toc158631912)

[Table 7.E.3 Demographic Summary for Grade Ten 198](#_Toc158631913)

[Table 7.E.4 Demographic Summary for Grade Eleven 200](#_Toc158631914)

[Table 7.E.5 Demographic Summary for Grade Twelve 202](#_Toc158631915)

[Table 7.E.6 Demographic Summary for High School 204](#_Toc158631916)

[Table 8.1 Analysis Data Sources 207](#_Toc158631917)

[Table 8.2 CAA for Science Test-Taking Rates—Registered Students 208](#_Toc158631918)

[Table 8.3 Item Difficulty Distributions 213](#_Toc158631919)

[Table 8.4 Item-Total Correlation Distributions 213](#_Toc158631920)

[Table 8.5 Classical Item Statistics for Each Form 214](#_Toc158631921)

[Table 8.6 DIF Categories for Dichotomous Items 218](#_Toc158631922)

[Table 8.7 DIF Categories for Polytomous Items 218](#_Toc158631923)

[Table 8.8 Student Groups for DIF Comparison 219](#_Toc158631924)

[Table 8.9 Final Linking Summary 225](#_Toc158631925)

[Table 8.10 Linked Item Parameter Results 226](#_Toc158631926)

[Table 8.11 Item Difficulty Parameter Distribution 226](#_Toc158631927)

[Table 8.12 Evaluation of Anchor Set Between Item Bank and 2022–‍23 228](#_Toc158631928)

[Table 8.13 Slopes and Intercepts That Convert Theta Scores to Scale Scores 230](#_Toc158631929)

[Table 8.14 Testing Time (in Minutes) for the Total Assessment 232](#_Toc158631930)

[Table 8.15 Summary Statistics for Scale Scores and Theta Scores, Reliability, and   
SEMs 236](#_Toc158631931)

[Table 8.16 Scale Score CSEM at Achievement-Level Threshold 240](#_Toc158631932)

[Table 8.17 Decision Accuracy for Reaching an Achievement Level 241](#_Toc158631933)

[Table 8.18 Decision Consistency for Reaching an Achievement Level 242](#_Toc158631934)

[Table 8.A.1 CAA for Science Test-Taking Rates by Student Group, Grade Five 253](#_Toc158631935)

[Table 8.A.2 CAA for Science Test-Taking Rates by Student Group, Grade Eight 255](#_Toc158631936)

[Table 8.A.3 CAA for Science Test-Taking Rates by Student Group, High School 257](#_Toc158631937)

[Table A.1 Item Use Value Descriptions 259](#_Toc158631938)

[Table A.2 Item Analyses Flag and Possible Value Descriptions 259](#_Toc158631939)

[Table 8.B.1 AIS and Polyserial for Grade Five 260](#_Toc158631940)

[Table 8.B.2 AIS and Polyserial for Grade Eight 264](#_Toc158631941)

[Table 8.B.3 AIS and Polyserial for High School 267](#_Toc158631942)

[Table 8.B.4 Distribution of Item Scores for Grade Five 270](#_Toc158631943)

[Table 8.B.5 Distribution of Item Scores for Grade Eight 273](#_Toc158631944)

[Table 8.B.6 Distribution of Item Scores for High School 276](#_Toc158631945)

[Table 8.B.7 Item Difficulty Distributions by Item Type 279](#_Toc158631946)

[Table 8.B.8 Item Difficulty Distributions by PT 279](#_Toc158631947)

[Table 8.B.9 Item-Total Correlation Distributions by Item Type 280](#_Toc158631948)

[Table 8.B.10 Item-Total Correlation Distributions by PT 280](#_Toc158631949)

[Table 8.C.1 Item Difficulties, Omit Rates, and No-Response Rates, Grade Five 281](#_Toc158631950)

[Table 8.C.2 Item Difficulties, Omit Rates, and No-Response Rates, Grade Eight 284](#_Toc158631951)

[Table 8.C.3 Item Difficulties, Omit Rates, and No-Response Rates, High School 287](#_Toc158631952)

[Table 8.C.4 Average Number of Item Omits by Grade Level and PT 290](#_Toc158631953)

[Table 8.C.5 Average Number of No Response Selections by Grade Level and PT 290](#_Toc158631954)

[Table 8.C.6 Total Number of Items Answered by Student Achievement Level 291](#_Toc158631955)

[Table 8.C.7 Percentage of Students in Each Grade Level or Grade Band Completing Embedded PTs 292](#_Toc158631956)

[Table 8.C.8 Completion Rates by Grade Level or Grade Band for Each Embedded PT 293](#_Toc158631957)

[Table 8.D.1 Number of Items by DIF Category for Grade Five 294](#_Toc158631958)

[Table 8.D.2 Number of Items by DIF Category for Grade Eight 295](#_Toc158631959)

[Table 8.D.3 Number of Items by DIF Category for High School 296](#_Toc158631960)

[Table 8.E.1 *b*-parameters from Item Bank and 2022–23 for the Equating Set of Grade   
Five 298](#_Toc158631961)

[Table 8.E.2 *b*-parameters from Item Bank and 2022–23 for the Equating Set of Grade   
Eight 300](#_Toc158631962)

[Table 8.E.3 *b*-parameters from Item Bank and 2022–23 for the Equating Set of High   
School 302](#_Toc158631963)

[Table 8.E.4 IRT Item Difficulty for Grade Five 303](#_Toc158631964)

[Table 8.E.5 IRT Item Difficulty for Grade Eight 306](#_Toc158631965)

[Table 8.E.6 IRT Item Difficulty for High School 309](#_Toc158631966)

[Table 8.E.7 IRT Item Difficulty Summary for Operational Items by Content Complexity 312](#_Toc158631967)

[Table 8.E.8 IRT Item Difficulty Summary for Field Test Items by Content Complexity 313](#_Toc158631968)

[Table 8.E.9 Distribution of IRT Item Difficulty by Content Complexity, Grade Five 314](#_Toc158631969)

[Table 8.E.10 Distribution of IRT Item Difficulty by Content Complexity, Grade Eight 315](#_Toc158631970)

[Table 8.E.11 Distribution of IRT Item Difficulty by Content Complexity, High School 316](#_Toc158631971)

[Table 8.E.12 Item Difficulty Parameter Distribution by Item Type for Grade Five 317](#_Toc158631972)

[Table 8.E.13 Item Difficulty Parameter Distribution by Item Type for Grade Eight 318](#_Toc158631973)

[Table 8.E.14 Item Difficulty Parameter Distribution by Item Type for High School 319](#_Toc158631974)

[Table 8.E.15 Item Difficulty Parameter Distribution by Content Domain for Grade Five 320](#_Toc158631975)

[Table 8.E.16 Item Difficulty Parameter Distribution by Content Domain for Grade Eight 321](#_Toc158631976)

[Table 8.E.17 Item Difficulty Parameter Distribution by Content Domain for High School 322](#_Toc158631977)

[Table 8.F.1 Testing Time (in Minutes) by PT 324](#_Toc158631978)

[Table 8.F.2 Testing Time (in Minutes) by Item Type 325](#_Toc158631979)

[Table 8.F.3 Total Testing Time (in Minutes) at Each Quartile Group 326](#_Toc158631980)

[Table 8.G.1 Reliabilities and SEMs by Demographic Student Group for Grade Five 328](#_Toc158631981)

[Table 8.G.2 Reliabilities and SEMs by Demographic Student Group for Grade Eight 331](#_Toc158631982)

[Table 8.G.3 Reliabilities and SEMs by Demographic Student Group for Grade Ten 334](#_Toc158631983)

[Table 8.G.4 Reliabilities and SEMs by Demographic Student Group for Grade Eleven 337](#_Toc158631984)

[Table 8.G.5 Reliabilities and SEMs by Demographic Student Group for Grade Twelve 340](#_Toc158631985)

[Table 8.G.6 Reliabilities and SEMs by Demographic Student Group for High School 343](#_Toc158631986)

[Table 8.G.7 Scale Score Conversion Tables with CSEMs, Grade Five Form One 346](#_Toc158631987)

[Table 8.G.8 Scale Score Conversion Tables with CSEMs, Grade Five Form Two 347](#_Toc158631988)

[Table 8.G.9 Scale Score Conversion Tables with CSEMs, Grade Five Form Three 348](#_Toc158631989)

[Table 8.G.10 Scale Score Conversion Tables with CSEMs, Grade Five Form Four 349](#_Toc158631990)

[Table 8.G.11 Scale Score Conversion Tables with CSEMs, Grade Eight Form One 350](#_Toc158631991)

[Table 8.G.12 Scale Score Conversion Tables with CSEMs, Grade Eight Form Two 351](#_Toc158631992)

[Table 8.G.13 Scale Score Conversion Tables with CSEMs, Grade Eight Form Three 352](#_Toc158631993)

[Table 8.G.14 Scale Score Conversion Tables with CSEMs, Grade Eight Form Four 353](#_Toc158631994)

[Table 8.G.15 Scale Score Conversion Tables with CSEMs, High School Form One 354](#_Toc158631995)

[Table 8.G.16 Scale Score Conversion Tables with CSEMs, High School Form Two 355](#_Toc158631996)

[Table 8.G.17 Scale Score Conversion Tables with CSEMs, High School Form Three 356](#_Toc158631997)

[Table 8.G.18 Scale Score Conversion Tables with CSEMs, High School Form Four 357](#_Toc158631998)

[Table 8.G.19 Theta TIF Data, Grade Five 359](#_Toc158631999)

[Table 8.G.20 Scale Score TIF Data, Grade Five 361](#_Toc158632000)

[Table 8.G.21 Theta TIF Data, Grade Eight 363](#_Toc158632001)

[Table 8.G.22 Scale Score TIF Data, Grade Eight 365](#_Toc158632002)

[Table 8.G.23 Theta TIF Data, High School 367](#_Toc158632003)

[Table 8.G.24 Scale Score TIF Data, High School 369](#_Toc158632004)

[Table 8.G.25 Decision Accuracy, Grade Five 370](#_Toc158632005)

[Table 8.G.26 Decision Accuracy, Grade Eight 370](#_Toc158632006)

[Table 8.G.27 Decision Accuracy, High School 370](#_Toc158632007)

[Table 8.G.28 Decision Consistency, Grade Five 370](#_Toc158632008)

[Table 8.G.29 Decision Consistency, Grade Eight 371](#_Toc158632009)

[Table 8.G.30 Decision Consistency, High School 371](#_Toc158632010)

[Table 8.H.1 Correlations Between CAA for Science and CAA for ELA Test Scores for All Students 372](#_Toc158632011)

[Table 8.H.2 Correlations Between CAA for Science and CAA for Mathematics Test Scores for All Students 372](#_Toc158632012)

[Table 8.H.3 Correlations Between CAA for Science and CAA for ELA Test Scores by   
Gender 372](#_Toc158632013)

[Table 8.H.4 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Gender 373](#_Toc158632014)

[Table 8.H.5 Correlations Between CAA for Science and CAA for ELA Test Scores by Primary Ethnicity 374](#_Toc158632015)

[Table 8.H.6 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Primary Ethnicity 375](#_Toc158632016)

[Table 8.H.7 Correlations Between CAA for Science and CAA for ELA Test Scores by English Language Fluency 376](#_Toc158632017)

[Table 8.H.8 Correlations Between CAA for Science and CAA for Mathematics Test Scores by English Language Fluency 377](#_Toc158632018)

[Table 8.H.9 Correlations Between CAA for Science and CAA for ELA Test Scores by Economic Status 378](#_Toc158632019)

[Table 8.H.10 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Economic Status 378](#_Toc158632020)

[Table 8.H.11 Correlations Between CAA for Science and CAA for ELA Test Scores by Migrant Status 379](#_Toc158632021)

[Table 8.H.12 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Migrant Status 379](#_Toc158632022)

[Table 8.H.13 Correlations Between CAA for Science and CAA for ELA Test Scores by Disability Group 380](#_Toc158632023)

[Table 8.H.14 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Disability Group 382](#_Toc158632024)

[Table 8.H.15 Correlations Between CAA for Science and CAA for ELA Test Scores by Foster Status 384](#_Toc158632025)

[Table 8.H.16 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Foster Status 384](#_Toc158632026)

[Table 10.1 Numbers and Percentages of Students Responsive and Nonresponsive by Embedded PT 393](#_Toc158632027)

[Table 10.A.1 “How engaged was the student with this performance task?”—Grade Five, Earth and Space Sciences Embedded PT 397](#_Toc158632028)

[Table 10.A.2 “How engaged was the student with this performance task?”—Grade Five, Life Sciences Embedded PT 398](#_Toc158632029)

[Table 10.A.3 “How engaged was the student with this performance task?”—Grade Five, Physical Sciences Embedded PT 399](#_Toc158632030)

[Table 10.A.4 “How engaged was the student with this performance task?”—Grade Eight, Earth and Space Sciences Embedded PT 400](#_Toc158632031)

[Table 10.A.5 “How engaged was the student with this performance task?”—Grade Eight, Life Sciences Embedded PT 401](#_Toc158632032)

[Table 10.A.6 “How engaged was the student with this performance task?”—Grade Eight, Physical Sciences Embedded PT 402](#_Toc158632033)

[Table 10.A.7 “How engaged was the student with this performance task?”—High School, Earth and Space Sciences Embedded PT 403](#_Toc158632034)

[Table 10.A.8 “How engaged was the student with this performance task?”—High School, Life Sciences Embedded PT 404](#_Toc158632035)

[Table 10.A.9 “How engaged was the student with this performance task?”—High School, Physical Sciences Embedded PT 405](#_Toc158632036)

[Table 10.A.10 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Five 406](#_Toc158632037)

[Table 10.A.11 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Eight 407](#_Toc158632038)

[Table 10.A.12 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—High School 408](#_Toc158632039)

[Table 10.B.1 “In your best judgment, which of the following statements best explains why your student did not provide any responses?”—Grade Five 409](#_Toc158632040)

[Table 10.B.2 “In your best judgment, which of the following statements best explains why your student did not provide any responses?”—Grade Eight 410](#_Toc158632041)

[Table 10.B.3 “In your best judgment, which of the following statements best explains why your student did not provide any responses?”—High School 411](#_Toc158632042)

[Table 10.B.4 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Five 412](#_Toc158632043)

[Table 10.B.5 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Eight 413](#_Toc158632044)

[Table 10.B.6 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—High School 414](#_Toc158632045)

[Table 10.B.7 “What method(s) did you use to elicit a response from your student?”—Grade Five, Earth and Space Sciences 415](#_Toc158632046)

[Table 10.B.8 “What method(s) did you use to elicit a response from your student?”—Grade Five, Life Sciences 415](#_Toc158632047)

[Table 10.B.9 “What method(s) did you use to elicit a response from your student?”—Grade Five, Physical Sciences 416](#_Toc158632048)

[Table 10.B.10 “What method(s) did you use to elicit a response from your student?”—Grade Eight, Earth and Space Sciences 416](#_Toc158632049)

[Table 10.B.11 “What method(s) did you use to elicit a response from your student?”—Grade Eight, Life Sciences 417](#_Toc158632050)

[Table 10.B.12 “What method(s) did you use to elicit a response from your student?”—Grade Eight, Physical Sciences 417](#_Toc158632051)

[Table 10.B.13 “What method(s) did you use to elicit a response from your student?”—High School, Earth and Space Sciences 418](#_Toc158632052)

[Table 10.B.14 “What method(s) did you use to elicit a response from your student?”—High School, Life Sciences 418](#_Toc158632053)

[Table 10.B.15 “What method(s) did you use to elicit a response from your student?”—High School, Physical Sciences 419](#_Toc158632054)

[Table 10.B.16 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Five, Earth and Space Sciences 420](#_Toc158632055)

[Table 10.B.17 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Five, Life   
Sciences 421](#_Toc158632056)

[Table 10.B.18 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Five, Physical Sciences 422](#_Toc158632057)

[Table 10.B.19 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Eight, Earth and Space Sciences 423](#_Toc158632058)

[Table 10.B.20 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Eight, Life   
Sciences 424](#_Toc158632059)

[Table 10.B.21 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Eight, Physical Sciences 425](#_Toc158632060)

[Table 10.B.22 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—High School, Earth and Space Sciences 426](#_Toc158632061)

[Table 10.B.23 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—High School, Life   
Sciences 427](#_Toc158632062)

[Table 10.B.24 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—High School, Physical Sciences 428](#_Toc158632063)

List of Figures

[Figure 7.1 Percentage of students at each achievement level for the CAA for Science 99](#_Toc158216740)

[Figure 8.E.1 *b*-parameters from item bank and 2022–23 for the equating set of grade   
five 297](#_Toc158216741)

[Figure 8.E.2 *b*-parameters from item bank and 2022–23 for the equating set of grade   
eight 299](#_Toc158216742)

[Figure 8.E.3 *b*-parameters from item bank and 2022–23 for the equating set of high   
school 301](#_Toc158216743)

[Figure 8.G.1 TIF by theta—grade five 358](#_Toc158216744)

[Figure 8.G.2 TIF by scale score—grade five 360](#_Toc158216745)

[Figure 8.G.3 TIF by theta—grade eight 362](#_Toc158216746)

[Figure 8.G.4 TIF by scale score—grade eight 364](#_Toc158216747)

[Figure 8.G.5 TIF by theta—high school 366](#_Toc158216748)

[Figure 8.G.6 TIF by scale score—high school 368](#_Toc158216749)

Acronyms and Initialisms Used in the *California Alternate Assessment for Science Technical Report*

|  |  |
| --- | --- |
| **Term** | **Definition** |
| 1PL-IRT | one-parameter logistic item response theory |
| ADEL | adult English learner |
| AERA | American Educational Research Association |
| AIS | average item score |
| ALTD | Assessment & Learning Technology Development |
| APA | American Psychological Association |
| CA NGSS | California Next Generation Science Standards |
| CAA | California Alternate Assessment |
| CAASPP | California Assessment of Student Performance and Progress |
| CAI | Cambium Assessment, Inc. |
| CALPADS | California Longitudinal Pupil Achievement Data System |
| CalTAC | California Technical Assistance Center |
| CARS | Crisis Alert Response System |
| CAST | California Science Test |
| *CCR* | *California Code of Regulations* |
| CDE | California Department of Education |
| CDS | county/district/school |
| CERS | California Educator Reporting System |
| CI | confidence interval |
| CORR | correlation |
| CSEM | conditional standard error of measurement |
| *DFA* | *Directions for Administration* |
| DIF | differential item functioning |
| DRM | data review meeting |
| *EC* | *Education Code* |
| EL | English learner |
| ELA | English language arts/literacy |
| ELPAC | English Language Proficiency Assessments for California |
| eSKM | Enterprise Score Key Management |
| EUs | essential understandings |
| FIA | final item analyses |
| FKSA | focal knowledge, skills, and abilities |
| GPCM | generalized partial credit model |
| HOSS | highest obtainable scale score |
| IBIS | Item Banking Information System |
| IDEA | Individuals with Disabilities Education Act |
| IEP | individualized education program |
| IFEP | initial fluent English proficient |
| IRM | item review meeting |
| IRT | item response theory |
| ISAAP | Individual Student Assessment Accessibility Profile |
| LEA | local educational agency |
| LOSS | lowest obtainable scale score |
| MC | multiple choice |
| MH | Mantel-Haenszel |
| MH-DIF | Mantel-Haenszel differential item functioning |
| NCME | National Council on Measurement in Education |
| OTI | Office of Testing Integrity |
| PAR | Psychometric Analysis & Research |
| PE | performance expectation |
| *PFA* | *Preparing for Administration* |
| PT | performance task |
| QA | quality assurance |
| RFEP | reclassified fluent English proficient |
| RSD | ratio of standard deviations |
| SBE | State Board of Education |
| SCOE | Sacramento County Office of Education |
| SD | standard deviation |
| SEM | standard error of measurement |
| SFTP | secure file transfer protocol |
| SMD | standardized mean difference |
| SR | selected response |
| SSID | Statewide Student Identifier |
| SSR | Student Score Report |
| STAIRS | Security and Test Administration Incident Reporting System |
| TCC | test characteristic curve |
| TDS | test delivery system |
| TEI | technology-enhanced items |
| TIF | test information function |
| TOMS | Test Operations Management System |
| UAT | user acceptance testing |
| UDL | Universal Design for Learning |
| *USC* | *United States Code* |

**This page is intentionally left blank.**

## Introduction

This chapter provides an overview of the California Alternate Assessment (CAA) for Science program, including background information, the purpose of the assessment, the intended population, and organizations and systems involved.

### Background

In October 2013, Assembly Bill 484 established the California Assessment of Student Performance and Progress (CAASPP) as the new student assessment system that replaced the Standardized Testing and Reporting program. The primary purpose of the CAASPP System of assessments is to assist teachers, administrators, and students and their parents/‌guardians, by promoting high-quality teaching and learning through the use of a variety of item types and assessment approaches. These assessments provide the foundation for the state’s school accountability system.

California adopted the California Next Generation Science Standards (CA NGSS) in September 2013. The CAA for Science is an assessment aligned with the Science Core Content Connectors (Science Connectors) derived from the CA NGSS. Its field test was administered during the 2018–19 CAASPP administration.

The CAA for Science is designed for students with the most significant cognitive disabilities and measures what students know and can do in science. The CAA for Science assesses students in grades five and eight and the high school grade band (i.e., grade ten, eleven, or twelve [if the student is not repeating grade twelve]) whose individualized education program (IEP) teams have determined that an alternate assessment is appropriate (California Department of Education [CDE], 2023a).

During the 2022–23 administration, the CAASPP System comprised the following assessments:

* Smarter Balanced assessments and tools
* Summative Assessments—Computer-based assessments for English language arts/literacy (ELA) and mathematics in grades three through eight and grade eleven
* Interim Assessments—Optional resources, developed for grades three through eight and grade eleven, designed to inform and promote teaching and learning by providing information that can be used to monitor student progress toward mastery of the Common Core State Standards and that may be administered to students at any grade level
* Tools for Teachers—Professional development materials and instructional resources designed to help teachers use formative assessment processes for improved teaching and learning in all grade levels
* California Science Test and tools
  + Summative Assessments—Computer-based assessments for science in grades five and eight and the high school grade band (i.e., grade ten, eleven, or twelve, if the student is not repeating grade twelve)
  + Tools for Teachers—Professional development materials and instructional resources designed to help teachers use formative assessment processes for improved teaching and learning in all grade levels
* CAAs for ELA and mathematics in grades three through eight and grade eleven for students with significant cognitive disabilities
* CAA for Science in grades five and eight and the high school grade band (i.e., grade ten, eleven, or twelve, if the student is not repeating grade twelve); for students with significant cognitive disabilities
* The California Spanish Assessment, optional for eligible students in grades three through eight and high school and designed to measure a student’s literacy in Spanish language arts inclusive of reading, writing mechanics, and listening, as well as to serve as a high school measure suitable to be used in part for the California Seal of Biliteracy

Note that this technical report focuses on the CAA for Science and not the CAAs for ELA and mathematics, which are described in a separate technical report. More background information about the CAASPP System can be found on the CAASPP Description – *CalEdFacts* web page on the CDE website.

### Purposes of the Assessment

The purposes of the CAA for Science are twofold:

1. To measure what eligible students know and can do based on the Science Connectors, which are linked with the CA NGSS across the three science domains (i.e., Earth and Space Sciences, Life Sciences, and Physical Sciences)
2. To help identify and address gaps in knowledge or skills early so students can receive the support they need (CDE, 2023a, 2023b)

The CAA for Science assesses the Science Connectors derived from the CA NGSS for the CAA-eligible student population. The Science Connectors provide learning goals that are aligned appropriately with the needs of students with the most significant cognitive disabilities and serve as the basis for the state’s CA NGSS alternate summative science assessments for eligible students.

### Test Content and Design

The California State Board of Education (SBE) approved the conceptual design for the CAA for Science in July 2016. This assessment follows an embedded performance task (PT) design, meaning that each embedded PT is expected to be administered shortly after content related to the Science Connectors has been taught. Test examiners administer four embedded PTs over the course of the school year, each composed of a set of test items measuring two Science Connectors from one of the three science domains (CDE, 2018). The embedded PTs are designed to be administered throughout the school year and not on one testing day or over consecutive days.

#### Assessment Model

In cases where implementation has been particularly successful, alternate assessments based on a collection of embedded PTshave been shown to leverage higher academic learning expectations for students taking an alternate assessment while promoting enhanced curricular and instructional supports for teachers (Gong & Marion, 2006).

The guiding principles adopted for the CAA for Science are that these assessments

* support and promote teachers’ implementation of the CA NGSS;
* embed summative assessment into instructional practice;
* offer a developmentally appropriate opportunity for students with the most significant cognitive disabilities to be assessed on their science knowledge, skills, and abilities; and
* provide meaningful information about academic performance to students, parents/‌guardians, teachers, and administrators.

The use of this model is reasonable and feasible, given the low number of students who take the CAA for Science.[[1]](#footnote-2)

#### Science Connectors

The assessment is aligned with the Science Connectors. The Science Connectors are the appropriate standards for the student population assigned to take the CAA for Science. The Science Connectors bridge the CA NGSS performance expectations (PEs) for the standard student population to the expectations developed to provide appropriate levels of challenge and rigor for students with the most significant cognitive disabilities. Table 1.1 provides descriptions of the terminology associated with the Science Connectors.

Table 1.1 Terminology Associated with the CAA for Science Content Standards

|  |  |
| --- | --- |
| **Terminology** | **Description** |
| PE | Incorporates a disciplinary core idea, a science and engineering practice, and a crosscutting concept into an assessable statement of what students should know and be able to accomplish regarding the three science domains (i.e., Earth and Space Sciences, Life Sciences, and Physical Sciences) and the Engineering, Technology, and Applications of Science |
| Science Connector | Builds a bridge to the content of a CA NGSS PE |
| Focal Knowledge, Skills, and Abilities (FKSA) | Describes what students should know and be able to do in terms of the Science Connector (FKSA1 up to FKSA6) |
| Essential Understanding | Defines a basic, foundational key idea or concept |

#### Test Components for the 2022–23 Administration

The 2022–23 CAA for Science involved three components:

1. Four embedded PTs (Refer to subsection [*5.4.2 Embedded Performance Tasks*](#_Embedded_Performance_Tasks) for a description of how these were administered.)
2. A brief test examiner survey to collect information about the student’s responsiveness to the embedded PT (Refer to [*Chapter 10: Test Examiner Survey*](#_Test_Examiner_Survey_2) for detailed information about survey development, content, and administration.)
3. Optional practice or training test content (Refer to section [*5.6 Practice and Training Tests*](#_Practice_and_Training) for additional information.)

##### Embedded Performance Tasks

The CAA for Science follows an assessment design known as curriculum-embedded PTs. The intent behind this assessment model is to have educators embed PTs as summative assessments following classroom instructional activities related to the Science Connectors. Each embedded PT is composed of two Connector sets that assess Science Connectors from one of the three science domains of Earth and Space Sciences, Life Sciences, and Physical Sciences.

For the 2022–23 CAASPP administration, students were tested for the CAA for Science with four grade level–specific embedded PTs for grade five, grade eight, and the high school grade band (i.e., grade ten, eleven, or twelve). Each embedded PT included *Directions for Administration (DFAs),* describing for test examiners how to administer the embedded PT items and hands-on activities. The embedded PT item types included selected-response, match, and grid items; these are described in subsection [*3.1.4 Item Format*](#_Item_Format).

The secure embedded PTs were delivered to students through the CAASPP test delivery system (TDS). The *DFAs* were delivered to local educational agencies (LEAs) as downloadable PDF documents within the secure Test Operations Management System (TOMS). Test examiners administered the embedded PTs in one-on-one sessions, with the answers recorded in the TDS.

##### Test Examiner Surveys

During the 2022–23 test administration year, test examiners were asked to respond to four short surveys. After each embedded PT was administered to the student, test examiners were presented with a routing question asking them if their student had been responsive during the testing session. Based on their response to the question, the test examiners were routed to the appropriate short survey to complete. The purpose of the survey was to collect basic information about students’ experiences with the assessment process to assist in future assessment development.

Refer to [chapter 10](#_Test_Examiner_Survey_2) for additional information about the test examiner survey design.

##### Practice and Training Tests

Practice tests for each individual grade level for all tested grade levels in all content domains were provided to LEAs to prepare students and LEA staff for the CAA for Science. A single training test that could be taken by students at all grade levels was also available. Students, teachers, and the public may access practice and training tests using a web browser.

These tests simulate the experience of the CAA for Science computer-based assessment and allow students and test examiners to become familiar with the user interface, item formats and functionality, available accessibility resources, and components of the TDS, as well as with the process of starting and completing a testing session. Practice and training tests align with Science Connectors but do not produce scores.

Refer to section [*5.6 Practice and Training Tests*](#_Practice_and_Training) for additional information.

### Intended Population

All eligible students enrolled in grades five, eight, and high school whose IEP indicated an alternate assessment were identified to take the CAA for Science (*California Code of Regulations*, Title 5 [5*CCR*]Education, Division 1, Chapter 2, Subchapter 3.75, Article 2, Section 851.5[c]).

For students identified for special education services, the decision to administer the CAST or the CAA for Science was made by their IEP team. Students whose parents/guardians submit a written request may opt out of taking the assessments (*Education Code [EC]* Section 60615). Additionally, students who were not tested because of a medical emergency were also exempt.

### Intended Use and Purpose of Test Scores

The results of assessments within the CAASPP System are used for two primary purposes as described in *EC* sections 60602.5(a) and (a)(4). (Excerpted from the *EC* Section 60602 web page.)

60602.5(a) It is the intent of the Legislature in enacting this chapter to provide a system of assessments of pupils that has the primary purposes of assisting teachers, administrators, and pupils and their parents; improving teaching and learning; and promoting high-quality teaching and learning using a variety of assessment approaches and item types. The assessments, where applicable and valid, will produce scores that can be aggregated and disaggregated for the purpose of holding schools and local educational agencies accountable for the achievement of all their pupils in learning the California academic content standards.

60602.5(a)(4) Provide information to pupils, parents and guardians, teachers, schools, and local educational agencies on a timely basis so that the information can be used to further the development of the pupil and to improve the educational program.

Therefore, the two primary purposes of an assessment within the CAASPP System are the following:

1. To communicate students’ progress in achieving the state’s academic standards to students, parents/guardians, and teachers
2. To inform decisions that teachers and administrators make about improving the educational program

Sections 60602.5(c) and (d) provide additional information regarding use and purpose of test scores for the system of assessments:

60602.5(c) It is the intent of the Legislature that parents, classroom teachers, other educators, pupil representatives, institutions of higher education, business community members, and the public be involved, in an active and ongoing basis, in the design and implementation of the statewide pupil assessment system and the development of assessment instruments.

60602.5(d) It is the intent of the Legislature, insofar as is practically feasible and following the completion of annual testing, that the content, test structure, and test items in the assessments that are part of the statewide pupil assessment system become open and transparent to teachers, parents, and pupils, to assist stakeholders in working together to demonstrate improvement in pupil academic achievement. A planned change in annual assessment content, format, or design should be made available to educators and the public well before the beginning of the school year in which the change will be implemented.

### Testing Window

Each year, the CAA for Science testing window opens for administration in September. The four embedded PTs are not designed to be given on one testing day or over consecutive testing days. For the 2022–23 CAASPP administration, the CAA for Science embedded PTs were available for administration on or after September 6, 2022, to the final day of the LEA’s instructional calendar or July 17, 2023, whichever came first (5 *CCR* Section 855[a][2]).

Like other CAASPP assessments, the CAA for Science embedded PTs were untimed for test takers. This assessment was administered individually, and testing time varied from one student to another, on the basis of factors such as the student’s response time and attention span. A student was administered each one of the CAA for Science embedded PTs over as many days as required to meet the student’s needs.

### Significant Developments for the CAA for Science 2022–23 Administration

#### Crisis Alert Response System Process

The Crisis Alert Response System (CARS) was introduced as an automatic process to notify a primary LEA CAASPP coordinator and superintendent when a student’s actions or response during testing caused concern. CARS incidents were tracked and maintained in TOMS.

#### *Preparing for Administration* Documents

ETS removed most of the nonsecure common front matter from all versions of grade-level *DFAs* and used it to create a *Preparing for Administration (PFA)* document, which was available for download on the CAASPP website, in TOMS, and on the Moodle Training Site. Test examiners were directed to use the *PFA* to prepare for test administration and the appropriate *DFA* with the remaining common front matter and item-level content during test administration.

#### Additional Student Score Report Language

Korean was a new language available for Student Score Reports in the 2022–23 CAA for Science administration in addition to the other languages (English, Filipino, Spanish, Traditional Chinese, and Vietnamese).

#### Accessibility Resources

The following accessibility resource–related update was made:

* The following additional options were added to the color contrast designated support:
* Yellow font on a black background
* Red font on a white background
* White font on a red background

### Groups and Organizations Involved with the CAA for Science

#### California State Board of Education

The SBE is the state agency that establishes educational policy for kindergarten through grade twelve in the areas of standards, instructional materials, assessment, and accountability. The SBE adopts textbooks for kindergarten through grade eight, adopts regulations to implement legislation, and has the authority to grant waivers of the *EC*.

In addition to adopting the rules and regulations for itself, its appointees, and California’s public schools, the SBE is also the state educational agency responsible for overseeing California’s compliance with programs that meet the requirements of the federal Every Student Succeeds Act as well as the state’s Public School Accountability Act that measures the academic performance and progress of schools on a variety of academic metrics (CDE, 2023d).

#### California Department of Education

The CDE oversees California’s public school system, which is responsible for the education of more than 5,800,000 children and young adults in more than 10,010 schools.[[2]](#footnote-3) California aims to provide a world-class education for all students, from early childhood to adulthood. The CDE serves the state by innovating and collaborating with educators, school staff, parents/guardians, and community partners which together, as a team, prepare students to live, work, and thrive in a highly connected world.

Within the CDE, it is the Instruction, Measurement, & Administration Branch that oversees programs promoting improved student achievement. Programs include oversight of statewide assessments and the collection and reporting of educational data (CDE, 2023c).

#### California Educators

A variety of California educators were selected because of their qualifications and experiences in teaching students with cognitive disabilities, demographics, and geographic locations were invited to participate in various aspects of the assessment process prior to the current administration. This included work related to defining the purpose and scope of the assessment, assessment design, item development, item reviews, standard setting, and score reporting.

#### Contractors

A number of organizations contribute to the success of the CAA for Science.

##### Primary Testing Contractor—ETS

The CDE and the SBE contract with ETS to develop, administer, and report the CAA for Science. As the primary testing contractor, ETS has overall responsibility for working with the CDE to implement and maintain an effective assessment system and coordinating ETS’ work with its subcontractors.

Activities conducted directly by ETS include, but are not limited to, the following:

* Providing management of the program activities
* Supporting and training county offices of education, LEAs, and direct funded charter schools
* Constructing, producing, and controlling the quality of CAA for Science test forms and related test materials, including grade- and content-specific *DFAs*
* Hosting and maintaining a website with resources for LEA CAASPP coordinators
* Developing, hosting, and providing support for TOMS
* Supporting the California Educator Reporting System (CERS)
* Processing student test assignments
* Processing orders and shipment of test materials
* Producing and distributing score reports electronically
* Developing a summary score reporting website that can be viewed by the public
* Completing all psychometric procedures
* Providing a tiered help desk support system for LEAs

##### Subcontractor—Cambium Assessment, Inc.

ETS also monitors and manages the work of Cambium Assessment, Inc. (CAI), subcontractor to ETS for the CAASPP System of computer-based assessments. Activities conducted by CAI include

* providing the CAI proprietary TDS, including the Student Testing Interface, Test Administrator Interface, secure browser, and practice and training tests;
* hosting and providing support for its TDS, a component of the overall CAASPP Assessment Delivery System;
* scoring machine-scorable items; and
* providing high-level technology help desk support to LEAs for technology issues directly related to the TDS.

##### Subcontractor—Sacramento County Office of Education

ETS contracted with the Sacramento County Office of Education to manage all activities associated with educator recruitment, training, and outreach, including the following:

* Supporting and training county offices of education, LEAs, and charter schools
* Developing informational materials
* Recruiting and providing logistics for educator meetings
* Producing *DFA*s

### Systems Overview and Functionality

#### Test Operations Management System

TOMS is the password-protected, web-based system used by LEAs to manage all aspects of CAASPP testing. TOMS serves various functions, including, but not limited to, the following:

* Managing test administration windows
* Assigning and managing CAASPP online user roles
* Managing student test assignments and accessibility resources
* Ordering test materials
* Viewing and downloading reports
* Reporting security incidents
* Providing a platform for authorized user access to secure materials, such as CAASPP *DFAs,* student data and results, CAASPP user information, and access to the CAASPP Security and Test Administration Incident Reporting System/Appeals process

TOMS receives student enrollment data and LEA and school hierarchy data from the California Longitudinal Pupil Achievement Data System (CALPADS) via daily feed. CALPADS is “a longitudinal data system used to maintain individual-level data including student demographics, course data, discipline, assessments, staff assignments, and other data for state and federal reporting.”[[3]](#footnote-4)

LEA staff involved in the administration of the CAASPP—such as LEA CAASPP coordinators, CAASPP test site coordinators, test administrators, and test examiners—are assigned varying levels of access to TOMS. For example, only an LEA CAASPP coordinator is given permission to assign and manage user roles; a test administrator or test examiner cannot download student reports. A description of user roles is explained more extensively in the *2022–23 CAASPP Online Test Administration Manual* (CDE, 2023a).

#### Test Delivery System

The TDS is the means by which the statewide computer-based assessments are delivered to students. Components of the TDS include

* the Test Administrator Interface, the web browser–based application that allows test examiners to activate student assessments and monitor student testing;
* the Student Testing Interface, on which students take the assessment using the secure browser; and
* the secure browser, the computer-based application through which the Student Testing Interface may be accessed. (The secure browser prevents students from accessing other applications during testing.)

#### Practice and Training Tests

All California testing programs have practice and training tests to inform educators, parents/‌guardians, and students about the individual assessments. The practice and training tests were provided to LEAs to prepare students and LEA staff for administration of the CAA for Science. These tests simulated the experience of the CAA for Science computer-based assessments. Unlike the summative assessments, the practice and training tests did not gauge student success on the operational assessment, or produce scores. Students, teachers, and the public could access them using a web browser, although accessing them through the secure browser permitted students to take the tests using the text-to-speech embedded accommodation and to test assistive technology.

The purpose of the training tests is to allow students and test examiners to quickly become familiar with the user interface and components of the TDS as well as with the process of starting and completing a testing session.

The purpose of the practice tests is to allow students and test examiners to experience a grade-level assessment, grade-specific items and difficulty levels, and the format and structure of an operational assessment.

A purpose of both the practice and training tests is to provide an opportunity for educators to assign embedded designated supports and accommodations and determine how they worked for their students prior to using the resources in an operational test setting.

#### California Educator Reporting System

CERS is the system used by LEAs to view preliminary student results from CAASPP testing. The primary purpose of CERS is to provide educators and administrators with access to timely assessment results for individual students and groups of students.

CERS allows educators to view their students’ test results at the individual student level and at the aggregated level using grouping and other features. For example, educators can create customized groups from assigned student groups based on demographic information or other characteristics of their choosing. The student results sent to CERS are appropriate for analysis of assessment results for use in informing instruction.

#### Test Results for California’s Assessments Website

The Test Results for California’s Assessments website is used by educators, families, researchers, and interested members of the public to view aggregated results from the CAA for Science. The primary purpose of the Test Results for California’s Assessments website is to provide users with access to results data for groups of students and to allow comparison of test result data for various student groups. Test scores for a given grade level are aggregated at the school, LEA or direct funded charter school, county, and state levels. The aggregated scores are generated for selected student groups of interest (e.g., gender, ethnicity, economic status, migrant status, and disability status) and for the total population.

### Overview of the Technical Report

This technical report addresses the characteristics of the CAA for Science administered from September 6, 2022, through July 17, 2023, and contains 10 additional chapters as follows:

* [Chapter 2](#_Overview_of_CAA) presents an overview of processes involved in the CAA for Science, including descriptions of item development, test administration, and psychometric analyses.
* [Chapter 3](#_Item_Development_and) discusses the detailed procedures of embedded PT development for the CAA for Science.
* [Chapter 4](#_Test_Assembly_1) describes the process of test assembly for the CAA for Science.
* [Chapter 5](#_Test_Administration_3) describes the details of administering the embedded PTs for the CAA for Science, as well as the procedures followed by ETS to ensure test security.
* [Chapter 6](#_Standard_Setting) presents a high-level overview of the standard setting procedures implemented for the CAA for Science.
* [Chapter 7](#_Scoring_and_Reporting_1) summarizes the scoring approaches and type of scores that are reported for the CAA for Science.
* [Chapter 8](#_Psychometric_Analyses_2) summarizes the statistical procedures conducted for a CAA for Science administration, including a description of classical item analyses, test completion rates and analyses, and differential item functioning analyses.
* [Chapter 9](#_Quality_Control_Procedures_2) discusses the various procedures used to ensure the quality of the CAA for Science.
* [Chapter 10](#_Test_Examiner_Survey_2) describes the development and administration of the test examiner survey questionnaires and the results of analyses conducted on their responses.
* [Chapter 11](#_Continuous_and_Systematic_1) discusses the various procedures used to gather information to improve the CAA for Science, as well as strategies to implement possible improvements.

### References

*California* *Code of Regulations,* Title 5, Education, Division 1, Chapter 2, Subchapter 3.75, Article 2, Section 851.5. (n.d.).

California Department of Education. (2018). *California Alternate Assessment for Science blueprint*. California Department of Education website.

California Department of Education. (2023a). *CAASPP online test administration manual.* Sacramento, CA: California Department of Education.

California Department of Education. (2023b). *California Alternate Assessment for Science*. California Department of Education website.

California Department of Education. (2023c, August). *Organization.* California Department of Education website.

California Department of Education. (2023d, October). *State Board of Education responsibilities.* California Department of Education website.

Gong, B., & Marion, S. (2006). Dealing with flexibility in assessments for students with significant cognitive disabilities. *Synthesis Report, 60*.

## Overview of CAA for Science Processes

This chapter provides an overview of the processes implemented by ETS during a typical, full testing cycle for the California Alternate Assessment (CAA) for Science, including item development, test design, test administration, and scoring. The details on each step in the process will be presented in the subsequent chapters.

### Item Development

As part of the adaptation and alignment process, ETS developed all embedded performance tasks (PTs) for the CAA for Science in accordance with the *ETS* *Standards for Quality and Fairness* (2014).

#### Selection of Science Core Content Connectors for Embedded Performance Task Development

ETS developed four embedded PTs for grade five, grade eight, and the high school grade band according to the blueprint (California Department of Education [CDE], 2018): three operational embedded PTs and one field test embedded PT. The California State Board of Education (SBE)–approved blueprint document identifies the California Next Generation Science Standards (CA NGSS)–aligned Science Core Content Connectors (Science Connectors) eligible to be assessed through embedded PTs. The blueprint was developed in consultation with the CDE. It consists of a Science Connector prioritization plan based on input from California educators and other internal and external experts on both the CA NGSS and alternate assessments. Each of the embedded PTs assesses two of these Science Connectors.

#### Embedded Performance Task Development

ETS developed each embedded PT with two Connector sets of items; each set assesses a particular Science Connector. A Connector set is a group of five items that assess a Science Connector, along with an orienting activity related to the same Science Connector. The concepts or topics that serve as the context for each item were reviewed to ensure that the content and presentation were accessible to, and developmentally appropriate for, students with the most significant cognitive disabilities.

A full review of the process to develop embedded PTs, including the number of items and the type of items, can be found in [chapter 3](#_Item_Development_and).

#### Item Format

The CAA for Science includes the following primary computer-based item formats:

* **Selected-response (SR) items—**Students are instructed to select one or more choices. Most CAA for Science items have two or three options; a few items have four options.
* **Technology-enhanced items (TEIs)—**Technology beyond simple option selection is incorporated in some items. These items can resemble simple classroom activities in which students might complete a diagram, create a model, categorize information, or make a selection from information in a chart.

Detailed information on item format is included in subsection [*3.1.4 Item Format*](#_Item_Format) in [*Chapter 3: Item Development and Review*](#_Item_Development_and).

SR items and TEIs are assigned either one or two points and are machine-scored.

#### Item Specifications

The CAA for Science item specifications provide descriptions of item characteristics that are intended to measure each content standard consistently. The item specifications were developed on the basis of the CA NGSS Clarification Statements and Science Connectors; the focal knowledge, skills, and abilities (FKSAs); and essential understandings (EUs). During item development, item developers were provided with CAA for Science item specifications and a CAA style guide that contained detailed information about the consistency in item development and item review processes. Refer to subsection [*3.1.2 Item Specifications*](#_Item_Specifications) for detailed information about item specifications.

### Test Assembly

The 2022–23 operational assessment was assembled in accordance with the CAA for Science blueprint, which was approved by the SBE in January 2018 (CDE, 2018). The CAA for Science is a linear form composed of three operational embedded PTs, each made up of two Connector sets that assess Science Connectors from one of the three science domains, which are Earth and Space Sciences, Life Sciences, and Physical Sciences.

The assembly began with a selection of approved anchor items from the item bank. Anchor items are a common set of items across the CAA for Science 2022–23 test forms that were used in previous test forms and have operational statistics. For the CAA for Science 2022–‍23 administration, anchor items were intended to first provide a link across the 2022–‍23 test forms, to help establish a common score scale for all of the test forms based on 2022–23 test administration data, and then to link that common score scale to the baseline scale that was established in the 2021–22 test administration.

For each embedded PT, a Connector set of five anchor items was paired with a Connector set of five operational field test items. After the initial assembly, assessment developers reviewed the assembled forms using comprehensive checklists to evaluate blueprint alignment, item content, clueing and content overlap, and overall balance of content regarding gender and ethnicity representation, variety of item types, and so forth.

After assessment developers assembled and reviewed the draft test forms, the forms were submitted for psychometric review and approval. Approved forms then received additional content and editorial reviews, including key checks and review of scoring files, before being submitted to the CDE for review and feedback. After responding to feedback from the CDE, forms received a final content review to ensure any requested revisions were implemented accurately before submittal to the CDE for approval.

#### Test Blueprint

The CAA for Science blueprint documents how test forms will be assembled. Similar to the California Science Test, the CAA for Science takes into account the three-dimensional interrelationships of the CA NGSS performance expectations (PEs) and the integration of the disciplinary core ideas, science and engineering practices, and crosscutting concepts. Where appropriate for the testing population, the CAA for Science measures Connectors with a multidimensional approach.

The test blueprint specifies the total number of items on each assessment and the number of items in each science domain according to standards (CDE, 2018). The standards upon which the CAA for Science test blueprint is built consist of the Science Connectors, FKSAs, and EUs, all derived from the CA NGSS. The blueprint for the CAA for Science was adopted by the SBE in January 2018.

The assessment includes three science domains (Earth and Space Sciences, Life Sciences, and Physical Sciences) and one engineering domain (Engineering, Technology, and Applications of Science). To meet the blueprint, each of the three science domains will constitute one-third of the assessment—items written to assess Connectors associated with Engineering, Technology, and Applications of Science will be assigned to one of the three science domains, depending on the context of their stimulus. California’s Environmental Principles and Concepts will also provide context for item development, as appropriate to the three science domains.

The CAA for Science uses an embedded PT design that permits test examiners to administer a set of test items measuring two Connectors from one of the three science domains. Each embedded PT contains 10 items and is administered shortly after instruction related to the PEs. Students are scored on three embedded PTs, one from each science domain.

Using Connectors, the embedded PTs of the CAA for Science assess student performance for six PEs each year. Although the CAA for Science blueprint is not intended to guide instruction, one of its goals is to sample Connectors broadly over time so instruction in a broad range of PEs will be true to the intentions of the CA NGSS and provide solid preparation for the CAA for Science.

#### Test Length

The number of items in the CAA for Science is the same across grade levels—there are 10 items of increasing complexity per embedded PT. For the 2022–23 operational assessment administration, each student was given three embedded PTs and one field test embedded PT.

Refer to [*Chapter 4: Test Assembly*](#_Test_Assembly_1) for more details on test form assembly.

### Test Administration

The CAA for Science was administered using the secure browser and test delivery system (TDS), ensuring a secure, confidential, standardized, consistent, and appropriate administration for students. Additional information about the administration of the CAA for Science can be found in [*Chapter 5: Test Administration*](#_Test_Administration_3).

#### Test Security and Confidentiality

All operational assessments within the California Assessment of Student Performance and Progress (CAASPP) System are secure. For the CAA for Science administration, every person having access to test materials maintained the security and confidentiality of the assessments. ETS’ internal Code of Ethics requires that all test information, including tangible materials (such as test items and test results), confidential files, processes, and activities were kept secure. To ensure security for all assessments that ETS develops or handles, ETS maintains an Office of Testing Integrity (OTI). A detailed description of the OTI and its mission is presented in subsection[*5.7.1 ETS’ Office of Testing Integrity*](#_ETS’_Office_of_1) in [*Chapter 5: Test Administration*](#_Test_Administration_3).

In the pursuit of enforcing secure practices, ETS strives to safeguard the various processes involved in an assessment development and administration cycle. Those processes are listed next. The practices related to each of the following security processes are discussed in detail in section [*5.7 Test Security and Confidentiality*](#_Test_Security_and):

* Procedures to maintain standardization of test security
* Test security monitoring
* Security of electronic files using a firewall
* Transfer of scores via secure data exchange
* Data management in the secure database
* Statistical analysis on secure servers
* Student confidentiality
* Student test results

#### Procedures to Maintain Standardization

ETS takes all necessary measures to ensure the standardization of administration of the CAA for Science.

The CAA for Science is administered in conjunction with the other assessments that compose the CAASPP System. ETS employs processes to ensure the standardization of an administration cycle; these processes are discussed in more detail in section [*5.2 User Roles and Standardization*](#_User_Roles_and).

Staff at LEAs involved in the CAASPP administration include LEA CAASPP coordinators, CAASPP test site coordinators, and test examiners. The responsibilities of each of the staff members are described in the *CAASPP Online Test Administration Manual* (CDE, 2023b).

Several series of instructions regarding the CAASPP administration are compiled in detailed manuals and provided to the LEA staff. Such documents include, but are not limited to, the following:

* ***CAASPP Online Test Administration Manual*—**This web-based manual provides test administration procedures and guidelines for LEA CAASPP coordinators and CAASPP test site coordinators, as well as the script and *Directions for Administration (DFA)* to be followed exactly by test administrators during a testing session (CDE, 2023b). (Refer to [*5.2.4.3 CAASPP Online Test Administration Manual*](#_CAASPP_Online_Test) in [chapter 5](#_Test_Administration_3) for more information.)
* ***CAASPP and English Language Proficiency Assessments for California (ELPAC) Test Operations Management System (TOMS) User Guide*—**This web-based manual provides instructions for TOMS, allowing LEA staff, including LEA CAASPP coordinators and CAASPP test site coordinators, to perform several tasks, including setting up test administrations, adding and managing users, assigning assessments, and configuring computer-based student test settings (CDE, 2023a). (Refer to [*5.2.4.4 CAASPP and ELPAC Test Operations Management System User Guide*](#_CAASPP_and_ELPAC_1) in [chapter 5](#_Test_Administration_3) for more information.)
* ***Preparing for Administration—***This document includes planning and preparation content to assist test examiners with test preparation (CDE, 2022a). (Refer to [*5.2.4.1 Preparing for Administration*](#_Preparing_for_Administration) in [chapter 5](#_Test_Administration_3) for more information.)
* ***DFA*s—**These directions include test examiner directions and scripts for administering the assessments. They contain grade-specific and form-specific information needed by the test examiners during test sessions. (Refer to [*5.2.4.2 Directions for Administration*](#_Directions_for_Administration) in [chapter 5](#_Test_Administration_3) for more information.)

### Fairness and Accessibility

Several procedures are in place to ensure that the CAA for Science is fair and accessible to all students. This section provides information on the available accessibility resources.

#### Overview

All eligible students enrolled in a California public school participate in the CAASPP System of assessments, including students with disabilities and English learner (EL) students. Additional resources are sometimes needed for these students. The CDE provides a full range of assessment resources for all students, including those who are EL students and students with disabilities.

#### Student Accessibility Resources

There are four different categories of student accessibility resources in the California assessment accessibility system, including universal tools, designated supports, accommodations, and unlisted resources that are permitted for use in CAASPP computer-based assessments. These are listed in the CDE California Assessment Accessibility Resources Matrix (Accessibility Matrix) (CDE, 2022b).

**Universal tools** are available to all students. These resources may be turned on and off when embedded as part of the technology platform for the computer-based CAASPP on the basis of student preference and selection.

**Designated supports** are available to all students when determined as needed by an educator or team of educators, with parent/guardian and student input as appropriate, or when specified in the student’s individualized education program (IEP) or Section 504 plan.

**Accommodations** must be permitted on the CAASPP for all eligible students when specified in the student’s IEP or Section 504 plan.

**Unlisted resources** are non-embedded and made available if specified in the eligible student’s IEP or Section 504 plan and do not jeopardize test security, and only on approval by the CDE. An unlisted resource may change the construct being measured.

While most of the resources presented for the CAASPP computer-based assessments are available for the CAA for Science, there are a few resources that are not applicable because the CAA for Science is designed to be given one-on-one in the student’s language of instruction, using the student’s identified instructional resources. For example, the speech-to-text accommodation is not available for an alternate assessment.

[Appendix 5.A](#_Appendix_5.A:_Accessibility) presents counts and percentages of students assigned designated supports, accommodations, and unlisted resources for the 2022–23 CAA for Science administration. The tables in [appendix 5.A](#_Appendix_5.A:_Accessibility_1) were created using student demographic data in version 2 of the production data file (“P2”) updated on September 11, 2023.

The majority of students did not use any designated supports, accommodations, or unlisted resources.

#### Individualization

The CAA for Science is designed to strike a careful balance between standardized administration and maximizing student engagement. To meet this goal, some parts of each embedded PT can be individualized to improve student engagement. The individualizations are described in subsection [*5.5.1 Individualization*](#_Individualization_3).

#### Description of Differential Item Functioning Analyses

Differential item functioning (DIF) analyses are conducted to detect possible test bias by locating items for which one group of students performs significantly better than another group. DIF is a collection of statistical methods used to recognize whether performance varies across different groups of students (e.g., male versus female or White versus Black or African American). If an item performed differentially across student groups, even when students were matched on ability, the item may be measuring something other than the intended construct. Therefore, it is important to identify items flagged for DIF. Content experts and bias and sensitivity experts from diverse backgrounds reviewed these DIF-flagged items to determine the potential sources and meanings of performance differences. Refer to section [*8.3 Differential Item Functioning Analyses*](#_Differential_Item_Functioning) for additional information about DIF.

### Scores

Individual student scores were reported for the 2022–23 CAA for Science administration. Student performance on the reporting scale was designated into one of the three achievement levels described in subsection [*7.1.4 Achievement Levels*](#_Achievement_Levels_1). For information regarding score specifications and score reports, refer to [*Chapter 7: Scoring and Reporting*](#_Scoring_and_Reporting_1).

#### Estimating Ability Scores

The item response theory (IRT) inverse test characteristic curve method (Stocking, 1996)—where the student’s ability value is estimated to be the value for which the expected number-correct score is equal to the student’s number-correct score—was used to estimate students’ overall ability parameters. For the purpose of reporting, students’ ability estimates (theta scores) were then expressed in three-digit scale scores by applying the appropriate linear transformation for each grade-level, content-area CAA for Science.

Student performance on the reporting scale was designated into one of three levels:

1. Limited Understanding (Level 1—Limited Understanding)
2. Foundational Understanding (Level 2—Foundational Understanding)
3. Understanding (Level 3—Understanding)

For information regarding score specifications and the establishment of score-reporting scales, refer to [*Chapter 7: Scoring and Reporting*](#_Scoring_and_Reporting_1)*.* For information regarding CAA for Science levels, refer to [*Chapter 6: Standard Setting*](#_Standard_Setting) for a description of the process used to set achievement-level standards.

#### Score Reporting

TOMS is a secure website hosted by ETS that permits LEA users to manage aspects of CAASPP test administration such as test assignment and the assignment of test settings. TOMS also provides a secure means for LEA CAASPP coordinators to download Student Score Reports as PDF files.

CAA for Science scores can also be viewed through the California Educator Reporting System (CERS), a secure website that provides authorized users with interactive and cumulative online reports for content area at the student, school, and LEA levels. CERS also provides individual score reports. Refer to subsection [*7.3.1 Online Reporting*](#_Online_Reporting) for details about TOMS and CERS and subsection [*7.3.3 Types of Score Reports*](#_Types_of_Score) for the content of each type of score report.

#### Aggregation Procedures

To provide meaningful results to interested educators, CAA for Science scores for a given grade-level—or in some cases, grade-band—assessment were aggregated at the school, LEA or direct funded charter school, county, and state levels. State-level results are available on the Test Results for California’s Assessments website. The aggregated scores were presented for all students or selected demographic student groups.

Aggregated scores were generated by combining student scores at the state, LEA or direct funded charter school, or school level; combining student scores for all students; or by combining student scores for students who represent selected demographic student groups.

The aggregation procedures used to present CAA for Science results are described in section [*7.2 Overview of Score Aggregation Procedures*](#_Overview_of_Score). Aggregated results by demographic variables are presented in [appendix 7.E](#_Appendix_7.E:_Demographic). In table 7.E.1 through table 7.E.6, students are grouped by demographic groups, including gender, ethnicity, English language fluency, special education service status, and economic status, as well as crosstab analysis for ethnicity and economic status. The tables show the numbers of students with valid scores in each group, scale score means and standard deviations, and the percentage of students in each achievement level. To protect student privacy, statistics are presented in the tables as “N/A” when the number of students in the sample is 10 or fewer. Definitions for the demographic student groups included in these tables are provided in table 7.5.

### Psychometric Analyses

Psychometric analyses were conducted on the data from the CAA for Science, including classical item analyses, DIF analyses, IRT calibration and linking, response time analyses, and reliability analyses. The results of these analyses support understanding of item performance and internal structure of the assessment and provide validity evidence for both response processes and scoring. Detailed descriptions of these analyses are presented in [*Chapter 8: Psychometric Analyses*](#_Psychometric_Analyses_1).

#### Description of the Classical Item Analyses

The psychometric analyses for the CAA for Science data included classical item analyses and DIF analyses to evaluate the performance of the operational items and the embedded field test items. The classical item analyses included the computation of item difficulty indices, the item-total correlation indices, the omission rate of each item, and the proportion of test takers obtaining each score point for polytomous items. CDE-approved flagging rules based on these statistics identified items that were not performing as expected. A description of the classical item analyses procedure is provided in section [*8.2 Classical Item Analyses*](#_Classical_Item_Analyses)*.* A description of the DIF analyses procedure is provided in section [*8.3 Differential Item Functioning Analyses*](#_Differential_Item_Functioning)*.*

#### Description of Item Response Theory Analyses

IRT is used to calibrate items, link item parameter estimates, scale or equate test scores across different forms or test administrations, evaluate item performance, build an item bank, and assemble test forms. Detailed information on the models and the procedures for the calibration and linking analyses are included in section [*8.4 Item Response Theory Analyses*](#_Item_Response_Theory).

### References

California Department of Education. (2018). *California Alternate Assessment for Science blueprint*. California Department of Education website.

California Department of Education. (2022a). *CAA for Science preparing for administration*. Sacramento, CA: California Department of Education.

California Department of Education. (2022b). *California assessment accessibility resources matrix*. California Department of Education website.

California Department of Education. (2023a). *CAASPP and ELPAC Test Operations Management System user guide*. Sacramento, CA: California Department of Education.

California Department of Education. (2023b). *CAASPP online test administration manual*. Sacramento, CA: California Department of Education.

Educational Testing Service. (2014). *ETS standards for quality and fairness*. Princeton, NJ: Educational Testing Service.

Stocking, M. L. (1996). An alternative method for scoring adaptive tests. *Journal of Educational and Behavioral Statistics, 21,* 365–89.

## Item Development and Review

This chapter discusses the detailed procedures of item development for the 2022–23 California Alternate Assessment (CAA) for Science administration.

### Guidelines

#### Overview

Each CAA for Science embedded performance task (PT) item was developed through a comprehensive cycle and designed to conform to ETS-defined principles of item writing. Each item in the CAA for Science item bank was developed to measure a specific Science Core Content Connector (Science Connector). The Science Connectors are based on the performance expectations (PEs) from the California Next Generation Science Standards (CA NGSS) and were designed to incorporate the science and engineering practices, disciplinary core ideas, and the crosscutting concepts that compose the CA NGSS. The Science Connectors are further broken down into more discrete focal knowledge, skills, and abilities (FKSAs) and, at the simplest level, the essential understandings (EUs).

In addition, guidelines for style, fairness, and bias and sensitivity helped item developers and reviewers ensure consistency across the item development process.

#### Item Specifications

The item specifications for prioritized Science Connectors describe the characteristics of the tasks to be developed to measure each Science Connector and provide detailed information to task writers who develop items for the CAA for Science. The specifications include the following:

* The full statement of the associated CA NGSS PE
* The full statement of the Science Connector
* The full content of each assessed FKSA of the Science Connector
* The full content of each assessed EU of the Science Connector
* How mastery of the EUs and FKSA(s) is demonstrated

Additionally, the application of universal design in assessment development involves establishing that assessments and testing environments are usable by all students to the greatest extent possible. To allow for the widest possible range of students taking the CAA for Science, ETS trains all item writers to follow the principles of universal design in their development and revision of test items. These principles include, but are not limited to,

* reducing wordiness;
* avoiding ambiguity;
* breaking up compound sentences;
* using active voice when possible;
* consistently applying concept names and graphic conventions;
* selecting developmentally appropriate text levels and terminology;
* avoiding complex sentence structures and sentences that begin with dependent clauses; and
* avoiding colloquialisms and words with double meanings, including language cognates.

Universal design principles also inform decisions about test layout and design, including such features as type size, line length, spacing, and graphics. These principles provide flexibility for the ways information is presented as well as for the ways students are engaged with, and respond to, that information. The goal is to reduce barriers in assessing *all* students.

#### Five-Year Plan

The CAA for Science blueprint requires that all the Science Connectors prioritized for assessment be assessed at least once during a five-year period (California Department of Education [CDE], 2018). To support the planning for this rotation, ETS and the CDE collaborated to create a five-year coverage plan. This plan contains a running record of the Science Connectors that have been assessed as well as a projection of the Science Connectors proposed for assessments in the coming years. The plan is reviewed and updated annually and is consulted during the planning for item development and forms construction. Refer to [appendix 4.A](#_Appendix_4.A:_Five-Year) for the five-year plan for the five test administrations, starting with the 2021–22 administration.

#### Item Format

Embedded PTs for the CAA for Science were designed to be engaging to the target population. Embedded PTs were developed with the understanding that a test examiner would deliver each task individually to each eligible student and assist the student in responding as appropriate during each portion of the embedded PT. Instructions and guidance for each embedded PT were contained within the embedded PT *Directions for Administration (DFAs)* that were available for download in the secure Test Operations Management System (TOMS) and the *Preparing for Administration* *(PFA)* document that was available for download in both the Moodle Training Site and TOMS.

The *PFA* and each embedded PT *DFA* contained background information and instructions for the test examiner. These instructions included

* guidelines on student engagement;
* guidance on the concept of individualization;
* the Student Response Decision Matrix;
* orienting activities and graphics for the orienting activities, if needed;
* the associated script for the computer-based test items; and
* a complete list of materials needed for the administration of this embedded PT and suggestions for individualization, if needed.

The CAA for Science included the following item formats in the computer-based test delivery system (TDS):

* **Selected response (SR)—**A student was instructed to select one or more options. Most CAA for Science items had two or three options; a few items had four options.
* **Match—**A student was instructed to select and place a picture on a specified part of a diagram or chart presented on the device’s screen.
* **Grid—**A student was instructed to place a check mark in a specified section in a table of responses presented on the device’s screen.

All SR, match, and grid items were scored by the TDS.

The number of items and points for each embedded PT is provided in table 3.1.

Table 3.1 Number of Items and Points for Each Embedded PT

|  |  |  |
| --- | --- | --- |
| **Description** | **Items** | **Points** |
| Each PT | 10 | 12 |
| Total Operational Items | 30 | 36 |

**Note:** The field test embedded PT does not count toward a student’s total raw score, the total number of operational items, or the maximum number of points.

#### Item Types

Each Science Connector, EU, or FKSA could be assessed through one or more of the available item types presented in table 3.2. Note that, in this table, an asterisk (\*) indicates technology-enhanced items.

Table 3.2 CAA Item Types

|  |  |  |
| --- | --- | --- |
| **Item Type** | **Response Type** | **Description** |
| Multiple choice (MC) single select | MC | The item generally consists of a stem and list of choices; the student can select only one choice to respond. This may also include a stimulus. |
| MC multiple select | MC | The item generally consists of a stem and list of choices; the student can select two or more choices to respond. This may also include a stimulus. |
| Grid single select\* | MC | The student responds by marking a single cell in a table grid. |
| Grid multiple select\* | MC | The student responds by marking two or more cells in a table grid. |
| Match single select\* | Drag & drop | The student responds by dragging and dropping a single choice (“source”) into the appropriate location (“target”).  There are four main varieties of this item type:   1. Target table—text-based sources with targets arranged in table structure 2. Target passage—text-based sources with targets arranged in paragraphs of text *(This variety is not used on the CAA for Science.)* 3. Target positions—text-based sources with targets arranged on top of an image 4. Image map—image-based sources with both sources and targets arranged on top of an image |
| Match multiple select\* | Drag & drop | The student responds by dragging and dropping two or more choices (“sources”) into the appropriate locations (“targets”).  There are four main varieties of this item type:   1. Target table—text-based sources with targets arranged in table structure 2. Target passage—text-based sources with targets arranged in paragraphs of text *(This variety is not used on the CAA for Science.)* 3. Target positions—text-based sources with targets arranged on top of an image 4. Image map—image-based sources with both sources and targets arranged on top of an image   These varieties allow for the following scenarios:   * Exact matching (i.e., ordering) * Sources correctly placed in multiple different targets * Reuse sources * Reuse targets * Partial scoring |
| Composite | Composite objective | Interactions vary depending on which item types were associated. Keys vary depending on which item types were associated. |

#### Item Banking

To support sophisticated testing designs, it was necessary to build an item bank where content and statistical attributes of each item were included. All the items in the item bank needed to be calibrated and linked onto common scales.

When enough students tested to support the psychometric analyses in a test administration, initial item analyses were implemented. The results were reviewed by ETS’ psychometric and Assessment & Learning Technology Development staff, who provided recommendations to the CDE on whether the items should be included or excluded from the calibrations. Decisions were made in consultation with the CDE; details of this process are in section[*8.2 Classical Item Analyses*](#_Classical_Item_Analyses).

Content experts from ETS and the CDE, as well as selected California educators, reviewed the associated item statistics and evaluated the performance of items during the annual data review meeting (DRM). They also reviewed the flagged items—those whose statistics fell beyond expected ranges—and worked to provide plausible explanations for these particular items based on their knowledge of the student population.

With the CDE’s approval, the items, together with their statistical information, were entered into the item bank for form assembly in future administrations. It is expected that more new items will be developed, field-tested, and entered into the item bank after future administrations.

#### Recruitment and Selection of Item Writers

Applications for embedded PT item writing were screened by senior ETS content staff. Only those applicants with strong science content or special education teaching backgrounds were approved for inclusion in the training program for item writing.

All item writers were recruited to meet the following qualifications:

* Possession of a bachelor’s degree in a science content area or in the field of education, with special focus on a particular science content area (An advanced degree in science or special education was desirable.)
* Experience teaching students with cognitive disabilities and, preferably, experience teaching science in grades five through twelve
* Previous experience or training in writing items for standards-based assessments, including knowledge of the many considerations that are important when developing items for special student populations
* Previous experience or training in writing items in the content areas covered by CAA for Science grade levels, content domains, or both
* Familiarity, understanding, and support of the Science Connectors, EUs, and FKSAs

#### Item Writer Training

Item writer training is a vital part of establishing the validity chain for item and task development. In addition to relying on internal item writing experts for the CAA for Science, ETS recruited and trained educators in the CA NGSS and Science Connectors.

The three primary goals for the training were to

1. provide teachers with knowledge, via professional development on writing items and *DFA* scripts, that they can use to help develop or refine their own classroom teaching and assessments;
2. ensure that teachers who successfully completed the training were ready to develop high-quality items for the CAA for Science; and
3. leverage the experiences, perspectives, and expertise of the teachers in writing items for the CAA for Science.

ETS held item writer training workshops to provide prospective item writers with professional development in several areas. A review of the general assessment development process gave trainees a sense of the total life cycle of an item.

Participants learned best practices in item writing to provide clarity within the item and avoid bias or sensitivity concerns, learned how to review a passage for item opportunities, and were introduced to how the new, innovative item types work.

Given that the trainees were California educators and educational leaders, ETS also emphasized incorporation of current effective teaching practices and instructional activities. Small-group and individual work generated sample items that the ETS facilitators then used in a large-group discussion to analyze and ascertain overall item quality. The ETS team also provided post hoc feedback via email and phone calls to trained item writers on further item samples and ideas submitted ahead of contractual item submissions.

### ETS Item Review Process

After items were drafted, ETS placed items and *DFA* scripts developed for the CAA for Science through an extensive internal item review process designed to provide the best standards-based assessments possible. This section summarizes the item review process that confirmed the quality of CAA for Science items.

#### Overview

Once an item was accepted for authoring, ETS employed a series of internal reviews. These reviews used established criteria to judge the quality of item content and to ensure that each item measured what it was intended to measure. These internal reviews also examined the overall quality of the items ahead of their being reviewed by the CDE and by educators at item review meetings (IRMs), which are described in more detail in section [*3.4 California Educator Review*](#_California_Educator_Review_1).

All items were entered into the Item Banking Information System (IBIS) with corresponding artwork and metadata. Within IBIS, items received content reviews by ETS’ assessment specialists and fairness and editorial reviews by ETS’ editors and fairness reviewers.

The CDE reviewed proposed changes to items in response to reviews by the participants of the IRMs to ensure the quality of the item pool. The CDE then gained access to CAA for Science items and conducted reviews in IBIS. ETS revised items in response to comments from the CDE prior to using them in the assessment forms.

The ETS review process for the CAA for Science includes the following; these tasks are described in the next subsections:

1. Content review
2. Accessibility review
3. Editorial review
4. Sensitivity and fairness review

Throughout this multistep item review process, the lead content-area assessment specialists and development team members at ETS continually evaluated the activities and items for adherence to the rules for item development.

#### ETS Content Review

On all items ETS developed, content-area assessment specialists conducted three reviews on items and stimuli. These assessment specialists verified thatthe items, *DFA* scripts, and stimuli were in compliance with ETS’ written guidelines for clarity, style, accuracy, and appropriateness for California students and were also in compliance with the approved item specifications, the *California Assessment of Student Performance and Progress (CAASPP) and English Language Proficiency Assessments for California (ELPAC) Item Review Acceptance Criteria* (ETS, 2019), and other ETS-produced procedures such as the ETS guidelines for fair tests and communications (2016). Assessment specialists reviewed each item in terms of the following characteristics:

* Relevance to the purpose of the assessment
* Match of each item to the item specifications, including the tier of item complexity
* Match of each item to the principles of quality item writing
* Match of each item to the identified standard or standards
* Difficulty of the item
* Accuracy of the content of the item
* Readability of the item or passage
* Grade-level and grade-band appropriateness of the item
* Appropriateness of any illustrations, graphs, or figures

Assessment specialists verified the classification of each item, both to evaluate the correctness of the classification and to confirm that the task posed by the item was relevant to the outcome it was intended to measure. The reviewers could accept the item and classification as written, suggest revisions, or recommend that the item be discarded. These steps occurred prior to the CDE’s review.

#### ETS Accessibility Review

The ETS Accessible Content & Inclusive Solutions team advised on accessibility of items and item types during the ETS content review. These experts on alternate test formats reviewed all items, with a focus on accessibility for all student populations, and provided potential refinement solutions to improve the accessibility in items and assessments.

#### ETS Editorial Review

After assessment specialists and researchers reviewed each item, a group of specially trained editors also reviewed each item in preparation for consideration by the CDE and the item review panelists. The editors checked items for clarity, correctness of language, appropriateness of language for the grade level or grade band assessed, adherence to the style guidelines, and conformity with accepted item-writing practices.

#### ETS Sensitivity and Fairness Review

ETS’ assessment specialists who were specially trained to identify and edit or eliminate items that contained content or wording that could be construed to be offensive to, or biased against, members of specific student groups (e.g., ethnicity, race, or gender) conducted the next level of review (ETS, 2014, 2016). These trained staff members reviewed every item before the CDE and IRMs. Newly developed items were then submitted to the CDE for review prior to educator reviews.

The review process promoted a general responsiveness to the following:

* Cultural diversity
* Diversity of background, cultural tradition, and viewpoints to be found in the test-taking populations
* Changing roles and attitudes toward various groups
* Role of language in setting and changing attitudes toward various groups
* Topics that may be unsettling or otherwise distract the student from the content being measured, such as natural disasters, disease, or family discord
* Contributions of diverse groups (including ethnic and minority groups, individuals with disabilities, and women) to the history and culture of the United States and the achievements of individuals within these groups
* Item accessibility for language learners of diverse backgrounds

### California Department of Education Review

After ETS reviews of items were completed, the items were reviewed by the CDE content teams. CDE content experts reviewed the items using the same criteria used in the ETS reviews. After CDE reviews occurred, ETS made edits to the items based on the CDE feedback, and the items were then finalized for IRMs with California educators.

### California Educator Review

IRMs with California educators were held at the end of the item review process as the final content expert review that items must undergo before being placed in an operational assessment.

#### California Educators as Content Experts

California educators filled an advisory role to the CDE and ETS and provided guidance on matters related to embedded PT item development for the CAA for Science.

These educators were responsible for reviewing all newly developed items for alignment with the Science Connectors. Meeting participants also reviewed the items for accuracy of content, clarity of phrasing, and quality, using the *CAASPP and ELPAC* *Item Review Acceptance Criteria* (ETS, 2019) for reference. In their examination of embedded PT items, participants could raise concerns about the appropriateness of the items as related to the grade level, age, and cognitive level of the test taker. Additionally, items were evaluated for any potential bias or sensitivity concerns associated with disability, gender, race, ethnicity, religion, or socioeconomic status. ETS recorded educator feedback for each item and adjusted item content based on approval from the CDE.

#### Composition of Item Review Panels

For the last IRM, which was held on February 8, 2023, the group of participating California educators consisted of current and former teachers (some of whom had taught students who comprised the identified population and others who were subject-matter experts in science), resource specialists, administrators, curriculum and content experts, and other education professionals. Minimum qualifications to be invited to participate were

* two or more years of teaching experience in kindergarten through grade twelve, and
* a bachelor’s or higher degree in a grade level or content area related to special education or science.

Preferred qualifications included

* experience teaching students with more than one type of disability, and
* two to five years of experience as a teacher or school administrator with a special education credential.

School administrators; local educational agency (LEA), county content, or program specialists; or university educators must have met the following qualifications to be invited to participate:

* Two or more years of experience as a school administrator; LEA, county content, or program specialist; or university instructor in a content-specific area
* Knowledge of, and experience with, the Science Connectors

Every effort was made to ensure that groups of item reviewers included a wide representation of gender, geographic regions, and ethnic groups in California. Efforts also were made to ensure representation by members with experience serving California’s diverse special education population.

Table 3.3 shows the educational qualifications, present occupation, and credentials of the individuals who participated in the previous CAA for Science IRM.

Table 3.3 Number of Item Reviewers with Each Qualification

|  |  |  |
| --- | --- | --- |
| **Qualification Type** | **Qualification** | **Number of Reviewers** |
| **N/A** | **Total number of reviewers** | **9** |
| **Occupation** | Special Education Teacher | 7 |
| **Occupation** | General Education/Classroom Teacher | 2 |
| **Highest Degree Earned** | Bachelor’s Degree | 1 |
| **Highest Degree Earned** | Master’s Degree | 7 |
| **Highest Degree Earned** | Doctoral Degree | 1 |
| **K–12 Teaching Credential** | Elementary Teaching (multiple subjects) | 2 |
| **K–12 Teaching Credential** | Secondary Teaching (single subject) | 3 |
| **K–12 Teaching Credential** | Educational Specialist/Special Education | 7 |
| **K–12 Teaching Credential** | English Learner (Crosscultural, Language and Academic Development; Bilingual, Crosscultural, Language and Academic Development) | 1 |
| **K–12 Teaching Credential** | Administrative Credential | 1 |
| **Location Type** | Urban | 3 |
| **Location Type** | Suburban | 6 |

**Note:** Numbers may not match the totals because members may have multiple occupations or teaching credentials or are currently working toward earning their highest degree. The information is self-reported and may not reflect all experience and earned credentials.

Item reviewers were selected through an application process after they were recruited through recommendations from IRM participants and at various science and education-related conferences. Applications were reviewed by ETS’ assessment directors, who confirmed that an applicant’s qualifications met the specified criteria. Applicants who met the criteria had their information forwarded to the CDE for further review and agreement before invitations to participate were distributed.

#### Meeting for Review of CAA for Science Items

ETS’ content-area assessment specialists facilitated the 2022–23 CAA for Science IRM. The meeting began with a brief training session on how to review and make recommendations for revising items. ETS provided training on the following topics:

* Overview of the purpose and scope of the CAA for Science
* Overview of the CAA for Science test design specifications and blueprint
* Analysis of the CAA for Science embedded PT item specifications
* Overview of criteria for evaluating test items
* Review and evaluation of items for bias and sensitivity issues

The criteria for evaluating items included the following:

* Overall technical quality
* Alignment with the Science Connectors
* Alignment with the construct being assessed by the Science Connector
* Complexity level
* Clarity
* Correctness of the answer
* Plausibility of the distractors
* Bias and sensitivity factors

Criteria also encompassed more global factors, including the quality of the alternative text to confirm that it describes an image in an age- and audience-appropriate manner within the context of the item. Meeting participants were also trained in how to make recommendations for revising items.

Guidelines for reviewing items were provided by ETS and approved by the CDE. The set of guidelines for reviewing items is summarized next:

* Does the item
* have one and only one clearly correct answer (for single-select items)?
* measure the content standard?
* match the item specifications?
* align with the construct being measured?
* test worthwhile concepts or information?
* Is the stimulus, if any, for the item
* required to answer the item?
* likely to be interesting to students?
* clearly and correctly labeled?
* providing all the information needed to answer the item?

### Data Review Meeting

The DRM conducted after the 2022–23 CAA for Science administration was held on June 27, 2023; the DRM reconciliation meeting was held on June 29, 2023. After the field test items were administered to students, ETS prepared the field test items containing statistical flags and the items’ associated statistics for review by the CDE and California educators. For the CAA for Science DRM, review materials included field test embedded PT items with their statistical data and statistical flags based on the respective test administration’s item analyses along with comment sheets for use by reviewers.

Educators who were part of the data review panel were assigned a training video in Upskill—a centralized, online location for training materials—to give them an overview of what is involved in a DRM as well as an understanding of the statistical measures used to review the field test items. This was followed by ETS’ conducting a training at the beginning of the meeting to highlight any new issues and to serve as a statistical refresher. Reviewers then made decisions about which field test items should be included in the item bank for future assembly. If a field test item was rejected and not to be included in the item bank, it could be revised, reintroduced to the item development process, field-tested once again, and put through another round of item analysis; or the field test item could be deactivated and removed from the item bank. ETS’ psychometric and content staff were available to reviewers throughout this process.

ETS’ content staff facilitated the meeting, confirming that all educators weighed in on each flagged field test item to verify whether there were any concerns, from a content perspective, as it pertained to the flag. ETS’ content staff and psychometricians provided training on the item statistics and responded to questions about the item statistics during the item discussion. The DRM participants reviewed the content and statistics of each field test item and then made a recommendation to accept or reject a field test item.

Content staff recorded each participant’s recommendations and comments regarding the flagged field test items. The feedback was referenced when working with the CDE to reconcile educator feedback and to make a final decision on whether to include the field test item in the operational pool.

Table 3.4 displays the item data review results of the field test items presented at the DRM. Most of the field test items did not have statistical flags and were not presented to the DRM panel. At least 50 percent of presented field test items were accepted as is for each grade level or the high school grade band.

Table 3.4 Item Data Review Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Accept As Is** | **Reject** | **Total Items** | **Rejection Rate** |
| Grade 5 | 5 | 4 | 9 | 44.44% |
| Grade 8 | 13 | 2 | 15 | 13.33% |
| High school | 9 | 2 | 11 | 18.18% |

### References

California Department of Education. (2018). *California Alternate Assessment for Science blueprint*. California Department of Education website.

Educational Testing Service. (2014). *ETS standards for quality and fairness*. Princeton, NJ: Educational Testing Service.

Educational Testing Service. (2016). *ETS guidelines for fair tests and communications*. Princeton, NJ: Educational Testing Service.

Educational Testing Service. (2019). *CAASPP and ELPAC item acceptance criteria* [Unpublished manuscript]. Princeton, NJ: Educational Testing Service.

## Test Assembly

This chapter discusses the detailed procedures of test assembly for the 2022–23 California Alternate Assessment (CAA) for Science administration.

### Overview

The 2022–23 CAA for Science operational assessment was administered as three operational embedded performance tasks (PTs) during the school year in grades five and eight and in the high school grade band (to students in grade ten, eleven, or twelve [if the student is not repeating grade twelve]). Each embedded PT within a grade level or the grade band assessed one of the three science domains (i.e., Earth and Space Sciences, Life Sciences, and Physical Sciences) and two Science Core Content Connectors (Science Connectors) from a domain.

### Test Blueprint and Other Content Specifications

The CAA for Science incorporates innovations and best practices from recent national alternate assessment initiatives, such as the Dynamic Learning Maps, and from the work done by the National Center and State Collaborative. All items and tasks were developed to assess the Science Connectors, which were developed by the National Center and State Collaborative, California educators, ETS, and EdCount. An essential understanding (EU) and focal knowledge, skills, and abilities (FKSAs) are identified for each Science Connector. EUs define a basic, foundational key idea or concept based on the Science Connector that builds increasing understanding of the grade-level content. FKSAs provide more specific detail about the requirements described by the Science Connectors.

#### Test Blueprint

The CAA for Science test blueprint is consistent across grade levels (California Department of Education [CDE], 2018). The blueprint designates the breakdown of each assessment, first by science domain and then by the Science Connectors. Information on a test blueprint for a given grade level and content area includes the

* specific ratio of each content domain on the overall assessment,
* specific Science Connectors to be assessed,
* number of items per cognitive complexity level, and
* number of items on an assessment.

The 2022–23 forms had 100 percent alignment with the test blueprint. Each of the three content domains were assessed by 10 items of increasing complexity for a total of 12 points.

#### Other Content Specifications

The CAA for Science assesses each Science Connector through the FKSAs and EUs derived from the Science Connectors. The Science Connectors are derived from the California Next Generation Science Standards performance expectations. Additionally, the Science Connectors focus on the core content, knowledge, and skills needed to help students at each grade level succeed; and identify priorities in science to guide the instruction for students in this population and for an alternate assessment. Finally, the Science Connectors provide a foundation that permits teachers, parents/guardians, and the students themselves to help students with significant cognitive disabilities identify and address gaps in knowledge or skills early so students can receive the support they need (CDE, 2021).

### Test Design

The CAA for Science is based on a linear design composed of three operational embedded PTs, each comprising two Connector sets that assess standards from one of the three science domains. The Connector sets also incorporate contexts aligned to the Engineering, Technology, and Applications of Science domain. There is an additional, fourth embedded PT, composed of field test items, that does not count toward the student’s total raw score.

A Connector set is a group of five items that assesses a Science Connector, along with an orienting activity related to the same Science Connector. Two Connector sets are paired to create an embedded PT that consists of 10 items and two orienting activities.

The four embedded PTs—three operational embedded PTs and one field test embedded PT—are intended to be administered throughout the school year, shortly after students received instruction in the Science Connectors assessed by the embedded PT. Thus, the embedded PTs can be administered in any order throughout the instructional year.

### Test Production Process

The final steps in production of the CAA for Science are to identify, select, and review items. These are discussed in the following subsections.

#### Identification of Eligible Items

The CAA for Science blueprint (CDE, 2018) and the test design documents specify the following guidelines:

* All anchor items must be operationally ready with item statistics.
* Each embedded PT within a grade level or the grade band assesses one of the three science domains.
* Each operational form contains one operational embedded PT for each of the three science domains.
* Each of the three operational embedded PTs consist of 10 items of increasing complexity and two orienting activities and should conform to the specifications in the test blueprint.
* Each operational embedded PT should consist of five anchor items and five operational field test items (items without item statistics).
* Each embedded PT should have a maximum score of 12 points.
* Each operational test form should have 30 items and should conform to the specifications in the test blueprint.
* Each operational test form should have a maximum score of 36 points.

#### Selection of Items

From the eligible item pool, assessment developers selected items that, as a whole,

* met the coverage specifications of the test blueprint,
* met the form-building guidelines developed by the ETS psychometrics team,
* represented a wide variety of item types, and
* provided a wide variety of item contexts.

#### Test Forms

Table 4.1 provides the number of Science Connectors administered across all forms in grade five, grade eight, and the high school grade band (to students in grade ten, eleven, or twelve [if the student is not repeating grade twelve]) for the operational and field test embedded PTs.

Table 4.1 Number of Science Connectors for the 2022–23 CAA for Science Forms

|  |  |  |  |
| --- | --- | --- | --- |
| **PT Description** | **Grade 5** | **Grade 8** | **High School** |
| Operational PTs | 9 | 9 | 9 |
| Field test PTs | 4 | 4 | 4 |

The number of Science Connectors summarized in table 4.1 resulted in four unique forms for grade five, grade eight, and the high school grade band. All the forms mentioned previously were evaluated using the psychometric criteria as described in the next subsection, [*4.4.4 Psychometric Review*](#_Psychometric_Review).

#### Psychometric Review

ETS’ assessment developers sent the proposed assessment to the ETS psychometrics team for approval prior to use of the forms in student testing. The proposed assessment was reviewed to ensure that all statistical guidelines were met for both individual items and the assessment. For this review, the psychometricians reviewed item statistics from prior test administrations to assess the items on the forms.

ETS’ psychometricians reviewed the item statistics, such as the *p*-value (item difficulty; refer to subsection [*8.2.1 Classical Item Difficulty Indices [p-value and Average Item Score]*](#_Classical_Item_Difficulty_3) for more details on this statistic) and item-total correlation (item discrimination; refer to subsection [*8.2.2 Item-Total Correlation*](#_Item-Total_Correlation_3) for more details on this statistic) obtained from the field test administration and used them to inform the item selection for the operational forms.

The following psychometric criteria were applied in the form assembly:

* The *p*-value for all operational items is between 0.2 and 0.95. A *p*-value less than 0.2 suggests that the item might be too difficult; a *p*-value greater than 0.95 suggests that the item might be too easy. Items that were too easy or too difficult were not used, as they provided little information on evaluating students’ abilities. Specifically, for anchor items, the acceptable *p*-value range is between 0.3 and 0.8. All operational items possessing item statistics from a prior test administration were anchor items.
* The item-total correlation is at least 0.2. Items selected had item-total correlations higher than 0.3.
* Items with C-DIF should not be used unless it is necessary for content coverage (refer to section [*8.3 Differential Item Functioning Analyses*](#_Differential_Item_Functioning) for more details on the differential item functioning [DIF]). All C-DIF items were reviewed by a DIF panel that included members of the focal groups that were affected and who confirmed the items were not biased before the items could be selected for use. The panelists did not have a vested interest in the outcome of the decision.

Refer to [appendix 4.B](#_Appendix_4.B:_Statistical_1) for more information regarding the statistical specifications used during development of the CAA for Science.

Table 4.2 presents the number of forms and the number of items ETS’ psychometricians reviewed for the 2022–23 CAA for Science administration. Only the 15 anchor items across the four test forms for grade five, grade eight, and the high school grade band had prior item statistics and were reviewed psychometrically during the test assembly process. Each of the anchor items linked the four test forms. At the form level, the distribution of *p*-values for the anchor items ranged from 0.37 to 0.93, and all the anchor items selected had item-total correlations higher than 0.30. While each anchor item had a *p*-value within the acceptable *p*-value range of 0.2 and 0.95, several anchor items had a *p*-value greater than 0.8—the maximum acceptable *p*-value for anchor items. The CAA for Science’s item bank currently lacks item depth and preventing items with a *p*-value greater than 0.8 from becoming anchor items would have resulted in forms not meeting the test blueprint and content specifications. Therefore, for content coverage purposes, items with *p*-values greater than 0.8 were included as anchor items.

Table 4.2 Number of Forms and Items Reviewed Psychometrically

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Forms** | **Number of Unique Operational Items** | **Number of Unique Field Test Items** | **Total Number of Unique Items** |
| Grade 5 | 4 | 56 | 28 | 84 |
| Grade 8 | 4 | 58 | 29 | 87 |
| High school | 4 | 59 | 28 | 87 |
| **Overall:** | **12** | **173** | **85** | **258** |

**Note:** Some operational and field test items are administered across two or more forms.

#### Content Review of Forms

After psychometric approval, the proposed assessment underwent two additional content reviews and one editorial review. The content reviewers were assessment developers who had not previously worked on the development of the test forms they were reviewing. These reviewers brought a fresh perspective to the review. They were given the appropriate materials and documentation to complete the following tasks:

* Verification of item keys
* Identification of possible clueing across the items
* Verification that individual items aligned with the Science Connectors
* Verification of coverage of the Science Connectors
* Identification of any possible grammatical or production errors

#### California Department of Education Forms Review

Following the ETS content review, all proposed assessments were sent to the CDE for review to ensure the proposed assessments met CAA for Science test blueprint requirements and to check that there was no clueing between items. The CDE was provided with the following materials:

* Access to items in the item banking system
* *Directions for Administration* *(DFAs)* for the items
* Form planners
* Comment sheets

The CDE used a gatekeeper process to review all test materials. All test materials were approved before they were made available for use.

For the reviews of form planners and the *DFAs,* ETS initiated the review by submitting materials to the CDE via the gatekeeper system, along with the criteria for the review. CDE consultants performed the initial review and returned comments and requests for revisions to ETS. ETS’ staff then revised the materials as requested and returned them to the CDE consultants, who reviewed the updated materials. If the test materials needed additional revisions, they were returned to ETS for further modifications.

Comments from the CDE were resolved during a virtual meeting with the ETS assessment development team.

Once CDE consultants found that the test materials met the review criteria, the CDE consultants submitted the test materials to the CDE administrator for approval. Test materials that were approved with revisions were revised by ETS and resubmitted for approval. Test materials that were not approved needed significant revisions and had to be submitted to the consultants again before they could be resubmitted to the CDE administrator for approval.

#### Configuration of the Test Delivery System

Once all the test reviews were completed and concerns, if any, had been resolved, the official ordered item sequence of the proposed forms was sent to Cambium Assessment, Inc. (CAI), for configuration of the test delivery system (TDS). Unlike other stages of the test production process, this stage must occur prior to every administration of the CAA for Science, even in the case of a form reuse.

Each item underwent an extensive platform review on different operating systems, such as Windows, Linux, and iOS, to ensure that the item’s appearance was consistent across all platforms.

The platform review was conducted by a team at CAI consisting of a team leader and several team members. The team leader presented the item as it was approved in ETS and CAI item banks. Each team member was assigned a different platform—hardware device and operating system—and reviewed the item to see that it rendered as expected. This platform review meeting ensured that all items were presented consistently to all students regardless of testing device or operating system for standardization of the test administration.

Prior to operational deployment, the testing system and content were deployed to a staging server where they were subject to user acceptance testing (UAT) by both ETS and CAI staff. The TDS UAT served as both a software evaluation and a content approval.

Following the UAT by ETS and CAI staff, separate UAT cycles were conducted by the CDE. The UAT review provided the CDE with an opportunity to interact with the exact assessment that would be administered to the students. The CDE had to approve the CAA for Science UAT before the assessment could be released for administration to students.

#### Test Form Delivery

Each embedded PT was expected to be administered shortly after content related to the Science Connectors was taught. To do so, the test examiner began a test session in the Test Administrator Interface on one device and then logged the student on to the secure TDS on another device. Next, the test examiner selected one of the four CAA for Science embedded PTs for the student in the TDS. After establishing the test session, the test examiner referred to the appropriate, form-specific *DFA* for step-by-step instructions for the orienting activities and test items, and then took the test examiner survey, all of which were completed within the TDS.

### Science Connector Coverage

The items comprising each embedded PT of the CAA for Science covered an extensive range of Science Connectors. These Science Connectors at the operational item–pool level are presented for grade five, grade eight, and the high school grade band in table 4.3.

Table 4.3 Science Connectors Assessed on the CAA for Science—All Grade Levels

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Connectors Assessed** | **Connectors Available** | **Percent of Connectors Assessed in 2022–23** | **Cumulative Percent of Connectors Assessed in 2021–22 and 2022–23** |
| Grade 5 | 10 | 23 | 43% | 78% |
| Grade 8 | 11 | 28 | 39% | 61% |
| High school | 11 | 32 | 34% | 53% |

The five-year coverage plan contains a running record of the Science Connectors that have been assessed as well as a projection of the Science Connectors proposed for assessments in the coming years. Table 4.A.1 through table 4.A.3 in [appendix 4.A](#_Appendix_4.A:_Five-Year) present the five-year coverage plan for grade five, grade eight, and the high school grade band, starting with the 2022–23 operational assessment administration.

### References

California Department of Education. (2018). *California Alternate Assessment for Science blueprint*. California Department of Education website.

California Department of Education. (2021). *California Alternate Assessment for Science*. California Department of Education website.

### Appendix 4.A: Five-Year Coverage Plan

**Notes:** In table 4.A.1 through table 4.A.3,

* “FT” indicates the year that a Connector set is being field-tested;
* “O” indicates the year that a Connector set is administered as operational items that do not have statistics;
* “A” indicates the year a Connector set is administered as an operational anchor set consisting only of items with statistics;
* an asterisk (\*) following either “FT,” “O,” or “A” indicates a Connector set with one or more items that align to a Science Connector and an Engineering, Technology, and Applications of Science (ETS) Connector;
* an asterisk (\*) alone indicates which ETS Connector is associated with a Connector set with one or more items administered that year; and
* “N/A” indicates no testing for the given Science Connector for the given administration.

Table 4.A.1 Five-Year Coverage Plan—Grade Five

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Science Connector** | **2021–22 Field Test Administration** | **2021–22 Operational Administration** | **2022–23 Field Test Administration** | **2022–23 Operational Administration** | **2023–24 Field Test Administration** | **2023–24 Operational Administration** | **2024–25 Field Test Administration** | **2024–25 Operational Administration** | **2025–26 Field Test Administration** | **2025–26 Operational Administration** | **Number of Operational Administrations in Five Years** |
| 4-ESS1-1 | N/A | A | FT | A | N/A | N/A | N/A | N/A | FT | N/A | 2 |
| 4-ESS2-2 | N/A | N/A | FT | O | N/A | N/A | N/A | N/A | N/A | O | 2 |
| 4-ESS3-2 | N/A | N/A | FT | N/A | N/A | O | N/A | O | N/A | N/A | 2 |
| 5-ESS1-2 | N/A | N/A | FT | N/A | N/A | N/A | N/A | O | N/A | A | 2 |
| 5-ESS2-1 | N/A | O | N/A | N/A | N/A | N/A | N/A | N/A | N/A | O | 2 |
| 5-ESS2-2 | N/A | N/A | N/A | O | N/A | O | N/A | A | N/A | N/A | 3 |
| 5-ESS3-1 | N/A | O\* | N/A | N/A | N/A | A\* | N/A | N/A | FT\* | N/A | 2 |
| 3-5-ETS1-1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | **\*** | N/A | N/A | 1 |
| 3-5-ETS1-2 | N/A | **\*** | N/A | **\*** | N/A | N/A | N/A | N/A | N/A | N/A | 2 |
| 3-5-ETS1-3 | N/A | N/A | N/A | N/A | N/A | **\*** | N/A | N/A | **\*** | N/A | 2 |
| 3-LS1-1 | N/A | N/A | N/A | O | FT | N/A | N/A | N/A | N/A | A | 2 |
| 3-LS2-1 | N/A | O | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | 2 |
| 3-LS3-1 | N/A | O | N/A | N/A | N/A | A | N/A | O | N/A | N/A | 3 |
| 3-LS4-2 | N/A | N/A | N/A | O | FT | N/A | N/A | A | N/A | O | 3 |
| 4-LS1-1 | N/A | A | N/A | N/A | FT | O | N/A | N/A | N/A | O | 3 |
| 5-LS2-1 | N/A | N/A | N/A | A | FT | N/A | N/A | O | N/A | N/A | 2 |
| 3-PS2-1 | FT | O | N/A | N/A | N/A | O\* | N/A | A\* | N/A | N/A | 3 |
| 4-PS3-2 | N/A | A | N/A | N/A | N/A | N/A | FT | N/A | N/A | N/A | 1 |
| 4-PS3-3 | N/A | N/A | N/A | O\* | N/A | O | N/A | N/A | N/A | N/A | 2 |
| 4-PS4-2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | O | N/A | A | 2 |
| 5-PS1-1 | N/A | N/A | N/A | O | N/A | N/A | FT | N/A | N/A | N/A | 1 |
| 5-PS1-2 | N/A | O | N/A | N/A | N/A | A | N/A | N/A | N/A | O | 3 |
| 5-PS1-3 | FT | N/A | N/A | A | N/A | N/A | N/A | O | N/A | O | 3 |

Table 4.A.2 Five-Year Coverage Plan—Grade Eight

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Science Connector** | **2021–22 Field Test Administration** | **2021–22 Operational Administration** | **2022–23 Field Test Administration** | **2022–23 Operational Administration** | **2023–24 Field Test Administration** | **2023–24 Operational Administration** | **2024–25 Field Test Administration** | **2024–25 Operational Administration** | **2025–26 Field Test Administration** | **2025–26 Operational Administration** | **Number of Operational Administrations in Five Years** |
| MS-ESS1-1 | N/A | N/A | N/A | N/A | FT | N/A | N/A | O | N/A | A | 2 |
| MS-ESS2-1 | N/A | N/A | N/A | O | FT | N/A | N/A | O | N/A | N/A | 2 |
| MS-ESS2-5 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | O | 2 |
| MS-ESS3-2 | N/A | O | N/A | O | N/A | N/A | N/A | A | N/A | N/A | 3 |
| MS-ESS3-3 | N/A | O | N/A | N/A | FT | A | N/A | N/A | N/A | N/A | 2 |
| MS-ESS3-4 | N/A | A\* | N/A | A\* | FT | N/A | N/A | N/A | N/A | N/A | 2 |
| MS-ESS3-5 | N/A | N/A | N/A | N/A | N/A | O\* | N/A | N/A | N/A | O\* | 2 |
| MS-ETS1-1 | N/A | N/A | N/A | N/A | N/A | \* | N/A | N/A | N/A | \* | 2 |
| MS-ETS1-2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | \* | N/A | N/A | 1 |
| MS-ETS1-3 | N/A | \* | N/A | \* | N/A | N/A | N/A | N/A | N/A | \* | 3 |
| MS-ETS1-4 | N/A | N/A | N/A | \* | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| MS-LS1-1 | N/A | O | N/A | N/A | N/A | N/A | N/A | N/A | FT | N/A | 1 |
| MS-LS1-2 | N/A | O | FT | N/A | N/A | A | N/A | N/A | N/A | N/A | 2 |
| MS-LS1-7 | N/A | N/A | FT | N/A | N/A | N/A | N/A | O | N/A | A | 1 |
| MS-LS1-8 | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | N/A | O | 2 |
| MS-LS2-1 | N/A | N/A | N/A | A | N/A | N/A | N/A | O | N/A | N/A | 2 |
| MS-LS2-2 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | 1 |
| MS-LS2-3 | N/A | A | FT | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| MS-LS2-4 | N/A | N/A | FT | N/A | N/A | N/A | N/A | A | FT | N/A | 1 |
| MS-LS3-2 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | 1 |
| MS-LS4-6 | N/A | N/A | N/A | O\* | N/A | N/A | N/A | N/A | N/A | O\* | 2 |
| MS-PS1-2 | FT | N/A | N/A | N/A | N/A | A | FT | N/A | N/A | O | 2 |
| MS-PS1-6 | N/A | N/A | N/A | O | N/A | N/A | FT | N/A | N/A | A | 2 |
| MS-PS2-1 | N/A | N/A | N/A | O | N/A | N/A | N/A | O | N/A | N/A | 2 |
| MS-PS2-2 | N/A | A | N/A | A | N/A | O | N/A | N/A | N/A | N/A | 3 |
| MS-PS3-2 | N/A | O | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | 2 |
| MS-PS3-3 | FT | O | N/A | N/A | N/A | N/A | N/A | A\* | N/A | N/A | 2 |
| MS-PS4-2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | O | N/A | O | 2 |

Table 4.A.3 Five-Year Coverage Plan—High School

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Science Connector** | **2021–22 Field Test Administration** | **2021–22 Operational Administration** | **2022–23 Field Test Administration** | **2022–23 Operational Administration** | **2023–24 Field Test Administration** | **2023–24 Operational Administration** | **2024–25 Field Test Administration** | **2024–25 Operational Administration** | **2025–26 Field Test Administration** | **2025–26 Operational Administration** | **Number of Operational Administrations in Five Years** |
| HS-ESS1-1 | N/A | N/A | FT | N/A | N/A | N/A | N/A | O | N/A | N/A | 1 |
| HS-ESS1-4 | N/A | A | N/A | A | N/A | N/A | N/A | N/A | FT | N/A | 2 |
| HS-ESS1-5 | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | N/A | O | 2 |
| HS-ESS2-2 | N/A | N/A | FT | N/A | N/A | N/A | N/A | O | N/A | N/A | 1 |
| HS-ESS2-3 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | A\* | 2 |
| HS-ESS2-5 | N/A | N/A | N/A | O\* | N/A | O\* | N/A | N/A | N/A | N/A | 2 |
| HS-ESS3-1 | N/A | O | FT | N/A | N/A | N/A | N/A | A\* | N/A | N/A | 2 |
| HS-ESS3-3 | N/A | O | N/A | N/A | N/A | A | N/A | N/A | FT | N/A | 2 |
| HS-ESS3-6 | N/A | N/A | FT | N/A | N/A | N/A | N/A | N/A | N/A | O | 1 |
| MS-ETS1-1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | \* | N/A | N/A | 1 |
| MS-ETS1-2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | \* | N/A | N/A | 1 |
| MS-ETS1-3 | N/A | N/A | N/A | \* | N/A | \* | N/A | N/A | N/A | \* | 3 |
| MS-ETS1-4 | N/A | \* | N/A | \* | N/A | N/A | N/A | N/A | N/A | N/A | 2 |
| HS-LS1-2 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | O | 2 |
| HS-LS1-4 | N/A | N/A | N/A | O | N/A | N/A | N/A | A | N/A | N/A | 2 |
| HS-LS1-6 | N/A | A | N/A | A | FT | N/A | N/A | N/A | N/A | N/A | 2 |
| HS-LS2-2 | N/A | N/A | N/A | N/A | FT | N/A | N/A | O | N/A | N/A | 1 |
| HS-LS2-4 | N/A | O | N/A | N/A | N/A | A | N/A | N/A | FT | N/A | 2 |
| HS-LS2-8 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | FT | N/A | 1 |
| HS-LS3-2 | N/A | N/A | N/A | O | FT | N/A | N/A | N/A | N/A | A | 2 |
| HS-LS4-3 | N/A | O | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | 2 |
| HS-LS4-6 | N/A | N/A | N/A | N/A | FT | N/A | N/A | N/A | N/A | O | 1 |
| HS-PS1-1 | N/A | O | N/A | N/A | N/A | N/A | N/A | N/A | N/A | O | 2 |
| HS-PS1-4 | N/A | O | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | 2 |
| HS-PS1-8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | 1 |
| HS-PS2-1 | N/A | N/A | N/A | O | N/A | N/A | FT | N/A | N/A | A | 2 |
| HS-PS2-3 | N/A | A\* | N/A | A\* | N/A | N/A | N/A | N/A | N/A | N/A | 2 |
| HS-PS2-6 | FT | N/A | N/A | N/A | N/A | N/A | N/A | A\* | N/A | N/A | 1 |
| HS-PS3-4 | N/A | N/A | N/A | O | N/A | N/A | FT | N/A | N/A | N/A | 1 |
| HS-PS3-5 | FT | N/A | N/A | N/A | N/A | A | N/A | N/A | N/A | O | 2 |
| HS-PS4-3 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | 1 |
| HS-PS4-5 | N/A | N/A | N/A | N/A | N/A | O | N/A | N/A | N/A | N/A | 1 |

### Appendix 4.B: Statistical Specifications for 2022–23 Assessment Development

Test assembly must follow guidelines to ensure the validity and reliability of test scores. These guidelines fall into two major categories: content-related and psychometric guidelines. Content-related guidelines ensure the appropriateness of item content and the alignment with standards. Psychometric guidelines provide specifications on the statistical properties of items, modules, and the entire multistage test.

The purpose of this specification is to summarize the specific *statistical* properties that were met when selecting items for the 2022–23 CAA for Science.

#### Statistical Properties of Individual Items

Individual items need to satisfy a number of statistical specifications to be usable in the forms.

##### Item Difficulty (*p*-values)

Items that are too difficult or too easy, indicated by a low or high *p*-value, should not be used as they serve little purpose of differentiating test takers’ abilities. The acceptable range for *p*-values is generally between 0.20 and 0.95. For anchor items, the acceptable range for *p*-value is between 0.30 and 0.80.

##### Polyserial Correlations

Nondiscriminating items, indicated by a low polyserial correlation value, should not be used. For test assembly, the recommended minimum polyserial correlation value is 0.20.

##### Differential Item Functioning (DIF)

Items analyzed for DIF at ETS are classified into one of three categories: A, B, or C. Category A indicates that DIF is negligible or nonsignificant, Category B indicates that DIF is slight to moderate, and Category C indicates that DIF is moderate to large. Refer to table 8.6 and table 8.7 in section [*8.3 Differential Item Functioning Analyses*](#_Differential_Item_Functioning) for more information on the categorization rules. In addition, when DIF is detected, a plus or minus sign is often used in conjunction with the specific DIF category to indicate the direction of DIF: Classifications of B− or C− indicate DIF is in favor of the reference group; classifications of B+ and C+ indicate DIF is in favor of the focal group. Items that function differentially across different demographic examinee student groups that have similar overall test performance should not be used.

An item classified into Category C shows moderate to large DIF and should not be included in the operational form. If it is absolutely necessary to include an item exhibiting C-DIF on an assessment or if such an item is found on an operational form, the item must be reviewed by a panel that includes members of the focal group(s) affected. The members of the panel should not have a vested interest in the outcome of the decision. If no explanation for the DIF can be found, the item may appear on the assembled assessment. However, the inclusion of no C-DIF items is preferred because their inclusion in an assembled assessment is beyond reproach in most cases. Additionally, if an item exhibiting C-DIF must be selected, then a balance with regard to the C-DIF item should be considered; that is, C-‍DIF items should not be all C− or all C+.

## Test Administration

This chapter details the processes involved in the administration of the 2022–23 California Alternate Assessment (CAA) for Science. It also describes the procedures followed by ETS to maintain test security throughout the test administration process.

### Overview

The CAA for Science was administered to students in grades five and eight and high school (grade ten, eleven, or twelve [as long as the student is not repeating grade twelve]) in 2022–‍23 in conjunction with the other assessments that compose the California Assessment of Student Performance and Progress (CAASPP) System.

In accordance with the procedures for the computer-based CAASPP, local educational agencies (LEAs) identified test examiners and entered the test examiners as users into the Test Operations Management System (TOMS). ETS provided LEA staff with the appropriate training materials, such as test administration manuals, videos, and webinars, to ensure that the LEA staff and test examiners understood how to administer the computer-based CAA for Science content-area assessments.

The testing window for the 2022–23 administration of the CAA for Science was planned for September 6, 2022, to the final day of the LEA’s instructional calendar or July 17, 2023, whichever came first. Specific test administration schedules within that window were determined locally pursuant to *California Code of Regulations,* Title 5 (5*CCR*), Section 855(a)(2).

#### Student Test-Taking Requirements

All LEAs with eligible students in grades five and eight whose individualized education program (IEP) indicated an alternate assessment should have administered the CAA for Science. Students in the high school grade band (i.e., grade ten, eleven, or twelve [if the student is not repeating grade twelve]) who were selected by the LEA to take a science assessment and whose IEP indicated an alternate assessment were assigned to take the CAA for Science (California Department of Education [CDE], 2022f).

A student in grade five or eight and in the high school grade band was eligible to take the CAA for Science if the student met all the following eligibility requirements:

* Has a significant cognitive disability that is described in the student’s IEP
* Is learning content derived from the Science Core Content Connectors (Science Connectors)
* Requires extensive direct individualized instruction and substantial resources to achieve measurable gains in the grade- and age-appropriate curriculum

##### Grades Five and Eight

All students enrolled in grades five and eight were automatically registered in TOMS to take the California Science Test (CAST). If the student’s IEP team indicated an alternate assessment, the LEA and school registered the eligible student manually in TOMS to take the CAA for Science.

##### High School

At the high school level, schools and LEAs were responsible for registering students in grade ten or eleven to take the CAST or the CAA for Science. Guidelines were provided by the CDE indicating that students who completed or were in the process of completing their last high school science course should take the science assessment, either the CAST or CAA for Science, depending on the student’s eligibility. All grade twelve students who were eligible to take the CAA for Science but had not previously completed it in grade ten or eleven were automatically registered to take the CAST and then registered manually by the LEA or school to take the CAA for Science if indicated by the student’s IEP. Neither students in grade nine nor students who repeated grade twelve were eligible to take a science assessment (CDE, 2022f).

### User Roles and Standardization

The test administration procedures were designed so that the assessments are administered in a standardized manner. ETS took all necessary measures to ensure the standardization of test administration, as described in this section.

#### Local Educational Agency CAASPP Coordinator

An LEA CAASPP coordinator was designated by the district superintendent or charter school administrator at the beginning of the 2022–23 school year. LEAs include public school districts, California State Board of Education–authorized charter schools, county office of education programs, and direct funded charter schools.

LEA CAASPP coordinators were responsible for ensuring the proper and consistent administration of the CAASPP. In addition to the responsibilities set forth in 5*CCR* Section 857, their responsibilities included

* adding CAASPP test site coordinators and test examiners into TOMS;
* training CAASPP test site coordinators and test examiners regarding the state requirements and CAASPP administration as well as security policies and procedures;
* providing checklists for CAASPP test site coordinators and test examiners to review in preparation for administering the summative assessments;
* overseeing test administration activities;
* reporting test security incidents (including testing irregularities) to the CDE using the online Security and Test Administration Incident Reporting System (STAIRS)/Appeals process; and
* requesting an Appeal (if indicated by TOMS prompts while reporting an incident using the STAIRS/Appeals process).

#### CAASPP Test Site Coordinator

A CAASPP test site coordinator is trained by the LEA CAASPP coordinator for each test site (5 *CCR* Section 857[f]). A CAASPP test site coordinator must be an employee of the LEA and must sign a security agreement (5 *CCR* Section 859[a]).

A test site coordinator was responsible for identifying test examiners and ensuring that they have signed CAASPP *Test Security Affidavits* (5 *CCR* Section 859[d]). A CAASPP test site coordinator’s duties may have included

* adding test examiners into TOMS;
* entering test settings for students;
* creating testing schedules and procedures for a school consistent with state and LEA policies;
* working with technology staff to ensure secure browsers are installed and any technical issues are resolved;
* monitoring testing progress during the testing window and ensuring all students take the CAA for Science, as appropriate;
* coordinating and verifying the correction of student data errors in the California Longitudinal Pupil Achievement Data System;
* ensuring a student’s test session is rescheduled, if necessary;
* addressing testing problems;
* reporting test security incidents (including testing irregularities) to the CDE using the online STAIRS/Appeals process;
* overseeing administration activities at a school site; and
* requesting an Appeal (if indicated by TOMS prompts while reporting an incident using the STAIRS/Appeals process).

#### Test Examiners

Test examiners were identified by CAASPP test site coordinators as individuals who would administer the CAA for Science.

A test examiner must have signed a security affidavit (5 *CCR* Section 859[d]) and be a certificated or licensed school staff member (5 *CCR* Section 850[ag]).

A test examiner’s duties may have included

* ensuring the physical conditions of the testing room meet the criteria for a secure test environment;
* administering the CAASPP, including the CAA for Science;
* reporting all test security incidents to the CAASPP test site coordinator and LEA CAASPP coordinator in a manner consistent with state and LEA policies;
* viewing student information prior to testing to ensure that the correct student receives the proper assessment with appropriate resources and reporting potential data errors to CAASPP test site coordinators and LEA CAASPP coordinators;
* monitoring student progress throughout the test session using the Test Administrator Interface; and
* fully complying with all directions provided in the *Directions for Administration (DFAs)* for the CAA for Science (CDE, 2023e).

#### Instructions for Test Administration

##### *Preparing for Administration*

The nonsecure *Preparing for Administration (PFA)* (CDE, 2022c) document contained the planning and preparation content from the *DFAs* and was posted on the Manuals and Instructions web page on the CAASPP website. The *PFA* was used by test examiners to prepare for the test administration and to become familiar with testing guidelines.

The *PFA* included the following:

* Administration notes
* Linked resources
* Information about student engagement
* Use of the “Mark as No Response” option

##### *Directions for Administration*

Test examiners used the embedded performance task (PT) *DFAs* for the CAA for Science to administer each separate embedded PT to students. The *DFAs* included the description of the orienting activity, a list of the exemplar materials, the script for each test item, and possible individualization options. Each of the four embedded PTs for a grade level was administered using a separate *DFA*.

Sample *DFAs* for the CAAs to be used in conjunction with the CAA practice and training tests were provided to LEAs as well (CDE, 2022d).

##### *CAASPP Online Test Administration Manual*

The *CAASPP Online Test Administration Manual* (CDE, 2023e) contained information and instructions on overall procedures and guidelines for all LEA and test site staff involved in the administration of computer-based assessments. Sections included the following topics:

* Roles and responsibilities of those involved with CAASPP testing
* Test administration resources
* Test security
* Administration preparation and planning
* General test administration
* Overview of the student testing application
* Instructions for steps to take before, during, and after testing

Appendices included definitions of common terms and descriptions of different aspects of the assessment and systems associated with the assessment.

##### *CAASPP and ELPAC Test Operations Management System User Guide*

TOMS is a web-based application that allows LEA CAASPP coordinators to set up test administrations, add and manage users, and submit computer-based student test settings.

TOMS modules described in the *TOMS User Guide* included the following (CDE, 2023d):

* **Test Administration Setup—**This module allowed LEAs to determine and calculate dates for the LEA’s 2022–23 administration of the CAASPP, including the CAA for Science.
* **Adding and Managing Users—**This module allowed LEA CAASPP coordinators to add CAASPP test site coordinators and test examiners to TOMS so that the designated user could administer, monitor, and manage the CAASPP computer-based assessments.
* **Reports—**This module allowed LEA CAASPP coordinators and CAASPP test site coordinators access to the various reports in TOMS.
* **STAIRS/Appeals—**This module allowed LEA CAASPP coordinators and CAASPP test site coordinators access to create new STAIRS cases or search for STAIRS/Appeals cases.
* **Student Profile—**This module allowed LEA CAASPP coordinators, CAASPP test site coordinators, and test administrators and test examiners to view and manage student’s test assignments and test settings.

##### Other System Manuals

Other manuals were created to assist LEA CAASPP coordinators and others with the technological components of the CAASPP System and are listed next.

* ***CAASPP and English Language Proficiency Assessments for California (ELPAC) Technical Specifications and Configuration Guide for Online Testing*—**This manual provided information, tools, and recommended configuration details to help technology staff prepare computers and install the secure browser to be used for the computer-based CAASPP (CDE, 2023c).
* ***CAASPP and ELPAC Security Incidents and Appeals Procedure Guide*—**This manual provided information on how to report a testing incident and submit an Appeal to reset, reopen, invalidate, or restore individual computer-based student assessments (CDE, 2023b).
* ***CAASPP and ELPAC Accessibility Guide*—**This manual provided descriptions of the accessibility features for computer-based assessments as well as information about supported hardware and software requirements for administering assessments to students using accessibility resources, including those with a braille accommodation using Job Access With Speech® (software) or a braille embosser (hardware) (CDE, 2023a).

#### Resources for Administration (Including Planning Guides)

To ensure the 2022–23 test administration was a successful experience for CAA for Science test examiners and students, ETS provided an online, self-guided training tutorial on the Moodle Training Site for CAA for Science test examiners (CDE, 2022b) in August 2022, as well as a Pretest Virtual Training Series, which was a series of virtual test administration workshops facilitated throughout the year for California educators. The virtual workshops included a session with a section dedicated exclusively to the topic of the CAA test administration procedures.

In addition, ETS developed and posted several test administration resources for schools and LEAs on both the public CAASPP website and on the secure TOMS website. These resources included detailed information on topics such as technology readiness, test administration, test security, accessibility resources, using the test delivery system (TDS), and general testing rules.

Given that the CAA for Science is administered to students who have the most significant cognitive disabilities, a test examiner familiar to the student—usually the student’s teacher—administers the CAA for Science to the student one-on-one.

##### *CAA for Science Administration Planning Guides*

The *Administration Planning Guides*, posted prior to the annual launch of the embedded PTs, provided information about the embedded PTs that were to be administered in the coming school year (CDE, 2022a). The form-specific *Administration Planning Guides* contained the following information to help test examiners understand how to plan for the administration of the embedded PTs throughout the school year:

* Basic information on the CAA for Science test administration, including test security
* Assessed standards (i.e., Science Connectors)
* A testing planner to assist in preparing for the administration of each of the four embedded PTs
* Points to consider when deciding the best time to administer a CAA for Science embedded PT to a student

### Local Educational Agency Training

Each year, ETS, in collaboration with the CDE and its Assessment Validity and Outreach contractor, the Sacramento County Office of Education (SCOE), establishes and implements a comprehensive training plan for LEA assessment staff and educators on all aspects of the assessment program. The ETS and SCOE annual training plans specify the audience, topics, frequency, and mode (synchronous or asynchronous) of the training, including such elements as format, participants, and organization.

Knowing that educators were confronted with challenges daily that put additional demands on their time, ETS and SCOE made every effort to make the information available in a variety of ways that allowed educators access to training at a time that was responsive to their varying circumstances. This included offering training events on multiple days and times, livestreaming events, recording and archiving training, and converting training to self-paced modules that could be taken any time, at the learner’s convenience.

All training opportunities were posted in one centralized location on the CAASPP website. LEA staff were able to register for training opportunities in one place, on the Upcoming Training Opportunities web page. Archived training was made available on the Past Training Opportunities web page, making it easier for educators to find a training they missed, and providing easier access to recorded training. ETS also employed a new strategy for providing access to training materials. Participants could register to receive a copy of the training materials without registering to attend a live training. Training materials were developed in such a way that educators could consume the information independently by reading through materials.

#### Synchronous and Asynchronous Training

All synchronous training was offered on Zoom, recorded, and made available for on-demand viewing. Zoom provides an opportunity for educators to ask questions and get answers in real time. Coffee Sessions were livestreamed on YouTube.

In response to an environment where educators had competing priorities to juggle, ETS and SCOE used various strategies to increase engagement during synchronous trainings. Live polls were presented to get real-time feedback about attendees’ knowledge of a particular topic, allowing presenters to tailor presentations to the audience’s level of understanding. The chat functionality was enabled to give participants an opportunity to interact with each other or to provide open-ended feedback, or it was disabled to minimize distraction and drive attendees’ focus to the information being presented. Breakout groups were used in smaller group trainings, as appropriate. Breaks and processing time were incorporated into presentations to give attendees opportunities to attend to other responsibilities that might result as part of their work environment.

Working closely with the CDE, ETS and SCOE continued to provide informal support to educators by offering monthly Coffee Sessions. Coffee Sessions included CDE and ETS’ staff who could answer questions about all aspects of testing. ETS also offered several Office Hours for coordinators where support staff were generally available from 9 a.m. to 3 p.m., allowing coordinators to join as needed and get customized support. SCOE continued to offer Assessment and Accountability Information Meetings intended to provide LEA coordinators with regular updates about California’s assessment and accountability systems. All trainings and meetings were recorded and archived for on-demand viewing on the Past Training Opportunities web page on the CAASPP website.

#### Videos and Guides

ETS produced videos on various aspects of administering the CAASPP, including how to perform functions within TOMS, such as setting up a test administration window, adding users, assigning assessments to students, and uploading test settings. SCOE produced the accompanying quick reference guides, providing multiple avenues of support for educators administering the assessments.

In addition to the standard administration videos, ETS produced additional videos to support administration. Some videos were geared toward parents/guardians to help them understand the assessment’s purpose. Other videos were intended to help coordinators or other users complete a process, such as administering a practice or training test, starting and stopping a test session, how to monitor student completion, and how to complete second scoring that is required for some of the assessments. This list is a sampling of the available videos intended to capture the major areas of support for various interest holders. The comprehensive suite of training videos can be found on the CAASPP Videos and Quick Reference Guides web page.

#### Training for Proper Identification and Assignment of Designated Supports and Accommodations

ETS developed a video with LEA staff to help California educators learn more about the importance of implementing CAASPP accessibility resources and best practices used by educators in the field. The “Importance of Implementing CAASPP and ELPAC Accessibility Resources: Voices from Educators” video was available on the Videos and Quick Reference Guides web page on the CAASPP website.

ETS also produced short demonstration videos for every embedded accessibility resource, demonstrating how to use the resource for educators, students, and parents/guardians. The videos were available in both English and Spanish on the Accessibility Resources Demonstration Videos web page on the CAASPP website. Demonstration videos were also created for the most frequently used non-embedded accessibility resources. These videos were linked within the Individual Student Assessment Accessibility Profile (ISAAP) Tool, increasing access to the demonstration videos. Educators using the ISAAP Tool to determine the student’s needs could view the corresponding demonstration video without having to navigate away from the tool.

A video on how to use the ISAAP Tool was also available to support educators in the process of creating an individual student profile and matching accessibility resources to student needs to ensure a fair and valid testing experience for all students.

For the 2022–23 CAASPP administration, ETS produced a two-part asynchronous training module. Module A, Matching Accessibility Resources to Students’ Needs, focused on providing participants with an understanding of the importance of accessibility resources, the categories of accessibility resources, and the process for matching students with appropriate accessibility resources for daily instruction and on assessments. Module B, Using Accessibility Resources in Daily Instruction, focused on the importance of removing barriers to student learning and using accessibility resources in daily instruction. Educators could complete the training independently or had the option to attend one of two live sessions held by ETS to extend and deepen the learning experience.

At the California Assessment Conference, SCOE offered two sessions on accessibility. “Leveraging UDL and Accessibility Resources to Improve Teaching and Learning” explored Universal Design for Learning (UDL) principles to help remove barriers to student learning and provided data collection tools to participants. The session on “Introduction to Accessibility and the ISAAP Tool” provided participants with the most up-to-date information regarding accessibility resources and offered a live practical approach to identifying and matching accessibility resources to students using the ISAAP Tool. The conference also included some shared practices sessions focused on accessibility.

#### Feedback for Continuous Improvement Survey

The CAASPP program solicits feedback annually from various interest holder groups, including LEA CAASPP coordinators, CAASPP test site coordinators, test administrators, and test examiners, through the CAASPP and ELPAC Feedback for Continuous Improvement Survey. Feedback was collected via a post-test survey sent to more than 275,000 California educators and through focus groups. Educators provided valuable feedback for potential improvements to the future administration of CAASPP and the ELPAC—one or both—by reporting some lessons they learned in 2022–23.

Improvements made in response to survey results are detailed in [chapter 11](#_Continuous_and_Systematic_1). The CDE and ETS used key recommendations from educators to implement positive changes in the next test administration year.

##### Overview

LEA and CAASPP test site coordinators, as well as test administrators and test examiners, were invited to participate in the survey. The California educators who responded provided specific, actionable insights about their test administration experience. This survey gathered information and data from educators who were part of the administration of CAASPP, the ELPAC, or both programs. Its goal was to highlight successes and identify areas for improvement, both immediate and long term.

Overall, California educators continue to express positive experiences in their preparations for administering CAASPP and the ELPAC.

Among the 133 CAA test examiner respondents, 82 percent reported using the *PFA* and 97 percent reported using the *DFA* before or during the administration of the CAAs. Nearly all CAA test examiners who had used either the *PFA* or *DFA* found that the respective document was helpful.

##### Communication

During the 2022–23 test administration year, the CDE and ETS continued to streamline communications and provide LEAs with relevant information throughout the year. CAASPP and ELPAC monthly communications were sent throughout the administration with timely reminders and training announcements. In addition, proactive communications were sent to help remind LEA CAASPP coordinators of important actions needed for a successful administration, such as reminders to set up a test administration window, order materials, or enter scores into the Data Entry Interface, if needed.

### Administering the CAA for Science

The CAA for Science 2022–23 operational assessment was administered one-on-one by a test examiner familiar with the student being tested. The test examiner administered four embedded PTs to each student; these were administered online through the CAASPP TDS.

#### Orienting Activities

Each embedded PT had two orienting activities, one for each of the two Connector sets in an embedded PT. The orienting activities were administered one-on-one by the test examiner prior to presenting the first item in each Connector set to the student. The administration of the items in each Connector set in an embedded PT directly followed the delivery of each orienting activity.

#### Embedded Performance Tasks

The embedded PTs were designed to be administered to students directly following the instruction of the related Science Connector being assessed.

#### Test Examiner Survey

During the 2022–23 test administration year, test examiners were asked to respond to a survey about their student after each embedded PT asking if the student had been responsive during the testing session. The test examiner was routed to an appropriate short survey based on the test examiner’s response to that routing question. Refer to [chapter 10](#_Test_Examiner_Survey_2) for details about this survey.

### Accessibility Resources

The Every Student Succeeds Act reaffirms the importance of ensuring that assessments are accessible to special populations, and the Individuals with Disabilities Education Act lays out monitoring requirements for students with disabilities. This section describes the accessibility resources used to support students in the CAA for Science, as well as the procedures to identify and assign students with accommodations and designated supports. Finally, the number of students who were assigned accessibility resources was reported on the basis of available data.

The 2022–23 CAA for Science offered commonly used accessibility resources available through the CAASPP computer-based testing platform, where applicable for the tested construct.

#### Individualization

A notable feature of the embedded PTs was that test examiners had the option to individualize certain elements of the assessment. Test examiners were instructed to review the activities associated with each embedded PT and decide whether the exemplar activity met a student’s needs or whether an individualized activity was appropriate. The test examiner documented the use of individualizations in the survey at the end of each embedded PT.

Potential individualizations were designed so that the premise of the item and the scientific principles tested would remain the same. Individualization options in embedded PTs sometimes involved the use of objects to make certain science concepts easier to understand for some students.

If the test examiner responded in the test examiner survey that the student was responsive for the embedded PT, the test examiner survey then asked the test examiner to document the kinds of individualizations the student was provided. Table 5.1 through table 5.3 display the results of the test examiner survey regarding the kinds of individualization provided. The n-‍counts in these tables are based on students completing all three of the operational embedded PTs and are smaller than the typical n-counts for a CAA for Science administration. Although test examiners were permitted to individualize the administration of the CAA for Science, table 5.1 through table 5.3 indicate that few students received individualizations, meaning the majority of students were administered the embedded PTs as outlined in the *DFA*s.

In table 5.1 through table 5.3, ESS is Earth and Space Sciences, LS is Life Sciences, and PS is Physical Sciences.

Table 5.1 Individualizations—Grade Five

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Individualization** | **PT 1 (ESS), Connector Set 1—Number of Students** | **PT 1 (ESS), Connector Set 1—Percent of Total Number of Students** | **PT 1 (ESS), Connector Set 2—Number of Students** | **PT 1 (ESS), Connector Set 2—Percent of Total Number of Students** | **PT 2 (LS), Connector Set 1—Number of Students** | **PT 2 (LS), Connector Set 1—Percent of Total Number of Students** | **PT 2 (LS), Connector Set 2—Number of Students** | **PT 2 (LS), Connector Set 2—Percent of Total Number of Students** | **PT 3 (PS), Connector Set 1—Number of Students** | **PT 3 (PS), Connector Set 1—Percent of Total Number of Students** | **PT 3 (PS), Connector Set 2—Number of Students** | **PT 3 (PS), Connector Set 2—Percent of Total Number of Students** |
| Using Standardized Scripts | 3,864 | 97% | 3,848 | 97% | 3,928 | 97% | 3,900 | 97% | 3,861 | 97% | 3,833 | 97% |
| Using Individualized Scripts | 125 | 3% | 114 | 3% | 133 | 3% | 106 | 3% | 107 | 3% | 106 | 3% |
| Using Standardized Materials | 3,959 | 99% | 3,912 | 99% | 4,029 | 99% | 3,987 | 100% | 3,919 | 99% | 3,874 | 98% |
| Using Individualized Materials | 30 | 1% | 50 | 1% | 32 | 1% | 19 | 0% | 49 | 1% | 65 | 2% |
| **Total Number of Students:** | **3,989** | **N/A** | **3,962** | **N/A** | **4,061** | **N/A** | **4,006** | **N/A** | **3,968** | **N/A** | **3,939** | **N/A** |

Table 5.2 Individualizations—Grade Eight

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Individualization** | **PT 1 (ESS), Connector Set 1—Number of Students** | **PT 1 (ESS), Connector Set 1—Percent of Total Number of Students** | **PT 1 (ESS), Connector Set 2—Number of Students** | **PT 1 (ESS), Connector Set 2—Percent of Total Number of Students** | **PT 2 (LS), Connector Set 1—Number of Students** | **PT 2 (LS), Connector Set 1—Percent of Total Number of Students** | **PT 2 (LS), Connector Set 2—Number of Students** | **PT21 (LS), Connector Set 2—Percent of Total Number of Students** | **PT 3 (PS), Connector Set 1—Number of Students** | **PT 3 (PS), Connector Set 1—Percent of Total Number of Students** | **PT 3 (PS), Connector Set 2—Number of Students** | **PT 3 (PS), Connector Set 2—Percent of Total Number of Students** |
| Using Standardized Scripts | 3,759 | 97% | 3,752 | 97% | 3,805 | 97% | 3,803 | 97% | 3,751 | 97% | 3,725 | 97% |
| Using Individualized Scripts | 118 | 3% | 111 | 3% | 114 | 3% | 102 | 3% | 105 | 3% | 103 | 3% |
| Using Standardized Materials | 3,865 | 100% | 3,846 | 100% | 3,902 | 100% | 3,892 | 100% | 3,844 | 100% | 3,809 | 100% |
| Using Individualized Materials | 12 | 0% | 17 | 0% | 17 | 0% | 13 | 0% | 12 | 0% | 19 | 0% |
| **Total Number of Students:** | **3,877** | **N/A** | **3,863** | **N/A** | **3,919** | **N/A** | **3,905** | **N/A** | **3,856** | **N/A** | **3,828** | **N/A** |

Table 5.3 Individualizations**—High School**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Individualization** | **PT 1 (ESS), Connector Set 1—Number of Students** | **PT 1 (ESS), Connector Set 1—Percent of Total Number of Students** | **PT 1 (ESS), Connector Set 2—Number of Students** | **PT 1 (ESS), Connector Set 2—Percent of Total Number of Students** | **PT 2 (LS), Connector Set 1—Number of Students** | **PT 2 (LS), Connector Set 1—Percent of Total Number of Students** | **PT 2 (LS), Connector Set 2—Number of Students** | **PT 2 (LS), Connector Set 2—Percent of Total Number of Students** | **PT 3 (PS), Connector Set 1—Number of Students** | **PT 3 (PS), Connector Set 1—Percent of Total Number of Students** | **PT 3 (PS), Connector Set 2—Number of Students** | **PT 3 (PS), Connector Set 2—Percent of Total Number of Students** |
| Using Standardized Scripts | 3,930 | 96% | 3,858 | 96% | 3,976 | 97% | 3,929 | 97% | 3,906 | 97% | 3,857 | 97% |
| Using Individualized Scripts | 143 | 4% | 141 | 4% | 139 | 3% | 137 | 3% | 128 | 3% | 123 | 3% |
| Using Standardized Materials | 4,031 | 99% | 3,981 | 100% | 4,090 | 99% | 4,047 | 100% | 4,016 | 100% | 3,948 | 99% |
| Using Individualized Materials | 42 | 1% | 18 | 0% | 25 | 1% | 19 | 0% | 18 | 0% | 32 | 1% |
| **Total Number of Students:** | **4,073** | **N/A** | **3,999** | **N/A** | **4,115** | **N/A** | **4,066** | **N/A** | **4,034** | **N/A** | **3,980** | **N/A** |

#### Accessibility Resource Categories

The purpose of universal tools, designated supports, and accommodations in testing is to provide *all* students with the opportunity to demonstrate what they know and what they are able to do. Universal tools, designated supports, and accommodations minimize or remove barriers that could otherwise prevent students from demonstrating their knowledge, skills, and achievement in a specific content area.

The CDE’s *California Assessment Accessibility Resources Matrix* (Accessibility Matrix) (CDE, 2022e) is intended for school-level personnel and IEP and Section 504 plan teams to select and administer the appropriate universal tools, designated supports, and accommodations as deemed necessary for individual students.

Table 5.A.1 through table 5.A.6 in [appendix 5.A](#_Appendix_5.A:_Accessibility_1) presents the numbers and percentages of students assigned designated supports, accommodations, and unlisted resources for the 2022–23 CAA for Science administration. The use of universal tools is not tracked because they are available to all students in the TDS.

##### Universal Tools

Universal tools were available to all students by default, although they could be disabled if a student found them distracting. Each universal tool fell into one of two categories: embedded and non-embedded. Embedded universal tools were provided through the TDS (through the CAASPP secure browser), although they could be turned off by a test examiner.

The universal tools in the following subsections were available in the 2022–23 CAA for Science administration.

###### Embedded

The following embedded universal tools were available to students testing in the secure browser:

* Breaks
* Digital notepad
* Expandable items
* Expandable passages
* Highlighter
* Keyboard navigation
* Line reader
* Mark for review
* Strikethrough
* Writing tools (e.g., bold, italic, bullets, undo or redo) (for specific items)
* Zoom (in or out)

###### Non-Embedded

The following non-embedded universal tools were available to students testing in the secure browser:

* Breaks
* Scratch paper

##### Designated Supports

Designated supports were available to all students when determined for use by an educator or team of educators (with parent/guardian and student input, as appropriate) or specified in the student’s IEP or Section 504 plan. These are assigned through the test settings in TOMS. The designated supports each fell into one of two categories: embedded and non-embedded. Embedded designated supports were provided through the Student Testing Interface (through the CAASPP secure browser).

The designated supports in the following subsections were available in the 2022–23 CAA for Science administration.

###### Embedded

The following embedded designated supports were available to students testing in the secure browser:

* Color contrast
* Masking
* Mouse pointer (size and color)
* Permissive mode
* Print (font) size
* Streamline
* Turn off any universal tool(s)

###### Non-Embedded

The following non-embedded designated supports were available to students testing in the secure browser:

* 100s number table
* Amplification
* Color contrast
* Color overlay
* Magnification
* Medical supports
* Multiplication table
* Noise buffers
* Read aloud (items)
* Scribe (nonwriting items)
* Separate setting (special lighting or acoustics, adaptive furniture, time of day)

##### Accommodations

Accommodations are changes in procedures or materials that increased equitable access during CAASPP administration and are permitted to all eligible students if specified in the student’s IEP or Section 504 plan. Assessment accommodations for students who needed them generated valid assessment results; they allowed these students to show what they know and can do. Accommodations did not compromise the learning expectations, construct, grade-level standard, or intended outcome of the assessments.

The accommodations in the following subsections were available in the 2022–23 CAA for Science administration.

###### Non-Embedded

The following non-embedded accommodations were available to students testing in the secure browser:

* Abacus
* Additional instructional supports and resources for alternate assessments
* Alternate response options
* Print-on-demand
* Word prediction

##### Unlisted Resources

An unlisted resource is an instructional support a student regularly uses in daily instruction, assessment, or both, and has not been previously identified as a universal tool, designated support, or accommodation. The Accessibility Matrix included an inventory of unlisted resources that were already identified and were preapproved (CDE, 2022e). During the 2022–23 CAASPP administration, an LEA CAASPP coordinator or a CAASPP test site coordinator would use TOMS to submit a request for use of an unlisted resource. A preidentified, preapproved unlisted resource request was automatically approved. A request for an unlisted resource that was not preidentified was sent to the CDE for review and adjudication.

Unlisted resources are non-embedded resources that are made available if specified in the eligible student’s IEP or Section 504 plan and only upon approval by the CDE. Unlisted resources that changed the construct of an assessment and were approved were flagged as causing a change in construct. Test results for a student using an unlisted resource that was approved but that changed the construct of what was being tested were considered invalid for reporting purposes. The student’s score status would remain valid, and the student’s scale score would be reported but appear on the Student Score Report (SSR) with an asterisk and a footnote that the assessment was administered under conditions that resulted in a score that may not be an accurate representation of the student’s achievement.

Preidentified unlisted resources applicable to the CAA for Science are as follows:

* Bilingual dictionary
* English dictionary
* Signed exact English
* Thesaurus
* Translated word lists
* Translations

The LEA CAASPP coordinator or CAASPP test site coordinator was required to submit a request for the use of an unlisted resource to the CDE a minimum of 10 business days before the student’s first day of testing.

#### Identification and Selection

All eligible students enrolled in a California public school participate in the CAASPP System, including students with disabilities and English learner students. The Smarter Balanced Assessment Consortium’s *Usability, Accessibility, and Accommodations Guidelines* (Smarter Balanced, 2022) and the CDE Accessibility Matrix (CDE, 2022e) are intended for school-level personnel and IEP and Section 504 plan teams to select and administer the appropriate universal tools, designated supports, and accommodations as deemed necessary for individual students.[[4]](#footnote-5) The CAA for Science follows the Smarter Balanced recommendations for use (Smarter Balanced, 2018).

The *Guidelines* apply to all participating students and promote an individualized approach to the implementation of assessment practices. Another web page, the Smarter Balanced Accessibility Strategies web page on the Tools for Teachers website (Smarter Balanced, 2023), connects the assessment resources described in the *Guidelines* with associated classroom practices.

The full list of the universal tools, designated supports, and accommodations used in CAASPP computer-based assessments, including the CAA for Science, is documented in the Accessibility Matrix. Most embedded and non-embedded universal tools, designated supports, and accommodations listed in parts 1, 2, and 3 of the Accessibility Matrix are available for the CAA for Science through the computer-based testing interface or, in the case of non-embedded resources, from the school or LEA. Part 5 of the Accessibility Matrix includes approved unlisted resources. School-level personnel, IEP teams, and Section 504 teams used the Accessibility Matrix when deciding how best to support the student’s test-taking experience. Another manual, the *Smarter Balanced Usability, Accessibility, and Accommodations Implementation Guide* (Smarter Balanced, 2014),provides suggestions for implementation of these resources.

Test administrators and test examiners are given the opportunity to administer the CAASPP practice and training tests so that students have the opportunity to familiarize themselves with a designated support or accommodation prior to testing.

#### Assignment

Designated supports and accommodations are assigned to individual students on the basis of identified student need. Such assignments are implemented in TOMS by the LEA CAASPP coordinator or CAASPP test site coordinator, either through individual assignment through the student’s profile in TOMS or in a batch upload for multiple students. When the batch upload process was used, settings were uploaded into TOMS using a spreadsheet with data that had either been entered into a template downloaded from TOMS; or created by selecting and entering information into the web-based ISAAP Tool. The ISAAP Tool could be used by LEAs in conjunction with the *Guidelines* and the *2022–23* CAASPP and ELPAC Accessibility Guide (CDE, 2023a), as well as with state regulations and policies (such as the Accessibility Matrix) related to assessment accessibility*.*

The embedded designated supports and accommodations were delivered to the student through the TDS at the time of testing; the non-embedded designated supports and accommodations were provided at the time of testing to the student by the LEA. Refer to section [*1.9 Systems Overview and Functionality*](#_Systems_Overview_and_2) in [*Chapter 1: Introduction*](#_Introduction) for more details regarding the TDS.

Once a student’s IEP or Section 504 plan team decided which accessibility resource(s) the student should use, LEA CAASPP coordinators and CAASPP test site coordinators used TOMS to assign designated supports and accommodations to students prior to the start of a test session.

There were three ways a student’s accessibility resource(s) could be assigned:

1. Using the ISAAP Tool to identify the accessibility resource(s) and then uploading the spreadsheet it creates into TOMS (This process is discussed in more detail in subsection [*5.5.3 Identification and Selection*](#_Identification_and_Selection_1).)
2. Using the Online Student Test Settings template to enter students’ assignments and then uploading the spreadsheet into TOMS
3. Entering assignments for each student individually in TOMS

If a student’s IEP or Section 504 plan team identified and designated a resource not identified in the CDE Accessibility Matrix, the LEA CAASPP coordinator or CAASPP test site coordinator needed to submit a request for an unlisted resource to be approved by the CDE. The CDE then determined whether the requested unlisted resource changed the construct being measured before the student started testing.

[Appendix 5.A](#_Appendix_5.A:_Accessibility_1) provides information on the number of students who were assigned accommodations and designated supports.

#### Delivery

Universal tools, designated supports, and accommodations can be delivered as either embedded or non-embedded resources. Embedded resources are digitally delivered features or settings available as part of the technology platform for CAA for Science testing. Examples of embedded resources include the expandable items, color contrast, and masking.

Non-embedded resources are available, when provided by the LEA, for both computer-based assessments and paper–pencil tests. These resources are not part of the technology platform for the computer-administered CAA for Science. Examples of non-embedded resources include magnification, noise buffers, and the use of a scribe.

Refer to subsection [*5.5.2 Accessibility Resource Categories*](#_Accessibility_Resource_Categories) for a detailed description of the accessibility resources available to students taking the CAA for Science.

#### Usage of Designated Supports and Accommodations

LEA CAASPP coordinators and CAASPP test site coordinators were responsible for assigning their students’ test settings in TOMS before testing occurred and providing the necessary resources during testing. If a test setting was not applied before testing, then a STAIRS incident was to be submitted to reset the assessment so the student could be retested with the correct accommodation or designated support (refer to subsection [*5.7.10 Security and Test Administration Incident Reporting System Process*](#_Security_and_Test_2) for additional information about STAIRS). If a test setting was accidentally assigned to a student, then a STAIRS incident was also to be submitted to reset the assessment so the student could be retested without the accommodation or designated support.

After schools and LEAs assigned eligible students to accommodations or designated supports, the Cambium Assessment, Inc. (CAI) TDS provided and captured whether a certain accommodation or designated support (or multiple accommodations or designated supports) was used by a student as the student progressed through the assessment.

Table 5.4 reports the number of students by grade level or the grade band and by embedded PT who, based on the availability of data, were assigned to a certain accommodation or designated support and used this accommodation or designated support during test administration. Nearly all students assigned an accommodation or a designated support did not use the accommodation or designated support. Note also that, because the TDS does not capture the usage of all embedded resources and cannot capture the usage of any non-embedded resources, this table reports only on a limited subset of the embedded resources.

Types of accommodations and designated supports—labeled “ACC” and “DS” in the *Resource Type* column—included in table 5.4 are listed as follows:

* **Print-on-Demand:** Paper copies of passages and stimuli, items, or all of these are printed for students.
* **Masking:** This resource involves blocking off content that is not of immediate need or that may be distracting to the student.

The other types of accommodations and designated supports were not used during the 2022–23 CAA for Science administration and, therefore, are not included in these tables.

In table 5.4, ESS is Earth and Space Sciences, LS is Life Sciences, PS is Physical Sciences, and FT is field test.

Table 5.4 Summary of Accommodations and Designated Supports Used by Students

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **PT** | **Accessibility Resource** | **Resource Type** | **Students Assigned** | **Students Used** |
| All grade levels | All | Any Tracked Resource | Any | 735 | 13 |
| All grade levels | ESS | Any Tracked Resource | Any | 692 | 2 |
| All grade levels | ESS | Non-Embedded Print-on-Demand | ACC | 22 | 2 |
| All grade levels | ESS | Embedded Masking | DS | 676 | 0 |
| All grade levels | LS | Any Tracked Resource | Any | 715 | 7 |
| All grade levels | LS | Non-Embedded Print-on-Demand | ACC | 21 | 4 |
| All grade levels | LS | Embedded Masking | DS | 700 | 3 |
| All grade levels | PS | Any Tracked Resource | Any | 727 | 3 |
| All grade levels | PS | Non-Embedded Print-on-Demand | ACC | 22 | 1 |
| All grade levels | PS | Embedded Masking | DS | 711 | 2 |
| All grade levels | FT | Any Tracked Resource | Any | 709 | 6 |
| All grade levels | FT | Non-Embedded Print-on-Demand | ACC | 23 | 4 |
| All grade levels | FT | Embedded Masking | DS | 692 | 2 |
| Grade 5 | All | Any Tracked Resource | Any | 327 | 5 |
| Grade 5 | ESS | Any Tracked Resource | Any | 305 | 2 |
| Grade 5 | ESS | Non-Embedded Print-on-Demand | ACC | 11 | 2 |
| Grade 5 | ESS | Embedded Masking | DS | 297 | 0 |
| Grade 5 | LS | Any Tracked Resource | Any | 317 | 3 |
| Grade 5 | LS | Non-Embedded Print-on-Demand | ACC | 10 | 3 |
| Grade 5 | LS | Embedded Masking | DS | 310 | 0 |
| Grade 5 | PS | Any Tracked Resource | Any | 323 | 1 |
| Grade 5 | PS | Non-Embedded Print-on-Demand | ACC | 11 | 1 |
| Grade 5 | PS | Embedded Masking | DS | 315 | 0 |
| Grade 5 | FT | Any Tracked Resource | Any | 309 | 2 |
| Grade 5 | FT | Non-Embedded Print-on-Demand | ACC | 12 | 1 |
| Grade 5 | FT | Embedded Masking | DS | 300 | 1 |
| Grade 8 | All | Any Tracked Resource | Any | 265 | 4 |
| Grade 8 | ESS | Any Tracked Resource | Any | 249 | 0 |
| Grade 8 | ESS | Non-Embedded Print-on-Demand | ACC | 7 | 0 |
| Grade 8 | ESS | Embedded Masking | DS | 245 | 0 |
| Grade 8 | LS | Any Tracked Resource | Any | 257 | 3 |
| Grade 8 | LS | Non-Embedded Print-on-Demand | ACC | 7 | 1 |
| Grade 8 | LS | Embedded Masking | DS | 253 | 2 |
| Grade 8 | PS | Any Tracked Resource | Any | 262 | 0 |
| Grade 8 | PS | Non-Embedded Print-on-Demand | ACC | 7 | 0 |
| Grade 8 | PS | Embedded Masking | DS | 258 | 0 |
| Grade 8 | FT | Any Tracked Resource | Any | 261 | 2 |
| Grade 8 | FT | Non-Embedded Print-on-Demand | ACC | 7 | 2 |
| Grade 8 | FT | Embedded Masking | DS | 257 | 0 |
| Grade 10 | All | Any Tracked Resource | Any | 11 | 0 |
| Grade 10 | ESS | Any Tracked Resource | Any | 11 | 0 |
| Grade 10 | ESS | Non-Embedded Print-on-Demand | ACC | 0 | 0 |
| Grade 10 | ESS | Embedded Masking | DS | 11 | 0 |
| Grade 10 | LS | Any Tracked Resource | Any | 11 | 0 |
| Grade 10 | LS | Non-Embedded Print-on-Demand | ACC | 0 | 0 |
| Grade 10 | LS | Embedded Masking | DS | 11 | 0 |
| Grade 10 | PS | Any Tracked Resource | Any | 11 | 0 |
| Grade 10 | PS | Non-Embedded Print-on-Demand | ACC | 0 | 0 |
| Grade 10 | PS | Embedded Masking | DS | 11 | 0 |
| Grade 10 | FT | Any Tracked Resource | Any | 11 | 0 |
| Grade 10 | FT | Non-Embedded Print-on-Demand | ACC | 0 | 0 |
| Grade 10 | FT | Embedded Masking | DS | 11 | 0 |
| Grade 11 | All | Any Tracked Resource | Any | 86 | 2 |
| Grade 11 | ESS | Any Tracked Resource | Any | 82 | 0 |
| Grade 11 | ESS | Non-Embedded Print-on-Demand | ACC | 3 | 0 |
| Grade 11 | ESS | Embedded Masking | DS | 79 | 0 |
| Grade 11 | LS | Any Tracked Resource | Any | 86 | 1 |
| Grade 11 | LS | Non-Embedded Print-on-Demand | ACC | 3 | 0 |
| Grade 11 | LS | Embedded Masking Resource | DS | 83 | 1 |
| Grade 11 | PS | Any Tracked Resource | Any | 85 | 0 |
| Grade 11 | PS | Non-Embedded Print-on-Demand | ACC | 3 | 0 |
| Grade 11 | PS | Embedded Masking | DS | 82 | 0 |
| Grade 11 | FT | Any Tracked Resource | Any | 82 | 2 |
| Grade 11 | FT | Non-Embedded Print-on-Demand | ACC | 3 | 1 |
| Grade 11 | FT | Embedded Masking | DS | 79 | 1 |
| Grade 12 | All | Any Tracked Resource | Any | 46 | 2 |
| Grade 12 | ESS | Any Tracked Resource | Any | 45 | 0 |
| Grade 12 | ESS | Non-Embedded Print-on-Demand | ACC | 1 | 0 |
| Grade 12 | ESS | Embedded Masking | DS | 44 | 0 |
| Grade 12 | LS | Any Tracked Resource | Any | 44 | 0 |
| Grade 12 | LS | Non-Embedded Print-on-Demand | ACC | 1 | 0 |
| Grade 12 | LS | Embedded Masking | DS | 43 | 0 |
| Grade 12 | PS | Any Tracked Resource | Any | 46 | 2 |
| Grade 12 | PS | Non-Embedded Print-on-Demand | ACC | 1 | 0 |
| Grade 12 | PS | Embedded Masking | DS | 45 | 2 |
| Grade 12 | FT | Any Tracked Resource | Any | 46 | 0 |
| Grade 12 | FT | Non-Embedded Print-on-Demand | ACC | 1 | 0 |
| Grade 12 | FT | Embedded Masking | DS | 45 | 0 |
| High school | All | Any Tracked Resource | Any | 143 | 4 |
| High school | ESS | Any Tracked Resource | Any | 138 | 0 |
| High school | ESS | Non-Embedded Print-on-Demand | ACC | 4 | 0 |
| High school | ESS | Embedded Masking | DS | 134 | 0 |
| High school | LS | Any Tracked Resource | Any | 141 | 1 |
| High school | LS | Non-Embedded Print-on-Demand | ACC | 4 | 0 |
| High school | LS | Embedded Masking | DS | 137 | 1 |
| High school | PS | Any Tracked Resource | Any | 142 | 2 |
| High school | PS | Non-Embedded Print-on-Demand | ACC | 4 | 0 |
| High school | PS | Embedded Masking | DS | 138 | 2 |
| High school | FT | Any Tracked Resource | Any | 139 | 2 |
| High school | FT | Non-Embedded Print-on-Demand | ACC | 4 | 1 |
| High school | FT | Embedded Masking | DS | 135 | 1 |

### Practice and Training Tests

Practice and training tests are available publicly to LEA staff, students, parent/guardians, and any other individual for the CAA for Science. These tests simulate the experience of the computer-based CAA for Science to allow anyone to experience the assessment.

Students can access practice and training tests using a web browser. They allow students and administrators to familiarize themselves with the user interface and components of the TDS and help maintain the standardization of test administration. Practice and training tests are available through the Practice and Training Test website linked on the Online Practice and Training Tests Portal web page on the CAASPP website.

The practice tests, offered at each grade level or the grade band, were released to prepare students for the CAA for Science. These tests more closely simulate the CAA for Science’s length and complexity and align with the CAA for Science blueprint.

For the CAA for Science, there is one single training test. The training test includes grade five test items for one domain and high school test items for a different domain. The training test is available to students at each grade level and the high school grade band and gives the students an opportunity to interact with many of the item types available on the operational assessment. This opportunity for interaction is especially important for students to become experienced with the functionality of the various item types.

### Test Security and Confidentiality

For the operational CAA for Science, every person who worked with the assessments, communicated test results, or received testing information was responsible for maintaining the security and confidentiality of the assessments, including CDE staff, ETS’ staff, ETS’ subcontractors, LEA assessment coordinators, school assessment coordinators, students, parents/guardians, teachers, and cooperative educational service agency staff. ETS’ Code of Ethics required that all test information, including tangible materials (e.g., test items), confidential files (e.g., those containing personally identifiable student information), and processes related to test administration (e.g., the configurations of secure servers), were kept secure. ETS had systems in place that maintained tight security for test items and test results, as well as for student data. To ensure security for all assessments that ETS develops or handles, ETS maintains an Office of Testing Integrity (OTI), which is described in the next subsection.

All assessments within the CAASPP System, as well as the confidentiality of student information, should be protected to ensure the validity, reliability, and fairness of the results. As stated in *Standard 7.9* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014), “The documentation should explain the steps necessary to protect test materials and to prevent inappropriate exchange of information during the test administration session” (p. 128).

This section of the *CAA for Science Technical Report* describes the measures intended to prevent potential test security incidents prior to testing and the actions that were taken to handle security incidents occurring during or after the testing window using the STAIRS process.

#### ETS’ Office of Testing Integrity

The OTI is a division of ETS that provides quality-assurance services for all testing programs managed by ETS. This division resides in the ETS legal department. The Office of Professional Standards Compliance at ETS publishes and maintains the *ETS Standards for Quality and Fairness* (2014), which supports the OTI’s goals and activities. The *ETS Standards for Quality and Fairness* provides guidelines to help ETS’ staff design, develop, and deliver technically sound, fair, and beneficial products and services and help the public and auditors evaluate those products and services.

The OTI’s mission is to

* prevent test security violations;
* minimize any testing security violations that can impact the fairness of testing;
* minimize and investigate any security breach that threatens the validity of the interpretation of test scores; and
* report on security activities.

The OTI helps prevent misconduct on the part of students and administrators, detects potential misconduct through empirically established indicators, and resolves situations involving misconduct in a fair and equitable way that reflects the laws and professional standards governing the integrity of testing. The OTI also implements policies designed to detect and block technologies used to gain an unfair advantage.

In its pursuit of enforcing secure testing practices, the OTI strives to safeguard the various processes involved in an assessment development and administration cycle. For the CAA for Science, those processes included the following:

* Assessment development
* Item and data review
* Item banking
* Transfer of forms and items to the CDE and CAI
* Security of electronic files using a firewall
* Test administration
* Test delivery
* Processing and scoring
* Data management
* Statistical analysis
* Student confidentiality

#### Procedures to Maintain Standardization of Test Security

Test security requires the accounting of all secure materials—including computer-based summative assessment items and student data—before, during, and after each test administration. The LEA CAASPP coordinator is responsible for keeping all electronic test materials secure, keeping student information confidential, and making sure the CAASPP test site coordinators and test examiners are properly trained regarding security policies and procedures.

The CAASPP test site coordinator is responsible for mitigating test security incidents at the test site and for reporting incidents to the LEA CAASPP coordinator.

The test examiner is responsible for reporting testing incidents to the CAASPP test site coordinator and securely destroying printed and digital media for items and passages generated by the print-on-demand feature of the TDS (CDE, 2023e).

The following measures ensured the security of the CAASPP:

* LEA CAASPP coordinators and CAASPP test site coordinators must have electronically signed and submitted a “CAASPP Test Security Agreement for LEA CAASPP coordinators and CAASPP test site coordinators” form in TOMS before ETS can grant the coordinators access to TOMS (5 *CCR* Section 859[d]).
* Anyone having access to the testing materials must have electronically signed and submitted a “Test Security Affidavit for Test Examiners, Test Administrators, Proctors, Translators, Scribes, and Any Other Person Having Access to CAASPP Tests” form in TOMS before receiving access to any testing materials (5 *CCR* Section 859[c]).
* Anyone having access to the testing materials but not having access to TOMS must have signed the CAASPP *Test Security Affidavit for Non-TOMS Users*, which was available as a web-based form, before receiving access to any testing materials.

In addition, it was the responsibility of every participant in the CAASPP System to report immediately any violation or suspected violation of test security or confidentiality. The test examiner reported to the CAASPP test site coordinator or LEA CAASPP coordinator, who then submitted the incident using the STAIRS/Appeals process. Breach incidents were to be reported by the LEA CAASPP coordinator to the California Technical Assistance Center (CalTAC) and entered into STAIRS within 24 hours of the incident (5 *CCR* Section 859[e]).

#### Test Security Monitoring

The LEA and school testing staff were responsible for maintaining the security and confidentiality of testing materials and devices during the testing window and reporting any irregularities or breaches that occurred. ETS performed site visits and testing procedure audits at randomly selected LEAs and test sites throughout California during the test administration of CAASPP and the ELPAC operational assessments. Audits were performed before, during, and after test administrations to observe adherence to published procedures regarding the handling of testing materials and test administration guidelines.

To provide this service, ETS used its OTI and subcontractor staff as auditors. All auditors had a minimum of a high school diploma, a valid driver’s license, and experience in security auditing or a related field. All had passed a background check conducted by the subcontracted vendor as part of the employment process.

ETS provided a final summary report of audit findings to the CDE at the end of the test administration. In addition, the OTI reported findings and recommendations to ETS’ program management on a weekly basis as audits were completed. ETS’ program management reported a summary of these findings to the CDE after a site visit. The OTI also provided individual audit reports directly to the LEA at the completion of the testing year.

#### Security of Electronic Files Using a Firewall

A firewall is software that prevents unauthorized entry to files, email, and other organization-specific information. All ETS data exchanges and internal email remain within the ETS firewall at all ETS locations, ranging from Princeton, New Jersey; to San Antonio, Texas; to Sacramento, California.

All electronic applications that are included in TOMS remain protected by the ETS firewall software at all times. Because of the sensitive nature of the student information processed by TOMS, the firewall plays a significant role in maintaining assurance of confidentiality among the users of this information.

Refer to section [*1.9 Systems Overview and Functionality*](#_Systems_Overview_and_2) in[*Chapter 1: Introduction*](#_Introduction) for more information on TOMS.

#### Transfer of Scores via Secure Data Exchange

Because of the confidential nature of test results, ETS uses secure file transfer protocol (SFTP) and encryption for all data file transfers; test data is never sent via email. SFTP is a method for reliable and exclusive routing of files. Files reside on a password-protected server that only authorized users can access. ETS shares an SFTP server with the CDE. On that site, ETS posts Microsoft Word and Excel files, Adobe Acrobat PDFs, or other document files for the CDE to review; the CDE returns reviewed materials in the same manner. Files are deleted upon retrieval.

The SFTP server is used as a conduit for the transfer of files; secure test data is stored only temporarily on the shared SFTP server. Industry-standard secure protocols are used to transfer test content and student data from the ETS internal data center to any external systems.

For the 2022–23 CAA for Science, ETS entered information about the deliverable into a web form on a SharePoint website when a file was posted. A CDE staff member monitored this log throughout the day for updates to the status of deliverables and downloaded and deleted the file from the SFTP server when its status showed that it had been posted.

#### Data Management in the Secure Database

ETS maintains a secure database to house all student demographic data and assessment results. Information associated with each student has a database relationship to the LEA, school, and grade codes as the data is collected during testing. Only individuals with the appropriate credentials can access the data. ETS builds all interfaces with the most stringent security considerations, including interfaces with data encryption for databases that store test items and student data. ETS applies best and up-to-date security practices, including system-to-system authentication and authorization, in all solution designs.

All stored test content and student data is encrypted. Industry-standard secure protocols are used to transfer test content and student data from the ETS internal data center to any external systems. ETS complies with the Family Educational Rights and Privacy Act (20 *United States Code [USC]* § 1232g; 34 *Code of Federal Regulations* Part 99) and the Children’s Online Privacy Protection Act (15 *USC* §§ 6501-6506, P.L. No. 105–277, 112 Stat. 2681–1728).

In TOMS, staff at LEAs and test sites have different levels of access appropriate to the role assigned to them (CDE, 2023d).

#### Statistical Analysis on Secure Servers

During CAASPP testing, ETS’ information technology staff members retrieve data files from CAI and load those files into a database. The ETS Data Quality Services staff extract the data from the database and perform quality-control procedures (e.g., the values of all variables are as expected) before passing files to the ETS statistical analysis group. The statistical analysis staff store the files on secure servers. All staff members involved with the data adhere to the ETS Code of Ethics and the ETS Information Protection Policies to prevent any unauthorized access to data.

#### Student Confidentiality

To meet the requirements of the Every Student Succeeds Act, as well as state requirements, LEAs must collect demographic data about students’ ethnicity, disabilities, parent/guardian education, and so forth during the school year. ETS takes every precaution to prevent any of this information from becoming public or being used for anything other than for testing and score-reporting purposes. These procedures are applied to all documents in which student demographic data appears, such as technical reports.

#### Student Test Results

##### Types of Results

The following deliverables are produced for reporting of the CAA for Science:

* Individual student results for computer-based assessments in the California Educator Reporting System (CERS)
* Individual SSRs (electronic)
* Internet reports—available on the CDE Test Results for California’s Assessments website—aggregated by content area and state, county, LEA, or test site

##### Security of Results Files

ETS takes measures to protect files and reports that show students’ scores and reporting levels. ETS is committed to safeguarding all secure information in its possession from unauthorized access, disclosure, modification, or destruction. ETS has strict information security policies in place to protect the confidentiality of both student and client data. Staff access to production databases is limited to personnel with a business need to access the data. User IDs for production systems must be person-specific or for systems use only.

ETS has implemented network controls for routers, gateways, switches, firewalls, network tier management, and network connectivity. Routers, gateways, and switches represent points of access between networks. However, these do not contain mass storage or represent points of vulnerability, particularly for unauthorized access or denial of service.

ETS has many facilities, policies, and procedures to protect computer files. Software and procedures such as firewalls, intrusion detection, and virus control are in place to provide for physical security, data security, and disaster recovery. ETS is certified in both the ISO 27001 standard for information security and the ISO 22301 standard for business continuity, and conducts disaster recovery exercises annually.

Access to the ETS Computer Processing Center is controlled by employee and visitor identification badges. The Center is secured by doors that can be unlocked only by the badges of personnel who have functional responsibilities within its secure perimeter. Authorized personnel accompany visitors to the ETS Computer Processing Center at all times. Extensive smoke detection and alarm systems, as well as a preaction fire-control system, are installed in the Center.

##### Security of Individual Results

ETS protects individual students’ results during the following conditions:

* Scoring
* Transfer of scores by means of secure data exchange
* Reporting
* Posting of aggregated data
* Storage

In addition to protecting the confidentiality of testing materials, ETS’ Code of Ethics further prohibits ETS’ employees from financial misuse, conflicts of interest, and unauthorized appropriation of ETS’ property and resources. Specific rules are also given to ETS’ employees and their immediate families who may take an assessment developed by ETS. The ETS OTI verifies that these standards are followed throughout ETS. This verification is conducted, in part, by periodic on-site security audits of departments, with follow-up reports containing recommendations for improvement.

#### Security and Test Administration Incident Reporting System Process

Test security incidents, such as improprieties, irregularities, and breaches, are prohibited behaviors that give a student an unfair advantage or compromise the secure administration of the assessments, which, in turn, compromise the reliability and validity of test results (CDE, 2023b). Whether intentional or unintentional, failure by staff or students to comply with security rules constitutes a test security incident. Test security incidents impact scoring and affect students’ performance on the assessment.

LEA CAASPP coordinators and CAASPP test site coordinators ensured that all test security and summative administration incidents were documented by following the prompts in TOMS that guided coordinators in their submittal. An Appeal is a request to reset, restore, reopen, invalidate, or grant a grace period extension to a student’s assessment. If an Appeal to a student’s assessment was warranted, TOMS provided additional prompts to file the Appeal.

After a case was submitted, an email containing a case number and next steps was sent to the submitter (and to the LEA CAASPP coordinator, if the case was submitted by the CAASPP test site coordinator). The STAIRScase in TOMS provided the LEA CAASPP coordinator, the CDE, and the LEA Outreach Administrator with the opportunity to interact and communicate regarding the STAIRS process (CDE, 2023b).

Prior to the assessment administration, ETS and the CDE agreed that the following types of STAIRS cases would also be forwarded to the CDE:

* Student cheating or accessing unauthorized devices
* Security breach (where a student exposed secure materials)
* Student unable to review previous answers (i.e., 20-minute pause rule)

Appeals requests were reviewed by the CDE or an ETS LEA Outreach Administrator. When a request to submit an Appeal was approved, the coordinator received a system-generated email with the Appeal type that was approved (CDE, 2023b).

Types of Appeals available during the 2022–23 CAASPP administration are described in table 5.5.

Table 5.5 Types of Appeals

|  |  |
| --- | --- |
| **Type of Appeal** | **Description** |
| Reset | Resetting a student’s assessment removed that assessment from the system and enabled the student to start a new assessment from the beginning. |
| Invalidate | Invalidated assessments were scored, and scores were provided on the SSR with a note that an irregularity occurred. The student(s) was counted as participating in the calculation of the school’s participation rate for accountability purposes. |
| Re-open | Reopening an assessment allowed a student to access an assessment that had already been submitted or had expired. |
| Restore | Restoring an assessment returned an assessment from the Reset status to its prior status. This action could be performed only on assessments that were reset previously. |
| Grace Period Extension | Permitting a grace period extension allowed the student to review previously answered items upon logging back on to the assessment after expiration of the pause rule.  A grace period extension was granted only in cases where there was a disruption to a test session, such as a technical difficulty, fire drill, schoolwide power outage, earthquake, or other act beyond the control of the test examiner. |

##### Impropriety

A testing impropriety is an unusual circumstance that has a low impact on the individual or group of students who are testing and has a low risk of potentially affecting student performance on the assessment, test security, or test validity. An example of an impropriety could be if students were making distracting gestures or sounds or talking during the test session that creates a disruption in the test session for other students, or a student left the test room without authorization.

An impropriety can be corrected and contained at a local level. An impropriety should be reported to the LEA CAASPP coordinator and CAASPP test site coordinator immediately. The coordinator must report the incident within 24 hours, using the STAIRS/Appeals process in TOMS.

##### Irregularity

A testing irregularity is an unusual circumstance that impacts an individual or a group of students who are testing and may potentially affect student performance on the assessment or impact test security or test validity. An example of an irregularity could be that students were assigned an incorrect designated support or accommodation, or students cheated or provided answers to each other.

These circumstances can be corrected and contained at the local level and submitted using the STAIRS/Appeals process in TOMS. An irregularity must be reported to the LEA CAASPP coordinator and CAASPP test site coordinator immediately. The coordinator must report the irregularity within 24 hours, using the online STAIRS/Appeals process in TOMS.

##### Breach

A testing breach is an event that poses a threat to the validity of the assessment. Examples may include such situations as a release of secure materials or a security or system risk. These circumstances have external implications for the CDE and may result in a decision to remove the test item(s) from the available secure item bank.

Breaches require immediate attention; a breach that was due to social media exposure on the part of a student or adult or due to media coverage of an administration was to be escalated to CalTAC via a telephone call from the LEA CAASPP coordinator. Following the call, the CAASPP test site coordinator or LEA CAASPP coordinator must report the incident using the online STAIRS/Appeals process in TOMS within 24 hours. All other breaches were to be entered into STAIRS directly.

#### Appeals

For test security incidents reported in STAIRS that resulted in a need to invalidate, restore, or provide a grace period extension for individual computer-based student assessments, the request had to be approved by the CDE. Requests to reset and reopen assessments were processed by an LEA Outreach Administrator.

In most instances, an Appeal was submitted to address a test security breach or irregularity. The LEA CAASPP coordinator or CAASPP test site coordinator submitted Appeals in TOMS. All submitted Appeals were available for retrieval and reviewed by LEA and site coordinators within a given organization. However, the view of Appeals was restricted according to the user role as established in TOMS. An Appeal could be requested only by the LEA CAASPP coordinator or CAASPP test site coordinator if prompted while filing a STAIRS case in TOMS (CDE, 2023b). Types of Appeals available during the 2022–23 CAASPP administration are described in table 5.5.

Table 5.6 presents the number of Appeals approved and rejected, respectively, by Appeal type for the CAA for Science.

Table 5.6 Number of Appeals Requested in STAIRS in the 2022–23 Administration

|  |  |  |
| --- | --- | --- |
| **Appeal Type** | **Number of Appeals Approved** | **Number of Appeals Rejected** |
| Reset | 39 | 5 |
| Invalidate | 0 | 0 |
| Re-open | 53 | 0 |
| Restore | 8 | 0 |
| Grace Period Extension | 0 | 0 |
| **Totals:** | **100** | **5** |

Table 5.7 presents the number and types of incidents submitted in STAIRS in the 2022–23 administration for the CAA for Science, as well as the number of individual Statewide Student Identifiers (SSIDs) submitted and approved. The number in the *Appeals SSIDs Approved* column is the number of accepted cases that resulted in an Appeal, which may differ from the number in the *Number of Incidents* column because of incorrect entry or other factors.

Table 5.7 Number and Types of Incidents Submitted in STAIRS in the 2022–23 Administration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Description** | **Appeal Type** | **Number of Incidents** | **Total Number of SSIDs Submitted** | **Appeals SSIDs Approved** |
| Accessibility Issue | Reset | 5 | 9 | 9 |
| Administered Incorrect Assessment | Reset, Re-open, or No Appeal | 33 | 35 | 30 |
| Administration Error | No Appeal | 0 | 0 | 0 |
| Data Entry Issue | Reset, Re-open, Invalidate, or No Appeal | 0 | 0 | 0 |
| Expired or Accidentally Submitted Test | Re-open | 48 | 53 | 53 |
| Exposing Secure Materials | Invalidate or No Appeal | 0 | 0 | 0 |
| Incorrect SSID Used | Reset or No Appeal | 0 | 0 | 0 |
| Restore from Reset | Restore | 8 | 8 | 8 |
| Student Cheating or Accessing Unauthorized Devices | Invalidate | 0 | 0 | 0 |
| Student Disruption | No Appeal | 0 | 0 | 0 |
| Technical Issues | Grace Period Extension or No Appeal | 0 | 0 | 0 |
| Validity Issue | Invalidate or Reset | 0 | 0 | 0 |
| **Totals:** | **N/A** | **94** | **105** | **100** |

### Processing and Scoring

The CAA for Science was administered as a computer-based assessment only and required two internet-connected devices: a student testing device and a separate device the test examiner used to start a test session through the Test Administrator Interface. The CAA for Science required the installation of CAASPP secure browsers on student testing devices. These were the same secure browsers used for the other computer-based CAASPP assessments. Test examiners used their device to open a *DFA* document, which included the scripts they used to guide their students through the assessment. All item types were designed to be machine-scorable.

### References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing.* Washington, DC: American Educational Research Association.

*California* *Code of Regulations,* Title 5, Education, Division 1, Chapter 2, Subchapter 3.75, Article 2.

California Department of Education. (2022a). *2022–23 CAA for Science administration planning guide: Grade eight.* Sacramento, CA: California Department of Education.

California Department of Education. (2022b). *2022–23 California Alternate Assessment for Science test examiner tutorial*. Sacramento, CA: California Department of Education.

California Department of Education. (2022c). *CAA for Science preparing for administration*. Sacramento, CA: California Department of Education.

California Department of Education. (2022d). *California Alternate Assessment for Science training test directions for administration.* Sacramento, CA: California Department of Education.

California Department of Education. (2022e). *California assessment accessibility resources matrix*. Sacramento, CA: California Department of Education.

California Department of Education. (2022f). *Science test administration for high school students.* Sacramento, CA: California Department of Education.

California Department of Education. (2023a). *CAASPP and ELPAC accessibility guide*. Sacramento, CA: California Department of Education.

California Department of Education. (2023b). *CAASPP and ELPAC* *security incidents and Appeals procedure guide.* Sacramento, CA: California Department of Education.

California Department of Education. (2023c). *CAASPP and ELPAC technical specifications and configuration guide for online testing*. Sacramento, CA: California Department of Education.

California Department of Education. (2023d). *CAASPP and ELPAC Test Operations Management System user guide*. Sacramento, CA: California Department of Education.

California Department of Education. (2023e). *CAASPP* *online test administration manual.* Sacramento, CA: California Department of Education.

Educational Testing Service. (2014). *ETS standards for quality and fairness*. Princeton, NJ: Educational Testing Service.

Smarter Balanced Assessment Consortium. (2014). *Smarter Balanced Assessment Consortium: Usability, accessibility, and accommodations implementation guide.* Los Angeles: Smarter Balanced Assessment Consortium.

Smarter Balanced Assessment Consortium. (2018). *Smarter Balanced resources and practices comparison crosswalk.* Los Angeles: Smarter Balanced Assessment Consortium.

Smarter Balanced Assessment Consortium. (2022). *Smarter Balanced Assessment Consortium: Usability, accessibility, and accommodations guidelines.* Los Angeles: Smarter Balanced Assessment Consortium.

Smarter Balanced Assessment Consortium. (2023). *Accessibility strategies* (web page). Los Angeles: Smarter Balanced Assessment Consortium.

### Appendix 5.A: Accessibility Resource Assignment

**Notes:**

* The total students tested refers to the number of students who started the embedded PT.
* Some students are eligible for multiple accessibility resources. As a result, the number of students tested per grade level may not equal the sum of the number of students eligible per accessibility resource across all accessibility resources.

Table 5.A.1 Accessibility Resource Assignment—Grades Five and Eight for Earth and Space Sciences

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Accessibility Resource** | **Grade 5: N** | **Grade 5: % of Total Tested** | **Grade 8: N** | **Grade 8: % of Total Tested** |
| Non-Embedded Accommodation—Abacus | 115 | 2% | 54 | 1% |
| Non-Embedded Accommodation—Additional Instructional Supports for Alternate Assessments | 898 | 18% | 778 | 17% |
| Non-Embedded Accommodation—Alternate Response Options | 615 | 12% | 477 | 10% |
| Non-Embedded Accommodation—Print on Demand | 11 | 0% | 7 | 0% |
| Non-Embedded Accommodation—Unlisted Resources | 0 | 0% | 0 | 0% |
| Embedded Designated Support—Color Contrast | 22 | 0% | 25 | 1% |
| Embedded Designated Support—Masking | 297 | 6% | 245 | 5% |
| Embedded Designated Support—Mouse Pointer | 106 | 2% | 76 | 2% |
| Embedded Designated Support—Permissive Mode | 25 | 1% | 20 | 0% |
| Embedded Designated Support—Print Size | 81 | 2% | 106 | 2% |
| Embedded Designated Support—Streamline | 173 | 3% | 154 | 3% |
| Embedded Designated Support—Turn Off Any Universal Tools | 0 | 0% | 0 | 0% |
| Non-Embedded Designated Support—Amplification | 65 | 1% | 54 | 1% |
| Non-Embedded Designated Support—Color Contrast | 27 | 1% | 29 | 1% |
| Non-Embedded Designated Support—Magnification | 119 | 2% | 120 | 3% |
| Non-Embedded Designated Support—Medical Supports | 11 | 0% | 4 | 0% |
| Non-Embedded Designated Support—Multiplication Table | 337 | 7% | 343 | 7% |
| Non-Embedded Designated Support—Noise Buffers | 661 | 13% | 504 | 11% |
| Non-Embedded Designated Support—Read Aloud Items | 1,438 | 29% | 1,208 | 26% |
| Non-Embedded Designated Support—Scribe Items | 625 | 13% | 519 | 11% |
| Non-Embedded Designated Support—Separate Setting | 1,650 | 33% | 1,436 | 31% |
| Non-Embedded Designated Support—Simplified Test Directions | 1,445 | 29% | 1,262 | 27% |
| Non-Embedded Designated Support—100s Number Table | 428 | 9% | 347 | 7% |
| **Total Students Tested:** | **4,954** | **N/A** | **4,672** | **N/A** |

Table 5.A.2 Accessibility Resource Assignment—Grades Five and Eight for Life Sciences

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Accessibility Resource** | **Grade 5: N** | **Grade 5: % of Total Tested** | **Grade 8: N** | **Grade 8: % of Total Tested** |
| Non-Embedded Accommodation—Abacus | 116 | 2% | 53 | 1% |
| Non-Embedded Accommodation—Additional Instructional Supports for Alternate Assessments | 954 | 19% | 792 | 17% |
| Non-Embedded Accommodation—Alternate Response Options | 656 | 13% | 479 | 10% |
| Non-Embedded Accommodation—Print on Demand | 10 | 0% | 7 | 0% |
| Non-Embedded Accommodation—Unlisted Resources | 0 | 0% | 0 | 0% |
| Embedded Designated Support—Color Contrast | 24 | 0% | 26 | 1% |
| Embedded Designated Support—Masking | 310 | 6% | 253 | 5% |
| Embedded Designated Support—Mouse Pointer | 108 | 2% | 81 | 2% |
| Embedded Designated Support—Permissive Mode | 24 | 0% | 21 | 0% |
| Embedded Designated Support—Print Size | 83 | 2% | 113 | 2% |
| Embedded Designated Support—Streamline | 173 | 3% | 154 | 3% |
| Embedded Designated Support—Turn Off Any Universal Tools | 0 | 0% | 0 | 0% |
| Non-Embedded Designated Support—Amplification | 63 | 1% | 55 | 1% |
| Non-Embedded Designated Support—Color Contrast | 28 | 1% | 31 | 1% |
| Non-Embedded Designated Support—Magnification | 124 | 3% | 124 | 3% |
| Non-Embedded Designated Support—Medical Supports | 12 | 0% | 5 | 0% |
| Non-Embedded Designated Support—Multiplication Table | 354 | 7% | 350 | 7% |
| Non-Embedded Designated Support—Noise Buffers | 695 | 14% | 520 | 11% |
| Non-Embedded Designated Support—Read Aloud Items | 1,511 | 31% | 1,237 | 26% |
| Non-Embedded Designated Support—Scribe Items | 646 | 13% | 528 | 11% |
| Non-Embedded Designated Support—Separate Setting | 1,720 | 35% | 1,464 | 31% |
| Non-Embedded Designated Support—Simplified Test Directions | 1,523 | 31% | 1,288 | 28% |
| Non-Embedded Designated Support—100s Number Table | 443 | 9% | 351 | 8% |
| **Total Students Tested:** | **4,954** | **N/A** | **4,672** | **N/A** |

Table 5.A.3 Accessibility Resource Assignment—Grades Five and Eight for Physical Sciences

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Accessibility Resource** | **Grade 5: N** | **Grade 5: % of Total Tested** | **Grade 8: N** | **Grade 8: % of Total Tested** |
| Non-Embedded Accommodation—Abacus | 117 | 2% | 54 | 1% |
| Non-Embedded Accommodation—Additional Instructional Supports for Alternate Assessments | 945 | 19% | 804 | 17% |
| Non-Embedded Accommodation—Alternate Response Options | 654 | 13% | 490 | 10% |
| Non-Embedded Accommodation—Print on Demand | 11 | 0% | 7 | 0% |
| Non-Embedded Accommodation—Unlisted Resources | 0 | 0% | 0 | 0% |
| Embedded Designated Support—Color Contrast | 24 | 0% | 26 | 1% |
| Embedded Designated Support—Masking | 315 | 6% | 258 | 6% |
| Embedded Designated Support—Mouse Pointer | 111 | 2% | 79 | 2% |
| Embedded Designated Support—Permissive Mode | 25 | 1% | 21 | 0% |
| Embedded Designated Support—Print Size | 83 | 2% | 112 | 2% |
| Embedded Designated Support—Streamline | 178 | 4% | 156 | 3% |
| Embedded Designated Support—Turn Off Any Universal Tools | 0 | 0% | 0 | 0% |
| Non-Embedded Designated Support—Amplification | 64 | 1% | 55 | 1% |
| Non-Embedded Designated Support—Color Contrast | 29 | 1% | 32 | 1% |
| Non-Embedded Designated Support—Magnification | 123 | 2% | 124 | 3% |
| Non-Embedded Designated Support—Medical Supports | 12 | 0% | 5 | 0% |
| Non-Embedded Designated Support—Multiplication Table | 354 | 7% | 356 | 8% |
| Non-Embedded Designated Support—Noise Buffers | 688 | 14% | 521 | 11% |
| Non-Embedded Designated Support—Read Aloud Items | 1,506 | 30% | 1,260 | 27% |
| Non-Embedded Designated Support—Scribe Items | 650 | 13% | 540 | 12% |
| Non-Embedded Designated Support—Separate Setting | 1,721 | 35% | 1,484 | 32% |
| Non-Embedded Designated Support—Simplified Test Directions | 1,526 | 31% | 1,312 | 28% |
| Non-Embedded Designated Support—100s Number Table | 441 | 9% | 361 | 8% |
| **Total Students Tested:** | **4,954** | **N/A** | **4,672** | **N/A** |

Table 5.A.4 Accessibility Resource Assignment—High School for Earth and Space Sciences

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accessibility Resource** | **Grade 10: N** | **Grade 10: % of Total Tested** | **Grade 11: N** | **Grade 11: % of Total Tested** | **Grade 12: N** | **Grade 12: % of Total Tested** | **High School: N** | **High School: % of Total Tested** |
| Non-Embedded Accommodation—Abacus | 1 | 0% | 26 | 1% | 5 | 0% | 32 | 1% |
| Non-Embedded Accommodation—Additional Instructional Supports for Alternate Assessments | 33 | 10% | 258 | 8% | 89 | 6% | 380 | 8% |
| Non-Embedded Accommodation—Alternate Response Options | 33 | 10% | 180 | 6% | 96 | 6% | 309 | 6% |
| Non-Embedded Accommodation—Print on Demand | 0 | 0% | 3 | 0% | 1 | 0% | 4 | 0% |
| Non-Embedded Accommodation—Unlisted Resources | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Embedded Designated Support—Color Contrast | 0 | 0% | 6 | 0% | 0 | 0% | 6 | 0% |
| Embedded Designated Support—Masking | 11 | 3% | 79 | 3% | 44 | 3% | 134 | 3% |
| Embedded Designated Support—Mouse Pointer | 3 | 1% | 13 | 0% | 43 | 3% | 59 | 1% |
| Embedded Designated Support—Permissive Mode | 0 | 0% | 7 | 0% | 18 | 1% | 25 | 1% |
| Embedded Designated Support—Print Size | 1 | 0% | 24 | 1% | 18 | 1% | 43 | 1% |
| Embedded Designated Support—Streamline | 2 | 1% | 40 | 1% | 22 | 1% | 64 | 1% |
| Embedded Designated Support—Turn Off Any Universal Tools | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Non-Embedded Designated Support—Amplification | 1 | 0% | 17 | 1% | 9 | 1% | 27 | 1% |
| Non-Embedded Designated Support—Color Contrast | 1 | 0% | 11 | 0% | 5 | 0% | 17 | 0% |
| Non-Embedded Designated Support—Magnification | 3 | 1% | 48 | 2% | 30 | 2% | 81 | 2% |
| Non-Embedded Designated Support—Medical Supports | 2 | 1% | 7 | 0% | 3 | 0% | 12 | 0% |
| Non-Embedded Designated Support—Multiplication Table | 41 | 13% | 140 | 5% | 52 | 3% | 233 | 5% |
| Non-Embedded Designated Support—Noise Buffers | 32 | 10% | 153 | 5% | 71 | 5% | 256 | 5% |
| Non-Embedded Designated Support—Read Aloud Items | 90 | 28% | 452 | 15% | 218 | 14% | 760 | 15% |
| Non-Embedded Designated Support—Scribe Items | 25 | 8% | 180 | 6% | 72 | 5% | 277 | 6% |
| Non-Embedded Designated Support—Separate Setting | 92 | 28% | 556 | 18% | 273 | 18% | 921 | 19% |
| Non-Embedded Designated Support—Simplified Test Directions | 80 | 25% | 440 | 14% | 204 | 13% | 724 | 15% |
| Non-Embedded Designated Support—100s Number Table | 38 | 12% | 130 | 4% | 69 | 4% | 237 | 5% |
| **Total Students Tested:** | **323** | **N/A** | **3,072** | **N/A** | **1,552** | **N/A** | **4,947** | **N/A** |

Table 5.A.5 Accessibility Resource Assignment—High School for Life Sciences

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accessibility Resource** | **Grade 10: N** | **Grade 10: % of Total Tested** | **Grade 11: N** | **Grade 11: % of Total Tested** | **Grade 12: N** | **Grade 12: % of Total Tested** | **High School: N** | **High School: % of Total Tested** |
| Non-Embedded Accommodation—Abacus | 1 | 0% | 26 | 1% | 5 | 0% | 32 | 1% |
| Non-Embedded Accommodation—Additional Instructional Supports for Alternate Assessments | 33 | 10% | 268 | 9% | 93 | 6% | 394 | 8% |
| Non-Embedded Accommodation—Alternate Response Options | 33 | 10% | 186 | 6% | 101 | 7% | 320 | 6% |
| Non-Embedded Accommodation—Print on Demand | 0 | 0% | 3 | 0% | 1 | 0% | 4 | 0% |
| Non-Embedded Accommodation—Unlisted Resources | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Embedded Designated Support—Color Contrast | 0 | 0% | 6 | 0% | 0 | 0% | 6 | 0% |
| Embedded Designated Support—Masking | 11 | 3% | 83 | 3% | 43 | 3% | 137 | 3% |
| Embedded Designated Support—Mouse Pointer | 3 | 1% | 13 | 0% | 43 | 3% | 59 | 1% |
| Embedded Designated Support—Permissive Mode | 0 | 0% | 7 | 0% | 18 | 1% | 25 | 1% |
| Embedded Designated Support—Print Size | 1 | 0% | 25 | 1% | 18 | 1% | 44 | 1% |
| Embedded Designated Support—Streamline | 2 | 1% | 40 | 1% | 22 | 1% | 64 | 1% |
| Embedded Designated Support—Turn Off Any Universal Tools | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Non-Embedded Designated Support—Amplification | 1 | 0% | 17 | 1% | 9 | 1% | 27 | 1% |
| Non-Embedded Designated Support—Color Contrast | 1 | 0% | 12 | 0% | 6 | 0% | 19 | 0% |
| Non-Embedded Designated Support—Magnification | 3 | 1% | 52 | 2% | 30 | 2% | 85 | 2% |
| Non-Embedded Designated Support—Medical Supports | 2 | 1% | 7 | 0% | 3 | 0% | 12 | 0% |
| Non-Embedded Designated Support—Multiplication Table | 41 | 13% | 145 | 5% | 53 | 3% | 239 | 5% |
| Non-Embedded Designated Support—Noise Buffers | 32 | 10% | 157 | 5% | 71 | 5% | 260 | 5% |
| Non-Embedded Designated Support—Read Aloud Items | 89 | 28% | 469 | 15% | 222 | 14% | 780 | 16% |
| Non-Embedded Designated Support—Scribe Items | 24 | 7% | 191 | 6% | 72 | 5% | 287 | 6% |
| Non-Embedded Designated Support—Separate Setting | 91 | 28% | 578 | 19% | 274 | 18% | 943 | 19% |
| Non-Embedded Designated Support—Simplified Test Directions | 79 | 24% | 466 | 15% | 206 | 13% | 751 | 15% |
| Non-Embedded Designated Support—100s Number Table | 38 | 12% | 143 | 5% | 71 | 5% | 252 | 5% |
| **Total Students Tested:** | **323** | **N/A** | **3,072** | **N/A** | **1,552** | **N/A** | **4,947** | **N/A** |

Table 5.A.6 Accessibility Resource Assignment—High School for Physical Sciences

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Accessibility Resource** | **Grade 10: N** | **Grade 10: % of Total Tested** | **Grade 11: N** | **Grade 11: % of Total Tested** | **Grade 12: N** | **Grade 12: % of Total Tested** | **High School: N** | **High School: % of Total Tested** |
| Non-Embedded Accommodation—Abacus | 1 | 0% | 26 | 1% | 5 | 0% | 32 | 1% |
| Non-Embedded Accommodation—Additional Instructional Supports for Alternate Assessments | 33 | 10% | 268 | 9% | 93 | 6% | 394 | 8% |
| Non-Embedded Accommodation—Alternate Response Options | 33 | 10% | 185 | 6% | 101 | 7% | 319 | 6% |
| Non-Embedded Accommodation—Print on Demand | 0 | 0% | 3 | 0% | 1 | 0% | 4 | 0% |
| Non-Embedded Accommodation—Unlisted Resources | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Embedded Designated Support—Color Contrast | 0 | 0% | 6 | 0% | 0 | 0% | 6 | 0% |
| Embedded Designated Support—Masking | 11 | 3% | 82 | 3% | 45 | 3% | 138 | 3% |
| Embedded Designated Support—Mouse Pointer | 3 | 1% | 13 | 0% | 44 | 3% | 60 | 1% |
| Embedded Designated Support—Permissive Mode | 0 | 0% | 8 | 0% | 18 | 1% | 26 | 1% |
| Embedded Designated Support—Print Size | 1 | 0% | 25 | 1% | 18 | 1% | 44 | 1% |
| Embedded Designated Support—Streamline | 2 | 1% | 40 | 1% | 23 | 1% | 65 | 1% |
| Embedded Designated Support—Turn Off Any Universal Tools | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Non-Embedded Designated Support—Amplification | 1 | 0% | 17 | 1% | 9 | 1% | 27 | 1% |
| Non-Embedded Designated Support—Color Contrast | 1 | 0% | 12 | 0% | 6 | 0% | 19 | 0% |
| Non-Embedded Designated Support—Magnification | 3 | 1% | 52 | 2% | 30 | 2% | 85 | 2% |
| Non-Embedded Designated Support—Medical Supports | 2 | 1% | 7 | 0% | 3 | 0% | 12 | 0% |
| Non-Embedded Designated Support—Multiplication Table | 41 | 13% | 146 | 5% | 53 | 3% | 240 | 5% |
| Non-Embedded Designated Support—Noise Buffers | 32 | 10% | 156 | 5% | 71 | 5% | 259 | 5% |
| Non-Embedded Designated Support—Read Aloud Items | 90 | 28% | 479 | 16% | 223 | 14% | 792 | 16% |
| Non-Embedded Designated Support—Scribe Items | 25 | 8% | 197 | 6% | 74 | 5% | 296 | 6% |
| Non-Embedded Designated Support—Separate Setting | 92 | 28% | 587 | 19% | 275 | 18% | 954 | 19% |
| Non-Embedded Designated Support—Simplified Test Directions | 80 | 25% | 473 | 15% | 207 | 13% | 760 | 15% |
| Non-Embedded Designated Support—100s Number Table | 38 | 12% | 143 | 5% | 72 | 5% | 253 | 5% |
| **Total Students Tested:** | **323** | **N/A** | **3,072** | **N/A** | **1,552** | **N/A** | **4,947** | **N/A** |

## Standard Setting

### Background

Standard setting, which also is referred to as achievement level setting, refers to a class of methodologies by which one or more thresholds are used to determine achievement levels. The California Department of Education (CDE) set three achievement levels—*Level 1—Limited Understanding, Level 2—Foundational Understanding,* and *Level 3—Understanding*—with two threshold cuts for each grade level and content area.

The CDE and ETS implemented an extensive achievement level–setting process involving software development, item mapping, review panels, committees, workshops, and extensive validity research to set the final thresholds and achievement level descriptors. For detailed information regarding this process, refer to the *California Alternate Assessment for Science Standard Setting Report* (ETS, 2022).

### Reference

ETS. (2022). *California Alternate Assessment for Science standard setting report* [Unpublished report]. Princeton, NJ: ETS.

## Scoring and Reporting

To determine individual students’ scores for the California Alternate Assessment (CAA) for Science, student item responses were scored, and individual student scores were calculated on the basis of the item responses. In addition, student test scores were aggregated to produce information for schools and local educational agencies (LEAs).

This chapter describes how various types of student responses were scored, as well as the various types of scores and score reports that were produced at the end of administration of the CAA for Science.

### Student Test Scores

Overall scale scores and achievement levels for the CAA for Science are reported at the individual student level. To obtain these overall scale scores and achievement levels, the ability (theta) scores need to be estimated.

Prior to the test administration, ETS’ Assessment & Learning Technology Development staff reviewed each item and determined the keys. The keys were provided to Cambium Assessment, Inc. (CAI), for implementation in the test delivery system (TDS). ETS processed all results, which included enacting procedures to ensure the completeness and accuracy of the student score records, before reporting student scores to the California Department of Education (CDE), LEAs, and parents/guardians.

ETS used two parallel scoring systems to produce and verify students’ scores. The Enterprise Score Key Management scoring system received individual students’ item scores and item responses from CAI and computed individual student scores for the ETS reporting system. ETS’ Psychometric Analysis & Research team also computed individual student scores based on the same data files using statistical analysis system software. The scores from the two systems were then compared for the purpose of internal quality control. Inconsistency in the total raw scores was investigated and resolved. The parallel scoring process ensured the quality and accuracy of scoring and supported the transfer of scores into the database of the student records scoring system, the Test Operations Management System (TOMS).

#### Scoring of Incomplete Cases

Whether an assessment should be scored or reported depended on the “complete” status of the assessment and how much of the assessment was submitted for scoring. Depending on the nature of the missing data, different actions were taken.

As defined in the CAA for Science scoring and reporting specifications, a student’s assessment was considered “complete” if the student logged on to all four embedded performance tasks (PTs) and responded to a minimum of four items across the three operational embedded PTs; “partially complete” if the student logged on to all four embedded PTs and responded to one to three items across the three operational embedded PTs; and “non-complete” if the student logged on to all four embedded PTs but did not respond to any item across the three operational embedded PTs.

ETS, in consultation with the CDE, implemented several rules to identify an incomplete assessment; these rules are presented in table 7.1, which includes rules for determining the following for a student:

* An assessment is considered attempted or taken.
* An assessment is scored.
* An assessment is considered complete.
* A score is reported.

Table 7.1 Rules for Incomplete Assessments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **If the student** | **Classify the student as taking the assessment?** | **Score the student’s responses?** | **Classify the student as attempting the assessment?** | **Test Completion Status** | **Report a score for the student?** |
| Logged on to all four PTs but answered no operational items across the three operational PTs | Yes | Yes, and provide the lowest obtainable scale score (LOSS) for the assessment | Yes | Noncompletion (or INC0) | Yes |
| Logged on to all four PTs and answered at least one operational item but not more than three operational items across the three operational PTs | Yes | Yes, and provide the next LOSS for the assessment (LOSS+1) | Yes | Partial Completion (or INC1) | Yes |
| Logged on to all four PTs and answered at least four operational items across the three operational PTs | Yes | Yes | Yes | Completion | Yes |
| Did not log on to at least one of the four PTs | No | N/A | No | Not Tested | No |
| Logged on to all four PTs and answered at least one item with a special condition code (refer to subsection [*7.3.2 Special Cases*](#_Special_Cases_3)) | No | N/A | No | Not Tested | No |

#### Theta Scores

A student’s raw score is the sum of scores on the individual items in the three operational embedded PTs presented to the student. Table 7.A.1 through table 7.A.24 in [appendix 7.A](#_Appendix_7.A:_Distribution) provide the distribution of the total raw score—the sum of scores on the individual items in the three operational embedded PTs—and the distribution of the total raw score for each operational embedded PT. Summary statistics (i.e., mean, standard deviation [SD], maximum, and minimum) of the total raw score for each operational embedded PT by form are displayed in table 7.A.25 through table 7.A.30.

The assessment for each grade level and the high school grade band has its own theta scale. If all the items presented to the student were calibrated onto that theta scale, the student’s raw score could be transformed into an ability (theta) estimate by using the item response theory (IRT) inverse test characteristic curve (TCC) method (Stocking, 1996). With this method, the student’s estimated ability is the ability value at which the expected raw score is equal to the student’s raw score. Refer to subsection [*8.4.3 Equating*](#_Equating_3) for equating procedures and to subsection [*8.4.6.1 Inverse Test Characteristic Curve Procedure*](#_Inverse_Test_Characteristic_3) for the IRT inverse TCC method.

When a conversion table from the raw score to theta score was created for each test form, the estimated ability (theta) score of each individual student could be obtained from the conversion table. The theta score could later be transformed into a scale score through a linear transformation. Refer to [appendix 7.C](#_Appendix_7.C:_Raw_1) for the raw-to-scale-score conversion tables.

#### Scale Scores for the Total Assessment

The following requirements were used to develop and define the CAA for Science reporting scale ranges:

1. Each scale score has three digits (e.g., 520, 851, or 980), where the leading digit is indicative of the grade level or grade band being reported. The leading digit is defined by the grade for grade five and grade eight, while the high school grade band’s leading digit is set to “9.” The latter two digits represent the scale score as derived from the transformation from the raw scores to the scale scores as described in the previous subsection.
2. Score ranges are grade-level or grade-band specific. The possible scale scores would be 500 to 599 for grade five with the LOSS at 500 and the highest obtainable scale score (HOSS) at 599. For grade eight, this range is 800 to 899 with a LOSS of 800 and a HOSS of 899. For the high school grade band, the scale ranges from 900 to 999 with a LOSS of 900 and a HOSS of 999.
3. Each threshold score on the scale is the same from year to year. Also, across the grade levels and high school grade band, the last two digits corresponding to the Level 2—Foundational Understanding and Level 3—Understanding threshold scores are the same (refer to subsection [*7.1.4 Achievement Levels*](#_Achievement_Levels_1)for a brief description of alternate achievement levels).
4. Students with incomplete assessments, as shown in table 7.1, have two possible scale scores. If a student logged on to all four embedded PTs but did not answer any items across the three operational embedded PTs, this student would be assigned a scale score of LOSS (e.g., 500 for a grade five student, 800 for a grade eight student, and 900 for a high school student). If a student logged on to all four embedded PTs and answered at least one but fewer than four items across the three operational embedded PTs, the student would be assigned a scale score of LOSS+1 (i.e., 501 for a grade five student, 801 for a grade eight student, and 901 for a high school student).

For students who completed the CAA for Science, their scale scores cannot be lower than LOSS+2 or higher than the HOSS as a result of truncation in the scale score transformation listed in table 7.2. For example, the scale scores for grade five are truncated at a minimum of 502 and a maximum of 599. As a result, the range of student ability estimates [−‍6, +6] are transformed to the scale score range [502, 599] for grade five, [802, 899] for grade eight, and [902, 999] for high school. The scale score range for other grade levels follows the same pattern.

In addition to the special requirements of the CAA for Science reporting scale, an equating procedure was implemented to place scores from different forms onto the same scale to make scores comparable.

First, to express the students’ ability estimates on the scale score metric of the CAA for Science, the inverse TCC procedure was used to convert each possible raw score to an ability estimate (theta score). Refer to subsection [*8.4.6.1 Inverse Test Characteristic Curve Procedure*](#_Inverse_Test_Characteristic_3) for details of this procedure. The distributions of estimated theta scores for all students tested in each grade level or the high school grade band are presented in table 7.B.1 in [appendix 7.B](#_Appendix_7.B:_Theta).

Second, theta scores were transformed linearly to the appropriate score scale. Refer to subsection [*8.4.6.2 Transformation from Theta Scores to Scale Scores*](#_Transformation_from_Theta_3) for details of the transformation. The slopes and intercepts for such linear transformations are presented in table 8.13. Once the theta scores were transformed, the theta-to-scale-score relationship could be mapped to the raw scores.

Finally, the raw-to-scale-score conversion tables were established. The complete raw-to-scale-score conversion tables for each CAA for Science form are presented in table 7.C.1 through table 7.C.12 in [appendix 7.C](#_Appendix_7.C:_Raw_1). The raw scores and transformed scale scores at each raw score are listed in those tables.

#### Achievement Levels

CAA for Science reporting scales classify each student’s performance into one of the three achievement levels,8F[[5]](#footnote-6) with Level 1—Limited Understanding indicating the lowest level of performance and Level 3—Understanding indicating the highest level of performance. The range of possible scale scores is divided into three achievement levels. Student assessment results are reported in the following overall achievement levels:

* **Level 1—Limited Understanding:** The student demonstrates a **limited understanding** of core concepts in science.
* **Level 2—Foundational Understanding:** The student demonstrates a **foundational understanding** of core concepts in science.
* **Level 3—Understanding:** The student demonstrates an **understanding** of core concepts in science.

The scale score ranges defining the various achievement levels for each grade level or the high school grade band are presented in table 7.2.

Table 7.2 Scale Score Ranges for Achievement Levels

|  |  |  |  |
| --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** |
| Grade 5 | 500–544 | 545–559 | 560–599 |
| Grade 8 | 800–844 | 845–859 | 860–899 |
| High school | 900–944 | 945–959 | 960–999 |

### Overview of Score Aggregation Procedures

To provide meaningful results to the interest holders, test scores for a given grade level and content area are aggregated at the school, LEA or direct funded charter school, county, and state levels. The aggregated scores are generated both for selected groups and for the population. The next subsection contains a description of the types of aggregation performed on California Assessment of Student Performance and Progress (CAASPP) computer-based assessment scores. Score aggregation includes only students with valid scores; refer to subsection [*7.3.2 Special Cases*](#_Special_Cases_3) for more information.

#### Student Score Distributions and Summary Statistics

Summary statistics that describe student performance on each assessment are presented in table 7.3. Included in the table are the number of students whose scores were reported for each assessment and the means and SDs of student scores expressed in terms of scale scores. The mean reported scale score was 545 for grade five and 849 for grade eight. The disaggregated reported scale score means for the high school grade levels are 946 for grades ten and eleven and 947 for grade twelve. The aggregated reported scale score mean across the three high school grade levels (grade ten, grade eleven, and grade twelve) is 947. The SD of the reported scale scores was between 19 and 21 for all grade levels and the high school grade band.

Table 7.3 Mean and SD of Theta Scores and Scale Scores

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Students Tested** | **Scale Score Mean** | **Scale Score SD** | **Theta Score Mean** | **Theta Score SD** |
| Grade 5 | 4,954 | 545 | 19 | −0.64 | 2.01 |
| Grade 8 | 4,672 | 849 | 20 | −0.49 | 2.05 |
| High school—Grade 10 | 323 | 946 | 21 | −0.68 | 2.13 |
| High school—Grade 11 | 3,072 | 946 | 19 | −0.60 | 1.99 |
| High school—Grade 12 | 1,552 | 947 | 19 | −0.48 | 1.98 |
| High school—All grades | 4,947 | 947 | 19 | −0.57 | 2.00 |

The number and percentage of students at each achievement level for each assessment is presented in table 7.4. Approximately one-quarter of the students at each grade level or the high school grade band were classified at Level 3. S. A higher percentage of grade five and high school students were classified at Level 1—Limited Understanding than at Level 2—Foundational Understanding, whereas a slightly higher percentage of grade eight students were classified at Level 2—Foundational Understanding than at Level 1—Limited Understanding.

Table 7.4 Number and Percentage of Students Classified by Achievement Level

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Students Tested** | **Level 1 N** | **Level 1 Percent** | **Level 2 N** | **Level 2 Percent** | **Level 3 N** | **Level 3 Percent** |
| Grade 5 | 4,954 | 2,093 | 42.25 | 1,809 | 36.52 | 1,052 | 21.24 |
| Grade 8 | 4,672 | 1,683 | 36.02 | 1,727 | 36.96 | 1,262 | 27.01 |
| High school—Grade 10 | 323 | 144 | 44.58 | 92 | 28.48 | 87 | 26.93 |
| High school—Grade 11 | 3,072 | 1,189 | 38.70 | 1,174 | 38.22 | 709 | 23.08 |
| High school—Grade 12 | 1,552 | 617 | 39.76 | 554 | 35.70 | 381 | 24.55 |
| High school—All grades | 4,947 | 1,950 | 39.42 | 1,820 | 36.79 | 1,177 | 23.79 |

Figure 7.1, which is derived from the data in table 7.4, presents the percentage of students at each achievement level by grade level or the high school grade band. Fewer students are at Level 3 than Level 1 or Level 2.

Figure 7.1 Percentage of students at each achievement level for the CAA for Science

The selected percentiles of the scale score distributions are presented in table 7.D.1 in [appendix 7.D](#_Appendix_7.D:_Scale_1). CAA for Science reporting scale score distribution information for each grade level or the high school grade band is available in table 7.D.2 through table 7.D.7.

#### Demographic Student Group Summaries

Statistics summarizing student performance by grade level or the high school grade band for selected groups of students are reported in table 7.E.1 through table 7.E.6. The students are grouped by demographic characteristics, including gender, ethnicity, English language fluency, economic status, primary disability type, migrant status, foster youth status, and ethnicity by economic status. For each demographic student group, the number of students with a valid scale score, scale score means and SDs, and the percentage of students in each achievement level are included in the tables.

Table 7.5 provides definitions of the demographic student groups. To protect student privacy, when the number of students in a student group is 10 or fewer, the summary statistics are not reported and are presented as “N/A.”

Table 7.5 Demographic Student Groups to Be Reported

|  |  |
| --- | --- |
| **Category** | **Student Groups** |
| **Gender** | * Male * Female * Nonbinary |
| **Ethnicity** | * American Indian or Alaska Native * Asian * Native Hawaiian or Other Pacific Islander * Filipino * Hispanic or Latino * Black or African American * White * Two or more races |
| **English Language Fluency** | * English only * Initial fluent English proficient (IFEP) * English learner (EL) * Reclassified fluent English proficient (RFEP) * Adult English learner (ADEL) * To be determined * English proficiency unknown |
| **Economic Status** | * Not economically disadvantaged * Economically disadvantaged |
| **Primary Disability Type** | * Intellectual disability * Hearing impairment * Speech or language impairment * Visual impairment * Emotional disturbance * Orthopedic impairment * Other health impairment * Specific learning disability * Deaf-blindness * Multiple disabilities * Autism * Traumatic brain injury |
| **Migrant Status** | * Eligible for the Title I Part C Migrant Program (Migrant education) * Not eligible for the Title I Part C Migrant Program (Not migrant education) |
| **Foster Youth Status** | * Not foster youth * Foster youth |

### Reports Produced and Scores for Each Report

The assessments that make up the CAASPP computer-based assessments provide results or score summaries that are reported for different purposes. The four major purposes are to

1. help facilitate conversations between parents/guardians and teachers about student performance,
2. serve as a tool to help parents/guardians and teachers work together to improve student learning,
3. help schools and LEAs identify strengths and areas that need improvement in their educational programs, and
4. provide the public and policymakers with information about student achievement.

This section provides detailed descriptions of the uses and applications of CAASPP reporting for students.

#### Online Reporting

TOMS is a secure website hosted by ETS that permits LEA users to manage the CAASPP computer-based assessments and to inform the TDS. This system uses a role-specific design to restrict access to certain tools and applications based on the user’s designated role. Specific functions of TOMS include the following:

* Manage user access privileges
* Manage test administration calendars and testing windows
* Manage student test assignments
* Manage and confirm the accuracy of students’ test settings (i.e., designated supports and accommodations) prior to testing
* Generate and download various reports

In addition to TOMS, another California online reporting system was used during the 2022–‍23 administration: the California Educator Reporting System (CERS).

TOMS communicated with CERS, which provided authorized users with interactive and cumulative online reports for the CAA for Science at the student, school, group, and LEA levels. CERS provided preliminary score data for each administered assessment available in the reporting system.

Based on the CAASPP reporting requirements, CERS provided the preliminary summative reports containing information outlining student knowledge and skills. CERS also permitted access to individual score reports, which provided preliminary score data for each administered assessment available in the reporting system. The online aggregated reports were available to be downloaded in PDF, Excel, and comma-separated value formats.

CERS was the primary source for LEA staff to analyze CAASPP results at the LEA, school, grade, classroom, or customized group level. CERS provided these reports, which can be downloaded and used to inform instruction. LEA staff with TOMS logon credentials could enter CERS through the CAASPP website to access student assessment results.

#### Special Cases

Student scores were not reported for the following cases:

* The student had a medical emergency during testing.
* The student’s parent/guardian requested exemption from testing.
* The student did not log on to test systems.
* The student score was invalidated in the system (not reported in aggregated reporting).

#### Types of Score Reports

There are two categories of CAASPP reports. The specific reports within each category are presented in this subsection.

1. **Student Score Report (SSR)—**The SSR was the official score report for parents/‌guardians. An SSR described the student’s results and was made available only to students who met the program’s participation requirement.
2. **LEA student data files and aggregations—**LEA student data files were available for download on demand by the LEA in TOMS to coincide with availability of the SSRs. Aggregated data was available to view in CERS and the Test Results for California’s Assessments website.

##### Student Score Report

The CAA for Science SSR is the official score report for parents/guardians and includes the following metrics:

* Reported scale scores (The ranges of scale scores are provided in table 7.2.)
* Reported achievement levels (CAA for Science achievement levels are “Level 1—Limited Understanding,” “Level 2—Foundational Understanding,” and “Level 3—Understanding.”)

LEAs had four options for accessing and distributing SSRs to parents/guardians:

1. Accessing electronic SSR PDFs using a locally provided parent/guardian or student portal
2. Downloading SSR PDFs from TOMS and making them available electronically using a secure local method
3. Downloading SSR PDFs from TOMS, printing them, and making them available locally
4. Purchasing paper SSRs from ETS

The LEA CAASPP coordinator could forward the appropriate reports to test sites. In the case of a locally printed CAA for Science SSR, the LEA sent the printed report(s) to the child’s parent/guardian. CAA for Science SSRs that included individual student results were not distributed beyond the student’s school.

Scores for students who were assigned accommodations or designated supports are reported in the same way as for students who were not assigned accommodations or designated supports. Detailed information about accessibility resources is described in subsection [*5.5.2 Accessibility Resource Categories*](#_Accessibility_Resource_Categories).

For the 2022–23 test administration, SSRs were made available to the LEAs in English, Spanish, Filipino, Chinese (Traditional), Vietnamese, and Korean. An SSR in a supported language was created if the student’s primary language as reported in the California Longitudinal Pupil Achievement Data System was one of these supported languages. The LEAs that received SSRs in supported languages received one SSR in English and another in the supported language. These reports were available as PDFs for the LEA to download from TOMS.

Further information about the SSR and its interpretation is provided on the CAASPP Starting Smarter website for California assessments.

###### Access via Student or Parent Portal

LEAs had the option to provide SSRs electronically using a locally provided parent or student portal.

Amazon Web Services—with the Amazon Simple Storage Service and the Amazon Key Management Service—ensured encrypted access for parents/guardians to view a child’s electronic SSR, which was available as a PDF.

###### Access via the Test Operations Management System

The LEA CAASPP coordinator downloaded the electronic PDFs directly from TOMS and could forward the appropriate reports to test sites. Optionally, the LEA could download and then print the SSR PDF and then send the printed report(s) to the child’s parent/‌guardian.

##### Local Educational Agency Student Data Files and Aggregations

The CAASPP student data files for the LEA were available for the LEA CAASPP coordinator and CAASPP test site coordinator to download from TOMS.

Preliminary student scores and aggregations were also available to LEAs prior to the release of final reports via electronic reporting, using CERS. This website permitted LEAs to view preliminary results data for all assessments taken.

Current and historical aggregated results are accessible to the public on the CDE Test Results for California’s Assessments website.

#### Score Report Applications

CAA for Science test results, presented in SSRs, provided parents/guardians with information about their child’s progress. The results were one tool for increasing communication and collaboration between parents/guardians and teachers about how to identify priorities to help the student progress in science. They provided limited information about one measure of a student’s academic performance. Like any important measure of student performance, the test results should be viewed with other available information such as progress on individualized education program goals, assignments, and teacher conferences.

Schools could use the CAA for Science results to help make decisions about how to support student achievement. CAA for Science results, however, should never be used as the only source of information to make important decisions about a child’s education.

CAA for Science results helped schools and LEAs identify strengths and weaknesses in their instructional programs. Each year, staff from schools and LEAs examine CAA for Science results at each grade level or the grade band tested. Their findings are used to help determine

* the extent to which students are learning the alternate achievement standards,
* instructional areas that can be improved,
* teaching strategies that can be developed to address the needs of students, and
* decisions about how to use funds to help ensure that students achieve the alternate achievement standards.

#### Criteria for Interpreting Test Scores

An LEA may use CAASPP computer-based summative assessment results to help make decisions about student placement, promotion, retention, or other considerations related to student achievement. However, it is important to remember that a single assessment can provide only limited information. Other relevant information should be considered as well. It is advisable for parents/guardians to evaluate their child’s strengths and weaknesses in the relevant topics by reviewing classroom work and progress reports in addition to the child’s CAASPP computer-based summative assessment results. It is also important to note that a student’s score in a content area could vary somewhat if the student were retested.

#### Criteria for Interpreting Score Reports

The information presented in various reports must be interpreted with caution when making performance comparisons. When comparing scale score and achievement-level results, the user is limited to comparisons within a grade level or grade band. The user may compare scale scores for the same grade level, within a school, between schools, or between a school and its LEA, its county, or the state. The CAASPP user can also make comparisons within the same grade level or grade band across years.

However, comparing scale scores from different grade levels for the CAASPP is not appropriate, because the curricula are different across grade levels and the scale scores are not vertically linked between grade levels.

For more details on the criteria for interpreting information provided on the score reports, refer to the CAASPP Starting Smarter website for California assessments or the *2022–23 CAASPP Scoring and Reporting Guide* (CDE, 2023), which was applicable for the 2022–23 CAASPP administration.

### References

California Department of Education. (2023). *CAASPP scoring and reporting guide.* Sacramento, CA: California Department of Education.

ETS. (2022). *California Alternate Assessment for Science standard setting report* [Unpublished report]. Princeton, NJ: ETS.

Stocking, M. L. (1996). An alternative method for scoring adaptive tests. *Journal of Educational and Behavioral Statistics, 21,* 365–89.

### Appendix 7.A: Distribution of Raw Scores—Total Score for Each Embedded Performance Task

**Note:** In table 7.A.1 through table 7.A.24, the maximum raw score for each embedded PT is 12. For the embedded PTs, the number of students and the percentage of students are denoted as “N/A” for each raw score point greater than 12.

Table 7.A.1 Distribution of Total Score and PT Scores—Grade Five, Form One

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life** **Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 100 | 8% | 133 | 11% | 120 | 10% | 138 | 12% |
| 1 | 10 | 1% | 26 | 2% | 25 | 2% | 22 | 2% |
| 2 | 13 | 1% | 25 | 2% | 32 | 3% | 38 | 3% |
| 3 | 10 | 1% | 45 | 4% | 53 | 4% | 55 | 5% |
| 4 | 10 | 1% | 92 | 8% | 85 | 7% | 96 | 8% |
| 5 | 12 | 1% | 129 | 11% | 114 | 10% | 122 | 10% |
| 6 | 5 | 0% | 125 | 10% | 135 | 11% | 132 | 11% |
| 7 | 8 | 1% | 149 | 12% | 153 | 13% | 152 | 13% |
| 8 | 6 | 1% | 112 | 9% | 124 | 10% | 158 | 13% |
| 9 | 9 | 1% | 122 | 10% | 110 | 9% | 123 | 10% |
| 10 | 22 | 2% | 101 | 8% | 123 | 10% | 86 | 7% |
| 11 | 10 | 1% | 101 | 8% | 86 | 7% | 53 | 4% |
| 12 | 25 | 2% | 39 | 3% | 39 | 3% | 24 | 2% |
| 13 | 35 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 64 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 71 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 54 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 51 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 39 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 44 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 22 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 27 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 21 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 18 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 8 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 1 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.2 Distribution of Total Score and PT Scores—Grade Five, Form Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life** **Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 86 | 8% | 117 | 10% | 105 | 9% | 127 | 11% |
| 1 | 16 | 1% | 18 | 2% | 29 | 3% | 11 | 1% |
| 2 | 9 | 1% | 31 | 3% | 21 | 2% | 28 | 2% |
| 3 | 7 | 1% | 45 | 4% | 35 | 3% | 42 | 4% |
| 4 | 5 | 0% | 78 | 7% | 57 | 5% | 79 | 7% |
| 5 | 9 | 1% | 107 | 10% | 114 | 10% | 93 | 8% |
| 6 | 11 | 1% | 146 | 13% | 127 | 11% | 134 | 12% |
| 7 | 1 | 0% | 145 | 13% | 131 | 12% | 144 | 13% |
| 8 | 10 | 1% | 104 | 9% | 144 | 13% | 144 | 13% |
| 9 | 11 | 1% | 104 | 9% | 136 | 12% | 142 | 13% |
| 10 | 10 | 1% | 108 | 10% | 100 | 9% | 108 | 10% |
| 11 | 17 | 2% | 76 | 7% | 86 | 8% | 49 | 4% |
| 12 | 16 | 1% | 45 | 4% | 39 | 3% | 23 | 2% |
| 13 | 25 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 42 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 42 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 57 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 58 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 56 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 51 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 36 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 40 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 21 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 21 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 14 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 4 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 3 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.3 Distribution of Total Score and PT Scores—Grade Five, Form Three

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life** **Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 105 | 8% | 146 | 11% | 131 | 10% | 164 | 12% |
| 1 | 15 | 1% | 15 | 1% | 22 | 2% | 22 | 2% |
| 2 | 13 | 1% | 34 | 3% | 24 | 2% | 31 | 2% |
| 3 | 7 | 1% | 51 | 4% | 31 | 2% | 49 | 4% |
| 4 | 8 | 1% | 116 | 9% | 55 | 4% | 73 | 5% |
| 5 | 12 | 1% | 192 | 14% | 95 | 7% | 72 | 5% |
| 6 | 10 | 1% | 204 | 15% | 128 | 10% | 109 | 8% |
| 7 | 9 | 1% | 212 | 16% | 161 | 12% | 105 | 8% |
| 8 | 9 | 1% | 159 | 12% | 147 | 11% | 122 | 9% |
| 9 | 11 | 1% | 121 | 9% | 135 | 10% | 139 | 10% |
| 10 | 10 | 1% | 59 | 4% | 185 | 14% | 134 | 10% |
| 11 | 11 | 1% | 29 | 2% | 145 | 11% | 150 | 11% |
| 12 | 24 | 2% | 2 | 0% | 81 | 6% | 170 | 13% |
| 13 | 24 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 36 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 36 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 55 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 57 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 44 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 69 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 57 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 67 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 56 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 57 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 64 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 63 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 60 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 44 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 35 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 12 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 5 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.4 Distribution of Total Score and PT Scores—Grade Five, Form Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life** **Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 90 | 7% | 115 | 9% | 112 | 9% | 136 | 11% |
| 1 | 15 | 1% | 26 | 2% | 23 | 2% | 26 | 2% |
| 2 | 8 | 1% | 33 | 3% | 26 | 2% | 24 | 2% |
| 3 | 13 | 1% | 53 | 4% | 32 | 2% | 38 | 3% |
| 4 | 12 | 1% | 85 | 7% | 65 | 5% | 65 | 5% |
| 5 | 12 | 1% | 152 | 12% | 90 | 7% | 87 | 7% |
| 6 | 7 | 1% | 192 | 15% | 116 | 9% | 107 | 8% |
| 7 | 6 | 0% | 172 | 13% | 112 | 9% | 95 | 7% |
| 8 | 13 | 1% | 158 | 12% | 140 | 11% | 97 | 8% |
| 9 | 7 | 1% | 154 | 12% | 155 | 12% | 120 | 9% |
| 10 | 11 | 1% | 98 | 8% | 163 | 13% | 143 | 11% |
| 11 | 6 | 0% | 41 | 3% | 175 | 14% | 152 | 12% |
| 12 | 16 | 1% | 7 | 1% | 77 | 6% | 196 | 15% |
| 13 | 29 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 27 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 45 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 52 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 43 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 45 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 58 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 51 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 63 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 43 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 63 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 65 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 53 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 67 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 53 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 39 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 33 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 9 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 2 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.5 Distribution of Total Score and PT Scores—Grade Eight, Form One

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 101 | 8% | 141 | 11% | 117 | 9% | 141 | 11% |
| 1 | 17 | 1% | 30 | 2% | 21 | 2% | 27 | 2% |
| 2 | 15 | 1% | 34 | 3% | 24 | 2% | 27 | 2% |
| 3 | 11 | 1% | 55 | 4% | 33 | 3% | 39 | 3% |
| 4 | 5 | 0% | 105 | 8% | 61 | 5% | 83 | 7% |
| 5 | 11 | 1% | 119 | 9% | 94 | 7% | 104 | 8% |
| 6 | 6 | 0% | 118 | 9% | 107 | 9% | 121 | 10% |
| 7 | 7 | 1% | 119 | 9% | 140 | 11% | 141 | 11% |
| 8 | 9 | 1% | 109 | 9% | 121 | 10% | 138 | 11% |
| 9 | 9 | 1% | 98 | 8% | 122 | 10% | 99 | 8% |
| 10 | 8 | 1% | 128 | 10% | 165 | 13% | 110 | 9% |
| 11 | 13 | 1% | 119 | 9% | 147 | 12% | 129 | 10% |
| 12 | 19 | 2% | 82 | 7% | 105 | 8% | 98 | 8% |
| 13 | 31 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 41 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 40 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 66 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 40 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 58 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 33 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 42 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 33 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 20 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.6 Distribution of Total Score and PT Scores—Grade Eight, Form Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 59 | 5% | 83 | 7% | 66 | 6% | 80 | 7% |
| 1 | 5 | 0% | 12 | 1% | 19 | 2% | 10 | 1% |
| 2 | 7 | 1% | 41 | 4% | 17 | 2% | 22 | 2% |
| 3 | 7 | 1% | 73 | 6% | 22 | 2% | 33 | 3% |
| 4 | 5 | 0% | 102 | 9% | 41 | 4% | 59 | 5% |
| 5 | 3 | 0% | 115 | 10% | 59 | 5% | 84 | 7% |
| 6 | 5 | 0% | 107 | 9% | 110 | 10% | 111 | 10% |
| 7 | 9 | 1% | 114 | 10% | 109 | 10% | 121 | 11% |
| 8 | 4 | 0% | 119 | 11% | 139 | 12% | 115 | 10% |
| 9 | 10 | 1% | 134 | 12% | 137 | 12% | 104 | 9% |
| 10 | 10 | 1% | 123 | 11% | 145 | 13% | 123 | 11% |
| 11 | 18 | 2% | 81 | 7% | 169 | 15% | 151 | 13% |
| 12 | 11 | 1% | 23 | 2% | 94 | 8% | 114 | 10% |
| 13 | 24 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 30 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 29 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 44 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 52 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 41 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 55 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 32 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 31 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 44 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 40 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 60 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 53 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 61 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 52 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 28 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 18 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 6 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.7 Distribution of Total Score and PT Scores—Grade Eight, Form Three

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 72 | 6% | 101 | 9% | 84 | 7% | 106 | 9% |
| 1 | 12 | 1% | 21 | 2% | 22 | 2% | 9 | 1% |
| 2 | 6 | 1% | 28 | 2% | 12 | 1% | 12 | 1% |
| 3 | 10 | 1% | 35 | 3% | 30 | 3% | 34 | 3% |
| 4 | 3 | 0% | 81 | 7% | 38 | 3% | 60 | 5% |
| 5 | 7 | 1% | 100 | 8% | 84 | 7% | 101 | 9% |
| 6 | 5 | 0% | 111 | 9% | 129 | 11% | 101 | 9% |
| 7 | 5 | 0% | 126 | 11% | 149 | 13% | 113 | 10% |
| 8 | 7 | 1% | 138 | 12% | 163 | 14% | 107 | 9% |
| 9 | 4 | 0% | 119 | 10% | 167 | 14% | 103 | 9% |
| 10 | 7 | 1% | 128 | 11% | 148 | 13% | 136 | 12% |
| 11 | 11 | 1% | 125 | 11% | 92 | 8% | 155 | 13% |
| 12 | 14 | 1% | 68 | 6% | 63 | 5% | 144 | 12% |
| 13 | 33 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 21 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 31 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 28 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 55 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 52 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 44 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 59 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 51 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 56 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 66 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 41 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 29 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 9 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.8 Distribution of Total Score and PT Scores—Grade Eight, Form Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 76 | 7% | 109 | 10% | 90 | 8% | 108 | 10% |
| 1 | 8 | 1% | 17 | 2% | 7 | 1% | 15 | 1% |
| 2 | 8 | 1% | 28 | 3% | 19 | 2% | 23 | 2% |
| 3 | 6 | 1% | 58 | 5% | 30 | 3% | 47 | 4% |
| 4 | 2 | 0% | 85 | 8% | 49 | 4% | 69 | 6% |
| 5 | 2 | 0% | 135 | 12% | 82 | 7% | 121 | 11% |
| 6 | 11 | 1% | 120 | 11% | 113 | 10% | 120 | 11% |
| 7 | 12 | 1% | 107 | 10% | 142 | 13% | 111 | 10% |
| 8 | 4 | 0% | 122 | 11% | 145 | 13% | 93 | 8% |
| 9 | 6 | 1% | 116 | 10% | 149 | 13% | 100 | 9% |
| 10 | 8 | 1% | 102 | 9% | 131 | 12% | 111 | 10% |
| 11 | 19 | 2% | 70 | 6% | 97 | 9% | 106 | 10% |
| 12 | 18 | 2% | 36 | 3% | 51 | 5% | 81 | 7% |
| 13 | 29 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 31 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 60 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 55 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 56 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 51 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 35 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 41 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 36 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 29 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 39 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 44 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 53 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 38 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 20 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 24 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 20 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 4 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.9 Distribution of Total Score and PT Scores—Grade Ten, Form One

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 14 | 9% | 18 | 11% | 15 | 9% | 19 | 12% |
| 1 | 1 | 1% | 4 | 2% | 10 | 6% | 4 | 2% |
| 2 | 1 | 1% | 3 | 2% | 7 | 4% | 7 | 4% |
| 3 | 1 | 1% | 9 | 6% | 7 | 4% | 6 | 4% |
| 4 | 3 | 2% | 12 | 7% | 11 | 7% | 10 | 6% |
| 5 | 2 | 1% | 19 | 12% | 13 | 8% | 16 | 10% |
| 6 | 1 | 1% | 18 | 11% | 10 | 6% | 22 | 14% |
| 7 | 3 | 2% | 28 | 17% | 13 | 8% | 15 | 9% |
| 8 | 3 | 2% | 14 | 9% | 10 | 6% | 8 | 5% |
| 9 | 4 | 2% | 13 | 8% | 11 | 7% | 17 | 11% |
| 10 | 2 | 1% | 15 | 9% | 5 | 3% | 20 | 12% |
| 11 | 6 | 4% | 7 | 4% | 17 | 11% | 13 | 8% |
| 12 | 2 | 1% | 1 | 1% | 32 | 20% | 4 | 2% |
| 13 | 2 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 3 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 6 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 8 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 3 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 10 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 6 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 8 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 4 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 1 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 8 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 3 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 4 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 2 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 3 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 6 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 7 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 7 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 11 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 5 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 9 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 2 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.10 Distribution of Total Score and PT Scores—Grade Ten, Form Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 1 | 10% | 1 | 10% | 1 | 10% | 1 | 10% |
| 1 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| 2 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| 3 | 0 | 0% | 1 | 10% | 1 | 10% | 1 | 10% |
| 4 | 0 | 0% | 1 | 10% | 1 | 10% | 3 | 30% |
| 5 | 0 | 0% | 2 | 20% | 0 | 0% | 0 | 0% |
| 6 | 0 | 0% | 1 | 10% | 5 | 50% | 1 | 10% |
| 7 | 0 | 0% | 2 | 20% | 0 | 0% | 0 | 0% |
| 8 | 0 | 0% | 1 | 10% | 1 | 10% | 1 | 10% |
| 9 | 0 | 0% | 0 | 0% | 0 | 0% | 2 | 20% |
| 10 | 0 | 0% | 1 | 10% | 0 | 0% | 0 | 0% |
| 11 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| 12 | 0 | 0% | 0 | 0% | 1 | 10% | 1 | 10% |
| 13 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 1 | 10% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 2 | 20% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 2 | 20% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 2 | 20% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 1 | 10% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 1 | 10% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.11 Distribution of Total Score and PT Scores—Grade Ten, Form Three

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 5 | 15% | 6 | 18% | 5 | 15% | 5 | 15% |
| 1 | 0 | 0% | 0 | 0% | 1 | 3% | 0 | 0% |
| 2 | 0 | 0% | 0 | 0% | 2 | 6% | 0 | 0% |
| 3 | 0 | 0% | 1 | 3% | 1 | 3% | 3 | 9% |
| 4 | 0 | 0% | 1 | 3% | 2 | 6% | 4 | 12% |
| 5 | 1 | 3% | 2 | 6% | 0 | 0% | 4 | 12% |
| 6 | 0 | 0% | 5 | 15% | 2 | 6% | 2 | 6% |
| 7 | 1 | 3% | 4 | 12% | 2 | 6% | 2 | 6% |
| 8 | 0 | 0% | 5 | 15% | 6 | 18% | 7 | 21% |
| 9 | 0 | 0% | 3 | 9% | 2 | 6% | 1 | 3% |
| 10 | 0 | 0% | 2 | 6% | 3 | 9% | 4 | 12% |
| 11 | 0 | 0% | 4 | 12% | 3 | 9% | 2 | 6% |
| 12 | 1 | 3% | 1 | 3% | 5 | 15% | 0 | 0% |
| 13 | 3 | 9% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 2 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 5 | 15% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 2 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 1 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 2 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 3 | 9% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.12 Distribution of Total Score and PT Scores—Grade Ten, Form Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 8 | 7% | 10 | 8% | 10 | 8% | 11 | 9% |
| 1 | 1 | 1% | 2 | 2% | 1 | 1% | 1 | 1% |
| 2 | 0 | 0% | 4 | 3% | 5 | 4% | 9 | 8% |
| 3 | 0 | 0% | 7 | 6% | 7 | 6% | 8 | 7% |
| 4 | 1 | 1% | 11 | 9% | 7 | 6% | 12 | 10% |
| 5 | 3 | 3% | 8 | 7% | 18 | 15% | 8 | 7% |
| 6 | 1 | 1% | 16 | 14% | 13 | 11% | 13 | 11% |
| 7 | 2 | 2% | 11 | 9% | 9 | 8% | 13 | 11% |
| 8 | 0 | 0% | 16 | 14% | 7 | 6% | 12 | 10% |
| 9 | 1 | 1% | 13 | 11% | 14 | 12% | 12 | 10% |
| 10 | 2 | 2% | 11 | 9% | 6 | 5% | 8 | 7% |
| 11 | 3 | 3% | 5 | 4% | 10 | 8% | 7 | 6% |
| 12 | 3 | 3% | 4 | 3% | 11 | 9% | 4 | 3% |
| 13 | 8 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 5 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 4 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 3 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 7 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 8 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 4 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 4 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 1 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 1 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 8 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 9 | 8% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 1 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 2 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 8 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 4 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 4 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 3 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 1 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 2 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 3 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 2 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 1 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.13 Distribution of Total Score and PT Scores—Grade Eleven, Form One

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 52 | 8% | 68 | 10% | 64 | 9% | 79 | 12% |
| 1 | 7 | 1% | 15 | 2% | 18 | 3% | 16 | 2% |
| 2 | 7 | 1% | 24 | 4% | 17 | 3% | 15 | 2% |
| 3 | 6 | 1% | 35 | 5% | 25 | 4% | 49 | 7% |
| 4 | 7 | 1% | 60 | 9% | 41 | 6% | 54 | 8% |
| 5 | 4 | 1% | 77 | 11% | 57 | 8% | 76 | 11% |
| 6 | 3 | 0% | 86 | 13% | 53 | 8% | 95 | 14% |
| 7 | 3 | 0% | 100 | 15% | 54 | 8% | 84 | 12% |
| 8 | 13 | 2% | 93 | 14% | 69 | 10% | 66 | 10% |
| 9 | 5 | 1% | 68 | 10% | 62 | 9% | 51 | 8% |
| 10 | 11 | 2% | 33 | 5% | 62 | 9% | 48 | 7% |
| 11 | 18 | 3% | 19 | 3% | 70 | 10% | 39 | 6% |
| 12 | 12 | 2% | 0 | 0% | 86 | 13% | 6 | 1% |
| 13 | 21 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 20 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 23 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 36 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 25 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 26 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 28 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 29 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 33 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 42 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 31 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 26 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 23 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 23 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 20 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 28 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 20 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 23 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 24 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 11 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 12 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 6 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.14 Distribution of Total Score and PT Scores—Grade Eleven, Form Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 66 | 8% | 82 | 10% | 78 | 9% | 94 | 11% |
| 1 | 7 | 1% | 20 | 2% | 16 | 2% | 15 | 2% |
| 2 | 6 | 1% | 19 | 2% | 17 | 2% | 36 | 4% |
| 3 | 8 | 1% | 44 | 5% | 32 | 4% | 48 | 6% |
| 4 | 9 | 1% | 91 | 11% | 54 | 6% | 80 | 9% |
| 5 | 5 | 1% | 122 | 14% | 82 | 10% | 101 | 12% |
| 6 | 0 | 0% | 133 | 16% | 85 | 10% | 118 | 14% |
| 7 | 6 | 1% | 165 | 20% | 80 | 9% | 117 | 14% |
| 8 | 6 | 1% | 81 | 10% | 94 | 11% | 70 | 8% |
| 9 | 9 | 1% | 47 | 6% | 90 | 11% | 66 | 8% |
| 10 | 3 | 0% | 33 | 4% | 61 | 7% | 53 | 6% |
| 11 | 16 | 2% | 6 | 1% | 76 | 9% | 40 | 5% |
| 12 | 19 | 2% | 2 | 0% | 80 | 9% | 7 | 1% |
| 13 | 21 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 41 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 42 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 43 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 51 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 60 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 56 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 44 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 45 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 30 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 37 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 30 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 21 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 30 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 25 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 22 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 24 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 22 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 14 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 12 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 12 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 3 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.15 Distribution of Total Score and PT Scores—Grade Eleven, Form Three

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 68 | 10% | 78 | 12% | 74 | 11% | 78 | 12% |
| 1 | 4 | 1% | 8 | 1% | 9 | 1% | 6 | 1% |
| 2 | 2 | 0% | 10 | 1% | 11 | 2% | 16 | 2% |
| 3 | 2 | 0% | 28 | 4% | 25 | 4% | 32 | 5% |
| 4 | 3 | 0% | 30 | 4% | 44 | 7% | 39 | 6% |
| 5 | 2 | 0% | 61 | 9% | 60 | 9% | 58 | 9% |
| 6 | 3 | 0% | 86 | 13% | 74 | 11% | 87 | 13% |
| 7 | 5 | 1% | 76 | 11% | 57 | 8% | 71 | 11% |
| 8 | 6 | 1% | 91 | 14% | 57 | 8% | 83 | 12% |
| 9 | 3 | 0% | 81 | 12% | 55 | 8% | 76 | 11% |
| 10 | 4 | 1% | 66 | 10% | 79 | 12% | 66 | 10% |
| 11 | 6 | 1% | 42 | 6% | 53 | 8% | 59 | 9% |
| 12 | 12 | 2% | 15 | 2% | 74 | 11% | 1 | 0% |
| 13 | 22 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 16 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 27 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 28 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 33 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 32 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 24 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 25 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 27 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 22 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 32 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 24 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 23 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 28 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 23 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 28 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 34 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 22 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 27 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 20 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 12 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 16 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 7 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.16 Distribution of Total Score and PT Scores—Grade Eleven, Form Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 63 | 7% | 73 | 8% | 71 | 8% | 78 | 9% |
| 1 | 5 | 1% | 11 | 1% | 12 | 1% | 7 | 1% |
| 2 | 3 | 0% | 15 | 2% | 14 | 2% | 22 | 3% |
| 3 | 1 | 0% | 20 | 2% | 21 | 2% | 29 | 3% |
| 4 | 5 | 1% | 48 | 5% | 49 | 6% | 49 | 6% |
| 5 | 3 | 0% | 71 | 8% | 61 | 7% | 55 | 6% |
| 6 | 3 | 0% | 100 | 11% | 74 | 8% | 102 | 12% |
| 7 | 5 | 1% | 102 | 12% | 85 | 10% | 105 | 12% |
| 8 | 6 | 1% | 115 | 13% | 84 | 10% | 118 | 13% |
| 9 | 5 | 1% | 108 | 12% | 100 | 11% | 119 | 14% |
| 10 | 8 | 1% | 123 | 14% | 75 | 9% | 97 | 11% |
| 11 | 5 | 1% | 61 | 7% | 89 | 10% | 66 | 8% |
| 12 | 17 | 2% | 29 | 3% | 141 | 16% | 29 | 3% |
| 13 | 14 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 20 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 25 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 15 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 40 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 37 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 40 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 43 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 39 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 27 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 30 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 31 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 45 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 45 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 31 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 47 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 45 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 34 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 30 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 34 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 37 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 17 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 16 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 5 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.17 Distribution of Total Score and PT Scores—Grade Twelve, Form One

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 34 | 7% | 42 | 9% | 37 | 8% | 46 | 10% |
| 1 | 4 | 1% | 9 | 2% | 13 | 3% | 10 | 2% |
| 2 | 5 | 1% | 15 | 3% | 12 | 3% | 9 | 2% |
| 3 | 3 | 1% | 29 | 6% | 13 | 3% | 29 | 6% |
| 4 | 3 | 1% | 32 | 7% | 23 | 5% | 29 | 6% |
| 5 | 2 | 0% | 51 | 11% | 41 | 9% | 72 | 16% |
| 6 | 3 | 1% | 67 | 15% | 48 | 10% | 64 | 14% |
| 7 | 0 | 0% | 87 | 19% | 40 | 9% | 56 | 12% |
| 8 | 2 | 0% | 53 | 12% | 35 | 8% | 43 | 9% |
| 9 | 2 | 0% | 32 | 7% | 42 | 9% | 39 | 9% |
| 10 | 7 | 2% | 29 | 6% | 31 | 7% | 26 | 6% |
| 11 | 10 | 2% | 8 | 2% | 48 | 10% | 24 | 5% |
| 12 | 9 | 2% | 4 | 1% | 75 | 16% | 11 | 2% |
| 13 | 14 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 19 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 21 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 23 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 23 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 18 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 20 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 20 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 20 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 26 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 20 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 17 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 17 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 18 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 20 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 10 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 14 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 10 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 17 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 13 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 6 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 2 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 2 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 4 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.18 Distribution of Total Score and PT Scores—Grade Twelve, Form Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 19 | 5% | 30 | 7% | 26 | 6% | 34 | 8% |
| 1 | 4 | 1% | 6 | 1% | 7 | 2% | 3 | 1% |
| 2 | 3 | 1% | 11 | 3% | 9 | 2% | 14 | 3% |
| 3 | 1 | 0% | 28 | 7% | 18 | 4% | 29 | 7% |
| 4 | 6 | 1% | 43 | 11% | 19 | 5% | 44 | 11% |
| 5 | 4 | 1% | 64 | 16% | 42 | 10% | 44 | 11% |
| 6 | 3 | 1% | 56 | 14% | 40 | 10% | 55 | 14% |
| 7 | 1 | 0% | 56 | 14% | 60 | 15% | 56 | 14% |
| 8 | 1 | 0% | 53 | 13% | 42 | 10% | 42 | 10% |
| 9 | 4 | 1% | 33 | 8% | 27 | 7% | 33 | 8% |
| 10 | 2 | 0% | 15 | 4% | 27 | 7% | 27 | 7% |
| 11 | 7 | 2% | 7 | 2% | 38 | 9% | 19 | 5% |
| 12 | 9 | 2% | 3 | 1% | 50 | 12% | 5 | 1% |
| 13 | 20 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 21 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 20 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 28 | 7% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 25 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 19 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 12 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 21 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 21 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 15 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 17 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 16 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 14 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 21 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 9 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 14 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 8 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 11 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 12 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 11 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 2 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 2 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 1 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 1 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.19 Distribution of Total Score and PT Scores—Grade Twelve, Form Three

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 26 | 7% | 32 | 8% | 29 | 7% | 33 | 9% |
| 1 | 2 | 1% | 5 | 1% | 7 | 2% | 4 | 1% |
| 2 | 2 | 1% | 6 | 2% | 6 | 2% | 9 | 2% |
| 3 | 4 | 1% | 13 | 3% | 11 | 3% | 17 | 4% |
| 4 | 2 | 1% | 16 | 4% | 30 | 8% | 25 | 6% |
| 5 | 1 | 0% | 40 | 10% | 28 | 7% | 44 | 11% |
| 6 | 1 | 0% | 40 | 10% | 42 | 11% | 45 | 12% |
| 7 | 0 | 0% | 59 | 15% | 33 | 9% | 35 | 9% |
| 8 | 4 | 1% | 46 | 12% | 36 | 9% | 46 | 12% |
| 9 | 1 | 0% | 40 | 10% | 33 | 9% | 44 | 11% |
| 10 | 4 | 1% | 42 | 11% | 26 | 7% | 49 | 13% |
| 11 | 3 | 1% | 38 | 10% | 41 | 11% | 27 | 7% |
| 12 | 8 | 2% | 10 | 3% | 65 | 17% | 9 | 2% |
| 13 | 9 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 12 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 14 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 19 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 15 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 17 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 17 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 20 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 15 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 8 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 19 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 9 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 16 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 13 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 8 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 14 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 13 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 23 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 18 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 20 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 13 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 12 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 5 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.20 Distribution of Total Score and PT Scores—Grade Twelve, Form Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 26 | 9% | 29 | 10% | 27 | 9% | 34 | 11% |
| 1 | 2 | 1% | 7 | 2% | 6 | 2% | 4 | 1% |
| 2 | 1 | 0% | 7 | 2% | 9 | 3% | 13 | 4% |
| 3 | 2 | 1% | 12 | 4% | 14 | 5% | 12 | 4% |
| 4 | 2 | 1% | 19 | 6% | 13 | 4% | 9 | 3% |
| 5 | 2 | 1% | 26 | 9% | 25 | 8% | 19 | 6% |
| 6 | 1 | 0% | 23 | 8% | 25 | 8% | 31 | 10% |
| 7 | 1 | 0% | 27 | 9% | 17 | 6% | 34 | 11% |
| 8 | 6 | 2% | 31 | 10% | 29 | 10% | 35 | 12% |
| 9 | 3 | 1% | 37 | 12% | 28 | 9% | 44 | 15% |
| 10 | 5 | 2% | 40 | 13% | 28 | 9% | 36 | 12% |
| 11 | 3 | 1% | 24 | 8% | 27 | 9% | 20 | 7% |
| 12 | 6 | 2% | 19 | 6% | 53 | 18% | 10 | 3% |
| 13 | 6 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 4 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 10 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 11 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 11 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 9 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 7 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 9 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 14 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 8 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 9 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 15 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 7 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 16 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 11 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 14 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 12 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 12 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 12 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 14 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 7 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 10 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 8 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 5 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.21 Distribution of Total Score and PT Scores—High School, Form One

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 100 | 8% | 128 | 10% | 116 | 9% | 144 | 11% |
| 1 | 12 | 1% | 28 | 2% | 41 | 3% | 30 | 2% |
| 2 | 13 | 1% | 42 | 3% | 36 | 3% | 31 | 2% |
| 3 | 10 | 1% | 73 | 6% | 45 | 3% | 84 | 6% |
| 4 | 13 | 1% | 104 | 8% | 75 | 6% | 93 | 7% |
| 5 | 8 | 1% | 147 | 11% | 111 | 9% | 164 | 13% |
| 6 | 7 | 1% | 171 | 13% | 111 | 9% | 181 | 14% |
| 7 | 6 | 0% | 215 | 17% | 107 | 8% | 155 | 12% |
| 8 | 18 | 1% | 160 | 12% | 114 | 9% | 117 | 9% |
| 9 | 11 | 1% | 113 | 9% | 115 | 9% | 107 | 8% |
| 10 | 20 | 2% | 77 | 6% | 98 | 8% | 94 | 7% |
| 11 | 34 | 3% | 34 | 3% | 135 | 10% | 76 | 6% |
| 12 | 23 | 2% | 5 | 0% | 193 | 15% | 21 | 2% |
| 13 | 37 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 42 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 67 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 51 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 57 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 57 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 69 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 59 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 44 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 43 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 43 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 44 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 41 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 40 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 52 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 29 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 27 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 10 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 2 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 4 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.22 Distribution of Total Score and PT Scores—High School, Form Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 86 | 7% | 113 | 9% | 105 | 8% | 129 | 10% |
| 1 | 11 | 1% | 26 | 2% | 23 | 2% | 18 | 1% |
| 2 | 9 | 1% | 30 | 2% | 26 | 2% | 50 | 4% |
| 3 | 9 | 1% | 73 | 6% | 51 | 4% | 78 | 6% |
| 4 | 15 | 1% | 135 | 11% | 74 | 6% | 127 | 10% |
| 5 | 9 | 1% | 188 | 15% | 124 | 10% | 145 | 12% |
| 6 | 3 | 0% | 190 | 15% | 130 | 10% | 174 | 14% |
| 7 | 7 | 1% | 223 | 18% | 140 | 11% | 173 | 14% |
| 8 | 7 | 1% | 135 | 11% | 137 | 11% | 113 | 9% |
| 9 | 13 | 1% | 80 | 6% | 117 | 9% | 101 | 8% |
| 10 | 5 | 0% | 49 | 4% | 88 | 7% | 80 | 6% |
| 11 | 23 | 2% | 13 | 1% | 114 | 9% | 59 | 5% |
| 12 | 28 | 2% | 5 | 0% | 131 | 10% | 13 | 1% |
| 13 | 41 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 63 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 64 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 71 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 78 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 79 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 70 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 65 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 67 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 45 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 35 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 51 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 34 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 36 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 32 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 33 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 26 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 23 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 14 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 6 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 1 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 1 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.23 Distribution of Total Score and PT Scores—High School, Form Three

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 99 | 9% | 116 | 11% | 108 | 10% | 116 | 11% |
| 1 | 6 | 1% | 13 | 1% | 17 | 2% | 10 | 1% |
| 2 | 4 | 0% | 16 | 1% | 19 | 2% | 25 | 2% |
| 3 | 6 | 1% | 42 | 4% | 37 | 3% | 52 | 5% |
| 4 | 5 | 0% | 47 | 4% | 76 | 7% | 68 | 6% |
| 5 | 4 | 0% | 103 | 9% | 88 | 8% | 106 | 10% |
| 6 | 4 | 0% | 131 | 12% | 118 | 11% | 134 | 12% |
| 7 | 6 | 1% | 139 | 13% | 92 | 8% | 108 | 10% |
| 8 | 10 | 1% | 142 | 13% | 99 | 9% | 136 | 12% |
| 9 | 4 | 0% | 124 | 11% | 90 | 8% | 121 | 11% |
| 10 | 8 | 1% | 110 | 10% | 108 | 10% | 119 | 11% |
| 11 | 9 | 1% | 84 | 8% | 97 | 9% | 88 | 8% |
| 12 | 21 | 2% | 26 | 2% | 144 | 13% | 10 | 1% |
| 13 | 34 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 29 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 41 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 48 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 41 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 44 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 35 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 52 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 33 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 40 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 32 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 43 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 42 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 25 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 31 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 12 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.24 Distribution of Total Score and PT Scores—High School, Form Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Number of Students (Total Test Score)** | **Percentage of Students (Total Test Score)** | **Number of Students (PT 1, Earth and Space Sciences)** | **Percentage of Students (PT 1, Earth and Space Sciences)** | **Number of Students (PT 2, Life Sciences)** | **Percentage of Students (PT 2, Life Sciences)** | **Number of Students (PT 3, Physical Sciences)** | **Percentage of Students (PT 3, Physical Sciences)** |
| 0 | 97 | 7% | 112 | 9% | 108 | 8% | 123 | 9% |
| 1 | 8 | 1% | 20 | 2% | 19 | 1% | 12 | 1% |
| 2 | 4 | 0% | 26 | 2% | 28 | 2% | 44 | 3% |
| 3 | 3 | 0% | 39 | 3% | 42 | 3% | 49 | 4% |
| 4 | 8 | 1% | 78 | 6% | 69 | 5% | 70 | 5% |
| 5 | 8 | 1% | 105 | 8% | 104 | 8% | 82 | 6% |
| 6 | 5 | 0% | 139 | 11% | 112 | 9% | 146 | 11% |
| 7 | 8 | 1% | 140 | 11% | 111 | 9% | 152 | 12% |
| 8 | 12 | 1% | 162 | 13% | 120 | 9% | 165 | 13% |
| 9 | 9 | 1% | 158 | 12% | 142 | 11% | 175 | 14% |
| 10 | 15 | 1% | 174 | 13% | 109 | 8% | 141 | 11% |
| 11 | 11 | 1% | 90 | 7% | 126 | 10% | 93 | 7% |
| 12 | 26 | 2% | 52 | 4% | 205 | 16% | 43 | 3% |
| 13 | 28 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 14 | 29 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 15 | 39 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 16 | 29 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 17 | 58 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 18 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 19 | 51 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 56 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 21 | 54 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 22 | 36 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 23 | 47 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 24 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 61 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 26 | 62 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 27 | 44 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 28 | 69 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 29 | 61 | 5% | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 50 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 31 | 45 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| 32 | 49 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 33 | 46 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| 34 | 30 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 35 | 26 | 2% | N/A | N/A | N/A | N/A | N/A | N/A |
| 36 | 11 | 1% | N/A | N/A | N/A | N/A | N/A | N/A |

Table 7.A.25 Raw Score Summary for Each Embedded PT**—Grade Five**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PT and Form** | **Number of Students** | **Number of Items** | **Maximum Number of Points** | **Mean Raw Score** | **Standard Deviation Raw Score** | **Minimum Raw Score** | **Maximum Raw Score** | **Mean Raw Score as a Percentage** |
| PT 1 Form 1 (Earth and Space Sciences) | 1,200 | 10 | 12 | 6.4 | 3.3 | 0 | 12 | 53.3 |
| PT 2 Form 1 (Life Sciences) | 1,201 | 10 | 12 | 6.0 | 3.2 | 0 | 12 | 50.1 |
| PT 3 Form 1 (Physical Sciences) | 1,200 | 10 | 12 | 6.3 | 3.4 | 0 | 12 | 52.8 |
| PT 1 Form 2 (Earth and Space Sciences) | 1,124 | 10 | 12 | 6.6 | 3.3 | 0 | 12 | 55.2 |
| PT 2 Form 2 (Life Sciences) | 1,124 | 10 | 12 | 6.3 | 3.2 | 0 | 12 | 52.7 |
| PT 3 Form 2 (Physical Sciences) | 1,124 | 10 | 12 | 6.4 | 3.3 | 0 | 12 | 53.2 |
| PT 1 Form 3 (Earth and Space Sciences) | 1,341 | 10 | 12 | 7.1 | 3.5 | 0 | 12 | 59.5 |
| PT 2 Form 3 (Life Sciences) | 1,341 | 10 | 12 | 7.1 | 3.9 | 0 | 12 | 59.3 |
| PT 3 Form 3 (Physical Sciences) | 1,344 | 10 | 12 | 5.7 | 2.8 | 0 | 12 | 47.7 |
| PT 1 Form 4 (Earth and Space Sciences) | 1,289 | 10 | 12 | 7.3 | 3.5 | 0 | 12 | 60.6 |
| PT 2 Form 4 (Life Sciences) | 1,288 | 10 | 12 | 7.4 | 3.8 | 0 | 12 | 61.6 |
| PT 3 Form 4 (Physical Sciences) | 1,286 | 10 | 12 | 6.1 | 3.0 | 0 | 12 | 51.0 |

Table 7.A.26 Raw Score Summary for Each Embedded PT**—Grade Eight**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PT and Form** | **Number of Students** | **Number of Items** | **Maximum Number of Points** | **Mean Raw Score** | **Standard Deviation Raw Score** | **Minimum Raw Score** | **Maximum Raw Score** | **Mean Raw Score as a Percentage** |
| PT 1 Form 1 (Earth and Space Sciences) | 1,257 | 10 | 12 | 7.2 | 3.5 | 0 | 12 | 60.3 |
| PT 2 Form 1 (Life Sciences) | 1,257 | 10 | 12 | 6.7 | 3.6 | 0 | 12 | 56.0 |
| PT 3 Form 1 (Physical Sciences) | 1,257 | 10 | 12 | 6.5 | 3.6 | 0 | 12 | 54.0 |
| PT 1 Form 2 (Earth and Space Sciences) | 1,127 | 10 | 12 | 7.8 | 3.2 | 0 | 12 | 64.9 |
| PT 2 Form 2 (Life Sciences) | 1,127 | 10 | 12 | 7.5 | 3.4 | 0 | 12 | 62.4 |
| PT 3 Form 2 (Physical Sciences) | 1,127 | 10 | 12 | 6.5 | 3.2 | 0 | 12 | 53.9 |
| PT 1 Form 3 (Earth and Space Sciences) | 1,181 | 10 | 12 | 7.3 | 3.1 | 0 | 12 | 60.5 |
| PT 2 Form 3 (Life Sciences) | 1,183 | 10 | 12 | 7.5 | 3.6 | 0 | 12 | 62.4 |
| PT 3 Form 3 (Physical Sciences) | 1,183 | 10 | 12 | 6.9 | 3.4 | 0 | 12 | 57.8 |
| PT 1 Form 4 (Earth and Space Sciences) | 1,107 | 10 | 12 | 7.2 | 3.2 | 0 | 12 | 59.6 |
| PT 2 Form 4 (Life Sciences) | 1,105 | 10 | 12 | 6.8 | 3.5 | 0 | 12 | 56.3 |
| PT 3 Form 4 (Physical Sciences) | 1,105 | 10 | 12 | 6.3 | 3.3 | 0 | 12 | 52.6 |

Table 7.A.27 Raw Score Summary for Each Embedded PT**—Grade Ten**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PT and Form** | **Number of Students** | **Number of Items** | **Maximum Number of Points** | **Mean Raw Score** | **SD Raw Score** | **Minimum Raw Score** | **Maximum Raw Score** | **Mean Raw Score as a Percentage** |
| PT 1 Form 1 (Earth and Space Sciences) | 161 | 10 | 12 | 6.9 | 4.1 | 0 | 12 | 57.2 |
| PT 2 Form 1 (Life Sciences) | 161 | 10 | 12 | 6.2 | 3.5 | 0 | 12 | 51.8 |
| PT 3 Form 1 (Physical Sciences) | 161 | 10 | 12 | 5.9 | 3.2 | 0 | 12 | 49.3 |
| PT 1 Form 2 (Earth and Space Sciences) | 10 | 10 | 12 | 5.7 | 3.1 | 0 | 12 | 47.5 |
| PT 2 Form 2 (Life Sciences) | 10 | 10 | 12 | 5.9 | 3.6 | 0 | 12 | 49.2 |
| PT 3 Form 2 (Physical Sciences) | 10 | 10 | 12 | 5.5 | 2.8 | 0 | 10 | 45.8 |
| PT 1 Form 3 (Earth and Space Sciences) | 34 | 10 | 12 | 6.8 | 4.2 | 0 | 12 | 56.6 |
| PT 2 Form 3 (Life Sciences) | 34 | 10 | 12 | 5.8 | 3.4 | 0 | 11 | 48.5 |
| PT 3 Form 3 (Physical Sciences) | 34 | 10 | 12 | 6.4 | 3.7 | 0 | 12 | 53.4 |
| PT 1 Form 4 (Earth and Space Sciences) | 118 | 10 | 12 | 6.6 | 3.5 | 0 | 12 | 54.7 |
| PT 2 Form 4 (Life Sciences) | 118 | 10 | 12 | 6.0 | 3.3 | 0 | 12 | 50.1 |
| PT 3 Form 4 (Physical Sciences) | 118 | 10 | 12 | 6.3 | 3.2 | 0 | 12 | 52.7 |

Table 7.A.28 Raw Score Summary for Each Embedded PT**—Grade Eleven**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PT and Form** | **Number of Students** | **Number of Items** | **Maximum Number of Points** | **Mean Raw Score** | **SD Raw Score** | **Minimum Raw Score** | **Maximum Raw Score** | **Mean Raw Score as a Percentage** |
| PT 1 Form 1 (Earth and Space Sciences) | 678 | 10 | 12 | 7.1 | 3.7 | 0 | 12 | 59.0 |
| PT 2 Form 1 (Life Sciences) | 678 | 10 | 12 | 5.8 | 3.2 | 0 | 12 | 48.1 |
| PT 3 Form 1 (Physical Sciences) | 678 | 10 | 12 | 5.8 | 2.9 | 0 | 11 | 48.0 |
| PT 1 Form 2 (Earth and Space Sciences) | 845 | 10 | 12 | 6.9 | 3.5 | 0 | 12 | 57.3 |
| PT 2 Form 2 (Life Sciences) | 845 | 10 | 12 | 5.7 | 3.1 | 0 | 12 | 47.2 |
| PT 3 Form 2 (Physical Sciences) | 845 | 10 | 12 | 5.5 | 2.7 | 0 | 12 | 45.4 |
| PT 1 Form 3 (Earth and Space Sciences) | 673 | 10 | 12 | 6.9 | 3.7 | 0 | 12 | 57.5 |
| PT 2 Form 3 (Life Sciences) | 673 | 10 | 12 | 6.4 | 3.3 | 0 | 12 | 52.9 |
| PT 3 Form 3 (Physical Sciences) | 672 | 10 | 12 | 6.5 | 3.3 | 0 | 12 | 53.9 |
| PT 1 Form 4 (Earth and Space Sciences) | 876 | 10 | 12 | 7.6 | 3.6 | 0 | 12 | 63.1 |
| PT 2 Form 4 (Life Sciences) | 876 | 10 | 12 | 6.9 | 3.2 | 0 | 12 | 57.2 |
| PT 3 Form 4 (Physical Sciences) | 877 | 10 | 12 | 7.0 | 3.2 | 0 | 12 | 58.0 |

Table 7.A.29 Raw Score Summary for Each Embedded PT**—Grade Twelve**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PT and Form** | **Number of Students** | **Number of Items** | **Maximum Number of Points** | **Mean Raw Score** | **SD Raw Score** | **Minimum Raw Score** | **Maximum Raw Score** | **Mean Raw Score as a Percentage** |
| PT 1 Form 1 (Earth and Space Sciences) | 459 | 10 | 12 | 7.3 | 3.7 | 0 | 12 | 60.8 |
| PT 2 Form 1 (Life Sciences) | 459 | 10 | 12 | 5.9 | 3.1 | 0 | 12 | 49.5 |
| PT 3 Form 1 (Physical Sciences) | 458 | 10 | 12 | 5.8 | 2.9 | 0 | 12 | 48.4 |
| PT 1 Form 2 (Earth and Space Sciences) | 405 | 10 | 12 | 7.1 | 3.4 | 0 | 12 | 59.5 |
| PT 2 Form 2 (Life Sciences) | 405 | 10 | 12 | 5.9 | 3.0 | 0 | 12 | 49.5 |
| PT 3 Form 2 (Physical Sciences) | 406 | 10 | 12 | 5.7 | 2.7 | 0 | 12 | 47.6 |
| PT 1 Form 3 (Earth and Space Sciences) | 387 | 10 | 12 | 7.4 | 3.6 | 0 | 12 | 61.8 |
| PT 2 Form 3 (Life Sciences) | 387 | 10 | 12 | 6.6 | 3.2 | 0 | 12 | 55.3 |
| PT 3 Form 3 (Physical Sciences) | 387 | 10 | 12 | 6.9 | 3.2 | 0 | 12 | 57.3 |
| PT 1 Form 4 (Earth and Space Sciences) | 301 | 10 | 12 | 7.3 | 3.8 | 0 | 12 | 61.2 |
| PT 2 Form 4 (Life Sciences) | 301 | 10 | 12 | 6.6 | 3.5 | 0 | 12 | 55.3 |
| PT 3 Form 4 (Physical Sciences) | 301 | 10 | 12 | 6.9 | 3.5 | 0 | 12 | 57.1 |

Table 7.A.30 Raw Score Summary for Each Embedded PT**—High School**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PT and Form** | **Number of Students** | **Number of Items** | **Maximum Number of Points** | **Mean Raw Score** | **SD Raw Score** | **Minimum Raw Score** | **Maximum Raw Score** | **Mean Raw Score as a Percentage** |
| PT 1 Form 1 (Earth and Space Sciences) | 1,298 | 10 | 12 | 7.1 | 3.8 | 0 | 12 | 59.4 |
| PT 2 Form 1 (Life Sciences) | 1,298 | 10 | 12 | 5.9 | 3.2 | 0 | 12 | 49.1 |
| PT 3 Form 1 (Physical Sciences) | 1,297 | 10 | 12 | 5.8 | 3.0 | 0 | 12 | 48.3 |
| PT 1 Form 2 (Earth and Space Sciences) | 1,260 | 10 | 12 | 7.0 | 3.5 | 0 | 12 | 57.9 |
| PT 2 Form 2 (Life Sciences) | 1,260 | 10 | 12 | 5.8 | 3.1 | 0 | 12 | 48.0 |
| PT 3 Form 2 (Physical Sciences) | 1,261 | 10 | 12 | 5.5 | 2.7 | 0 | 12 | 46.2 |
| PT 1 Form 3 (Earth and Space Sciences) | 1,094 | 10 | 12 | 7.1 | 3.7 | 0 | 12 | 59.0 |
| PT 2 Form 3 (Life Sciences) | 1,094 | 10 | 12 | 6.4 | 3.3 | 0 | 12 | 53.6 |
| PT 3 Form 3 (Physical Sciences) | 1,093 | 10 | 12 | 6.6 | 3.3 | 0 | 12 | 55.1 |
| PT 3 Form 1 (Earth and Space Sciences) | 1,295 | 10 | 12 | 7.4 | 3.6 | 0 | 12 | 61.9 |
| PT 2 Form 4 (Life Sciences) | 1,295 | 10 | 12 | 6.7 | 3.3 | 0 | 12 | 56.1 |
| PT 3 Form 4 (Physical Sciences) | 1,296 | 10 | 12 | 6.9 | 3.3 | 0 | 12 | 57.3 |

### Appendix 7.B: Theta Scores (Estimated Ability Values) of Students Taking Each Assessment

**Note:** An expression that opens with a parenthesis and closes with a bracket indicates that a value is greater than the first number and is less than or equal to the second number. For example, “(0.5, 2]” indicates a value greater than 0.5 but less than or equal to 2.

Table 7.B.1 Frequency Distribution of Theta for Overall Scores

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Theta Score** | **Grade 5** | **Grade 8** | **HS Grade 10** | **HS Grade 11** | **HS Grade 12** | **HS All Grades** |
| Incomplete | 419 | 344 | 30 | 269 | 118 | 417 |
| [−6.0, −6.0] | 4 | 13 | N/A | 5 | 1 | 6 |
| (−6.0, −5.5] | N/A | N/A | N/A | N/A | N/A | N/A |
| (−5.5, −5.0] | N/A | N/A | N/A | N/A | N/A | N/A |
| (−5.0, −4.5] | 23 | 8 | 1 | 1 | 1 | 3 |
| (−4.5, −4.0] | N/A | 12 | N/A | 3 | 3 | 6 |
| (−4.0, −3.5] | 39 | 38 | N/A | 13 | 5 | 18 |
| (−3.5, −3.0] | 57 | 23 | 2 | 24 | 14 | 40 |
| (−3.0, −2.5] | 83 | 64 | 10 | 36 | 20 | 66 |
| (−2.5, −2.0] | 85 | 88 | 7 | 34 | 18 | 59 |
| (−2.0, −1.5] | 174 | 226 | 18 | 95 | 43 | 156 |
| (−1.5, −1.0] | 559 | 516 | 36 | 304 | 172 | 512 |
| (−1.0, −0.5] | 793 | 811 | 54 | 556 | 283 | 893 |
| (−0.5, 0.0] | 723 | 587 | 45 | 522 | 242 | 809 |
| (0.0, 0.5] | 588 | 491 | 28 | 394 | 193 | 615 |
| (0.5, 1.0] | 615 | 577 | 27 | 356 | 164 | 547 |
| (1.0, 1.5] | 422 | 386 | 23 | 202 | 108 | 333 |
| (1.5, 2.0] | 145 | 208 | 21 | 152 | 94 | 267 |
| (2.0, 2.5] | 161 | 141 | 12 | 53 | 31 | 96 |
| (2.5, 3.0] | 32 | 62 | 6 | 25 | 16 | 47 |
| (3.0, 3.5] | 26 | 38 | 2 | 23 | 16 | 41 |
| (3.5, 4.0] | N/A | N/A | N/A | N/A | N/A | N/A |
| (4.0, 4.5] | N/A | N/A | N/A | N/A | N/A | N/A |
| (4.5, 5.0] | N/A | N/A | N/A | N/A | N/A | N/A |
| (5.0, 5.5] | N/A | N/A | N/A | N/A | N/A | N/A |
| (5.5, 6.0] | 6 | 39 | 1 | 5 | 10 | 16 |

### Appendix 7.C: Raw Score and Scale Score Distributions

**Notes:**

* An incomplete assessment was assigned either the LOSS or LOSS+1.
* When a student was logged on to the test delivery system but did not answer any item, LOSS was assigned as 500 for grade five, 800 for grade eight, and 900 for high school.
* When a student was logged on and answered fewer than four items, LOSS+1 was assigned, such as 501 for grade five, 801 for grade eight, and 901 for high school.
* For those incomplete test cases, raw scores were overwritten as zero.
* Percentages for some forms may not sum up to exactly 100 because of rounding.
* Raw-score-to-scale-score distribution is shown only for values within the raw score range for the respective form.
* In table 7.C.1 through table 7.C.12, the form indicates the set of embedded PTs a given student received.

Table 7.C.1 Raw-Score-to-Scale-Score Distribution—Grade Five, Forms One and Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form One Theta** | **Form One Scale Score** | **Form One N** | **Form One Percent** | **Form Two Theta** | **Form Two Scale Score** | **Form Two N** | **Form Two Percent** |
| LOSS | N/A | 500 | 79 | 7% | N/A | 500 | 70 | 6% |
| LOSS+1 | N/A | 501 | 25 | 2% | N/A | 501 | 29 | 3% |
| 0 | −6.0000 | 502 | 3 | 0% | −6.0000 | 502 | 0 | 0% |
| 1 | −4.5015 | 502 | 6 | 1% | −4.5987 | 502 | 5 | 0% |
| 2 | −3.7623 | 508 | 12 | 1% | −3.8569 | 507 | 8 | 1% |
| 3 | −3.3095 | 513 | 8 | 1% | −3.4016 | 512 | 6 | 1% |
| 4 | −2.9732 | 517 | 10 | 1% | −3.0629 | 516 | 5 | 0% |
| 5 | −2.7003 | 520 | 12 | 1% | −2.7875 | 519 | 9 | 1% |
| 6 | −2.4669 | 523 | 5 | 0% | −2.5518 | 522 | 11 | 1% |
| 7 | −2.2602 | 525 | 8 | 1% | −2.3429 | 524 | 1 | 0% |
| 8 | −2.0728 | 527 | 6 | 1% | −2.1534 | 527 | 10 | 1% |
| 9 | −1.8996 | 529 | 9 | 1% | −1.9781 | 528 | 11 | 1% |
| 10 | −1.7373 | 531 | 22 | 2% | −1.8138 | 530 | 10 | 1% |
| 11 | −1.5833 | 533 | 10 | 1% | −1.6579 | 532 | 17 | 2% |
| 12 | −1.4357 | 535 | 25 | 2% | −1.5085 | 534 | 16 | 1% |
| 13 | −1.2932 | 536 | 35 | 3% | −1.3644 | 535 | 25 | 2% |
| 14 | −1.1545 | 538 | 43 | 4% | −1.2241 | 537 | 47 | 4% |
| 15 | −1.0186 | 539 | 50 | 4% | −1.0868 | 539 | 42 | 4% |
| 16 | −0.8848 | 541 | 64 | 5% | −0.9517 | 540 | 42 | 4% |
| 17 | −0.7521 | 542 | 71 | 6% | −0.8178 | 542 | 47 | 4% |
| 18 | −0.6200 | 544 | 54 | 5% | −0.6846 | 543 | 57 | 5% |
| 19 | −0.4877 | 545 | 48 | 4% | −0.5514 | 545 | 43 | 4% |
| 20 | −0.3545 | 547 | 51 | 4% | −0.4173 | 546 | 46 | 4% |
| 21 | −0.2197 | 548 | 48 | 4% | −0.2818 | 548 | 58 | 5% |
| 22 | −0.0826 | 550 | 45 | 4% | −0.1440 | 549 | 45 | 4% |
| 23 | 0.0578 | 551 | 47 | 4% | −0.0031 | 551 | 56 | 5% |
| 24 | 0.2024 | 553 | 43 | 4% | 0.1420 | 552 | 38 | 3% |
| 25 | 0.3525 | 555 | 39 | 3% | 0.2925 | 554 | 48 | 4% |
| 26 | 0.5095 | 557 | 45 | 4% | 0.4499 | 556 | 50 | 4% |
| 27 | 0.6754 | 558 | 45 | 4% | 0.6162 | 558 | 45 | 4% |
| 28 | 0.8527 | 560 | 44 | 4% | 0.7938 | 560 | 51 | 5% |
| 29 | 1.0448 | 563 | 43 | 4% | 0.9863 | 562 | 37 | 3% |
| 30 | 1.2567 | 565 | 47 | 4% | 1.1987 | 564 | 36 | 3% |
| 31 | 1.4962 | 568 | 22 | 2% | 1.4387 | 567 | 40 | 4% |
| 32 | 1.7761 | 571 | 27 | 2% | 1.7193 | 570 | 21 | 2% |
| 33 | 2.1202 | 575 | 21 | 2% | 2.0642 | 574 | 21 | 2% |
| 34 | 2.5818 | 580 | 18 | 2% | 2.5270 | 579 | 14 | 1% |
| 35 | 3.3310 | 588 | 8 | 1% | 3.2776 | 588 | 4 | 0% |
| 36 | 6.0000 | 599 | 1 | 0% | 6.0000 | 599 | 3 | 0% |

Table 7.C.2 Raw-Score-to-Scale-Score Distribution—Grade Five, Forms Three and Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form Three Theta** | **Form Three Scale Score** | **Form Three N** | **Form Three Percent** | **Form Four Theta** | **Form Four Scale Score** | **Form Four N** | **Form Four Percent** |
| LOSS | N/A | 500 | 86 | 6% | N/A | 500 | 80 | 6% |
| LOSS+1 | N/A | 501 | 27 | 2% | N/A | 501 | 23 | 2% |
| 0 | −6.0000 | 502 | 0 | 0% | −6.0000 | 502 | 1 | 0% |
| 1 | −4.6034 | 502 | 10 | 1% | −4.6462 | 502 | 2 | 0% |
| 2 | −3.8670 | 507 | 11 | 1% | −3.9091 | 507 | 8 | 1% |
| 3 | −3.4171 | 512 | 6 | 0% | −3.4583 | 512 | 12 | 1% |
| 4 | −3.0838 | 516 | 8 | 1% | −3.1240 | 516 | 12 | 1% |
| 5 | −2.8139 | 519 | 12 | 1% | −2.8530 | 519 | 12 | 1% |
| 6 | −2.5836 | 522 | 10 | 1% | −2.6215 | 521 | 7 | 1% |
| 7 | −2.3802 | 524 | 9 | 1% | −2.4167 | 524 | 6 | 0% |
| 8 | −2.1960 | 526 | 9 | 1% | −2.2311 | 526 | 13 | 1% |
| 9 | −2.0261 | 528 | 11 | 1% | −2.0596 | 528 | 7 | 1% |
| 10 | −1.8671 | 530 | 10 | 1% | −1.8989 | 529 | 11 | 1% |
| 11 | −1.7164 | 531 | 11 | 1% | −1.7464 | 531 | 6 | 0% |
| 12 | −1.5722 | 533 | 24 | 2% | −1.6003 | 533 | 16 | 1% |
| 13 | −1.4329 | 535 | 24 | 2% | −1.4590 | 534 | 29 | 2% |
| 14 | −1.2973 | 536 | 36 | 3% | −1.3214 | 536 | 27 | 2% |
| 15 | −1.1645 | 538 | 36 | 3% | −1.1865 | 537 | 38 | 3% |
| 16 | −1.0335 | 539 | 55 | 4% | −1.0534 | 539 | 47 | 4% |
| 17 | −0.9036 | 541 | 57 | 4% | −0.9212 | 540 | 45 | 3% |
| 18 | −0.7739 | 542 | 44 | 3% | −0.7893 | 542 | 48 | 4% |
| 19 | −0.6437 | 544 | 69 | 5% | −0.6569 | 543 | 52 | 4% |
| 20 | −0.5123 | 545 | 57 | 4% | −0.5233 | 545 | 43 | 3% |
| 21 | −0.3789 | 547 | 54 | 4% | −0.3878 | 546 | 45 | 3% |
| 22 | −0.2427 | 548 | 48 | 4% | −0.2494 | 548 | 58 | 5% |
| 23 | −0.1028 | 550 | 67 | 5% | −0.1075 | 550 | 51 | 4% |
| 24 | 0.0420 | 551 | 56 | 4% | 0.0393 | 551 | 50 | 4% |
| 25 | 0.1929 | 553 | 57 | 4% | 0.1920 | 553 | 47 | 4% |
| 26 | 0.3514 | 555 | 50 | 4% | 0.3523 | 555 | 63 | 5% |
| 27 | 0.5197 | 557 | 64 | 5% | 0.5221 | 557 | 43 | 3% |
| 28 | 0.7002 | 559 | 49 | 4% | 0.7040 | 559 | 63 | 5% |
| 29 | 0.8967 | 561 | 63 | 5% | 0.9017 | 561 | 65 | 5% |
| 30 | 1.1142 | 563 | 60 | 4% | 1.1202 | 563 | 53 | 4% |
| 31 | 1.3608 | 566 | 54 | 4% | 1.3676 | 566 | 67 | 5% |
| 32 | 1.6493 | 569 | 44 | 3% | 1.6567 | 569 | 53 | 4% |
| 33 | 2.0042 | 573 | 35 | 3% | 2.0120 | 573 | 39 | 3% |
| 34 | 2.4791 | 579 | 12 | 1% | 2.4870 | 579 | 33 | 3% |
| 35 | 3.2447 | 587 | 5 | 0% | 3.2524 | 587 | 9 | 1% |
| 36 | 6.0000 | 599 | 0 | 0% | 6.0000 | 599 | 2 | 0% |

Table 7.C.3 Raw-Score-to-Scale-Score Distribution—Grade Eight, Forms One and Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form One Theta** | **Form One Scale Score** | **Form One N** | **Form One Percent** | **Form Two Theta** | **Form Two Scale Score** | **Form Two N** | **Form Two Percent** |
| LOSS | N/A | 800 | 84 | 7% | N/A | 800 | 50 | 4% |
| LOSS+1 | N/A | 801 | 33 | 3% | N/A | 801 | 14 | 1% |
| 0 | −6.0000 | 802 | 4 | 0% | −6.0000 | 802 | 3 | 0% |
| 1 | −4.7999 | 802 | 4 | 0% | −4.8436 | 802 | 0 | 0% |
| 2 | −4.0548 | 809 | 8 | 1% | −4.1007 | 809 | 4 | 0% |
| 3 | −3.5966 | 814 | 11 | 1% | −3.6446 | 814 | 7 | 1% |
| 4 | −3.2556 | 818 | 5 | 0% | −3.3057 | 817 | 5 | 0% |
| 5 | −2.9784 | 821 | 11 | 1% | −3.0304 | 820 | 3 | 0% |
| 6 | −2.7412 | 824 | 6 | 0% | −2.7951 | 823 | 5 | 0% |
| 7 | −2.5314 | 826 | 7 | 1% | −2.5870 | 825 | 9 | 1% |
| 8 | −2.3412 | 828 | 9 | 1% | −2.3984 | 827 | 4 | 0% |
| 9 | −2.1658 | 830 | 9 | 1% | −2.2243 | 829 | 10 | 1% |
| 10 | −2.0018 | 832 | 8 | 1% | −2.0614 | 831 | 10 | 1% |
| 11 | −1.8466 | 833 | 13 | 1% | −1.9070 | 833 | 18 | 2% |
| 12 | −1.6985 | 835 | 19 | 2% | −1.7593 | 834 | 11 | 1% |
| 13 | −1.5560 | 836 | 31 | 2% | −1.6169 | 836 | 24 | 2% |
| 14 | −1.4180 | 838 | 46 | 4% | −1.4784 | 837 | 30 | 3% |
| 15 | −1.2834 | 839 | 46 | 4% | −1.3430 | 839 | 48 | 4% |
| 16 | −1.1515 | 841 | 49 | 4% | −1.2095 | 840 | 29 | 3% |
| 17 | −1.0214 | 842 | 41 | 3% | −1.0774 | 842 | 44 | 4% |
| 18 | −0.8926 | 844 | 48 | 4% | −0.9458 | 843 | 52 | 5% |
| 19 | −0.7643 | 845 | 40 | 3% | −0.8139 | 844 | 41 | 4% |
| 20 | −0.6359 | 846 | 66 | 5% | −0.6810 | 846 | 45 | 4% |
| 21 | −0.5065 | 848 | 40 | 3% | −0.5464 | 847 | 55 | 5% |
| 22 | −0.3756 | 849 | 37 | 3% | −0.4092 | 849 | 32 | 3% |
| 23 | −0.2421 | 851 | 38 | 3% | −0.2685 | 850 | 31 | 3% |
| 24 | −0.1051 | 852 | 58 | 5% | −0.1232 | 852 | 44 | 4% |
| 25 | 0.0367 | 854 | 37 | 3% | 0.0281 | 854 | 38 | 3% |
| 26 | 0.1847 | 855 | 33 | 3% | 0.1868 | 855 | 46 | 4% |
| 27 | 0.3409 | 857 | 42 | 3% | 0.3552 | 857 | 47 | 4% |
| 28 | 0.5079 | 859 | 45 | 4% | 0.5357 | 859 | 50 | 4% |
| 29 | 0.6889 | 861 | 46 | 4% | 0.7322 | 861 | 40 | 4% |
| 30 | 0.8892 | 863 | 37 | 3% | 0.9500 | 864 | 60 | 5% |
| 31 | 1.1164 | 865 | 47 | 4% | 1.1971 | 866 | 53 | 5% |
| 32 | 1.3832 | 868 | 49 | 4% | 1.4871 | 869 | 61 | 5% |
| 33 | 1.7135 | 872 | 49 | 4% | 1.8445 | 873 | 52 | 5% |
| 34 | 2.1607 | 877 | 48 | 4% | 2.3242 | 878 | 28 | 2% |
| 35 | 2.8945 | 885 | 33 | 3% | 3.0976 | 887 | 18 | 2% |
| 36 | 6.0000 | 899 | 20 | 2% | 6.0000 | 899 | 6 | 1% |

Table 7.C.4 Raw-Score-to-Scale-Score Distribution—Grade Eight, Forms Three and Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form Three Theta** | **Form Three Scale Score** | **Form Three N** | **Form Three Percent** | **Form Four Theta** | **Form Four Scale Score** | **Form Four N** | **Form Four Percent** |
| LOSS | N/A | 800 | 58 | 5% | N/A | 800 | 66 | 6% |
| LOSS+1 | N/A | 801 | 23 | 2% | N/A | 801 | 16 | 1% |
| 0 | −6.0000 | 802 | 4 | 0% | −6.0000 | 802 | 2 | 0% |
| 1 | −4.7346 | 802 | 3 | 0% | −4.6545 | 803 | 1 | 0% |
| 2 | −3.9892 | 810 | 5 | 0% | −3.9051 | 811 | 8 | 1% |
| 3 | −3.5312 | 815 | 7 | 1% | −3.4433 | 816 | 5 | 0% |
| 4 | −3.1905 | 819 | 3 | 0% | −3.0992 | 820 | 2 | 0% |
| 5 | −2.9139 | 822 | 7 | 1% | −2.8195 | 823 | 2 | 0% |
| 6 | −2.6777 | 824 | 5 | 0% | −2.5803 | 825 | 11 | 1% |
| 7 | −2.4690 | 827 | 5 | 0% | −2.3688 | 828 | 12 | 1% |
| 8 | −2.2802 | 829 | 7 | 1% | −2.1775 | 830 | 4 | 0% |
| 9 | −2.1063 | 830 | 4 | 0% | −2.0012 | 832 | 6 | 1% |
| 10 | −1.9440 | 832 | 7 | 1% | −1.8366 | 833 | 8 | 1% |
| 11 | −1.7906 | 834 | 11 | 1% | −1.6810 | 835 | 19 | 2% |
| 12 | −1.6443 | 835 | 14 | 1% | −1.5327 | 837 | 18 | 2% |
| 13 | −1.5036 | 837 | 33 | 3% | −1.3900 | 838 | 29 | 3% |
| 14 | −1.3673 | 838 | 21 | 2% | −1.2517 | 840 | 31 | 3% |
| 15 | −1.2345 | 840 | 31 | 3% | −1.1169 | 841 | 43 | 4% |
| 16 | −1.1042 | 841 | 28 | 2% | −0.9847 | 843 | 43 | 4% |
| 17 | −0.9756 | 843 | 55 | 5% | −0.8541 | 844 | 60 | 5% |
| 18 | −0.8480 | 844 | 52 | 4% | −0.7245 | 845 | 55 | 5% |
| 19 | −0.7207 | 845 | 44 | 4% | −0.5952 | 847 | 56 | 5% |
| 20 | −0.5929 | 847 | 59 | 5% | −0.4653 | 848 | 45 | 4% |
| 21 | −0.4639 | 848 | 37 | 3% | −0.3342 | 850 | 51 | 5% |
| 22 | −0.3329 | 850 | 43 | 4% | −0.2011 | 851 | 35 | 3% |
| 23 | −0.1989 | 851 | 47 | 4% | −0.0650 | 853 | 41 | 4% |
| 24 | −0.0609 | 853 | 48 | 4% | 0.0751 | 854 | 36 | 3% |
| 25 | 0.0824 | 854 | 45 | 4% | 0.2203 | 856 | 49 | 4% |
| 26 | 0.2324 | 856 | 50 | 4% | 0.3722 | 857 | 29 | 3% |
| 27 | 0.3912 | 858 | 38 | 3% | 0.5327 | 859 | 43 | 4% |
| 28 | 0.5613 | 859 | 51 | 4% | 0.7043 | 861 | 39 | 4% |
| 29 | 0.7463 | 861 | 56 | 5% | 0.8904 | 863 | 44 | 4% |
| 30 | 0.9510 | 864 | 66 | 6% | 1.0960 | 865 | 53 | 5% |
| 31 | 1.1834 | 866 | 48 | 4% | 1.3287 | 868 | 37 | 3% |
| 32 | 1.4561 | 869 | 38 | 3% | 1.6012 | 871 | 38 | 3% |
| 33 | 1.7930 | 873 | 49 | 4% | 1.9374 | 874 | 20 | 2% |
| 34 | 2.2474 | 878 | 41 | 3% | 2.3904 | 879 | 24 | 2% |
| 35 | 2.9893 | 886 | 29 | 2% | 3.1301 | 887 | 20 | 2% |
| 36 | 6.0000 | 899 | 9 | 1% | 6.0000 | 899 | 4 | 0% |

Table 7.C.5 Raw-Score-to-Scale-Score Distribution—Grade Ten, Forms One and Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form One Theta** | **Form One Scale Score** | **Form One N** | **Form One Percent** | **Form Two Theta** | **Form Two Scale Score** | **Form Two N** | **Form Two Percent** |
| LOSS | N/A | 900 | 13 | 8% | N/A | 900 | 1 | 10% |
| LOSS+1 | N/A | 901 | 3 | 2% | N/A | 901 | 0 | 0% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 0 | 0% |
| 1 | −4.4036 | 902 | 0 | 0% | −4.3833 | 902 | 0 | 0% |
| 2 | −3.6611 | 909 | 0 | 0% | −3.6394 | 910 | 0 | 0% |
| 3 | −3.2065 | 915 | 1 | 1% | −3.1832 | 915 | 0 | 0% |
| 4 | −2.8696 | 919 | 3 | 2% | −2.8448 | 919 | 0 | 0% |
| 5 | −2.5970 | 922 | 2 | 1% | −2.5707 | 922 | 0 | 0% |
| 6 | −2.3649 | 924 | 1 | 1% | −2.3368 | 925 | 0 | 0% |
| 7 | −2.1605 | 927 | 3 | 2% | −2.1305 | 927 | 0 | 0% |
| 8 | −1.9759 | 929 | 3 | 2% | −1.9439 | 929 | 0 | 0% |
| 9 | −1.8062 | 931 | 4 | 2% | −1.7721 | 931 | 0 | 0% |
| 10 | −1.6479 | 933 | 2 | 1% | −1.6113 | 933 | 0 | 0% |
| 11 | −1.4984 | 935 | 6 | 4% | −1.4593 | 935 | 0 | 0% |
| 12 | −1.3559 | 936 | 2 | 1% | −1.3138 | 937 | 0 | 0% |
| 13 | −1.2187 | 938 | 2 | 1% | −1.1736 | 938 | 0 | 0% |
| 14 | −1.0857 | 939 | 3 | 2% | −1.0372 | 940 | 1 | 10% |
| 15 | −0.9558 | 941 | 6 | 4% | −0.9036 | 941 | 2 | 20% |
| 16 | −0.8281 | 942 | 8 | 5% | −0.7720 | 943 | 0 | 0% |
| 17 | −0.7018 | 944 | 3 | 2% | −0.6415 | 944 | 2 | 20% |
| 18 | −0.5760 | 945 | 10 | 6% | −0.5114 | 946 | 0 | 0% |
| 19 | −0.4499 | 947 | 6 | 4% | −0.3808 | 947 | 2 | 20% |
| 20 | −0.3228 | 948 | 8 | 5% | −0.2491 | 949 | 0 | 0% |
| 21 | −0.1937 | 950 | 4 | 2% | −0.1155 | 951 | 1 | 10% |
| 22 | −0.0618 | 951 | 1 | 1% | 0.0208 | 952 | 0 | 0% |
| 23 | 0.0740 | 953 | 8 | 5% | 0.1607 | 954 | 0 | 0% |
| 24 | 0.2149 | 954 | 3 | 2% | 0.3053 | 955 | 0 | 0% |
| 25 | 0.3623 | 956 | 4 | 2% | 0.4559 | 957 | 0 | 0% |
| 26 | 0.5179 | 958 | 2 | 1% | 0.6138 | 959 | 0 | 0% |
| 27 | 0.6838 | 960 | 3 | 2% | 0.7812 | 961 | 0 | 0% |
| 28 | 0.8629 | 962 | 6 | 4% | 0.9606 | 963 | 0 | 0% |
| 29 | 1.0588 | 964 | 7 | 4% | 1.1554 | 965 | 0 | 0% |
| 30 | 1.2769 | 967 | 7 | 4% | 1.3707 | 968 | 0 | 0% |
| 31 | 1.5251 | 970 | 11 | 7% | 1.6142 | 971 | 0 | 0% |
| 32 | 1.8165 | 973 | 5 | 3% | 1.8988 | 974 | 0 | 0% |
| 33 | 2.1754 | 977 | 9 | 6% | 2.2484 | 978 | 0 | 0% |
| 34 | 2.6557 | 983 | 2 | 1% | 2.7162 | 983 | 1 | 10% |
| 35 | 3.4276 | 992 | 0 | 0% | 3.4724 | 992 | 0 | 0% |
| 36 | 6.0000 | 999 | 0 | 0% | 6.0000 | 999 | 0 | 0% |

Table 7.C.6 Raw-Score-to-Scale-Score Distribution—Grade Ten, Forms Three and Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form Three Theta** | **Form Three Scale Score** | **Form Three N** | **Form Three Percent** | **Form Four Theta** | **Form Four Scale Score** | **Form Four N** | **Form Four Percent** |
| LOSS | N/A | 900 | 5 | 15% | N/A | 900 | 8 | 7% |
| LOSS+1 | N/A | 901 | 0 | 0% | N/A | 901 | 0 | 0% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 0 | 0% |
| 1 | −4.5362 | 902 | 0 | 0% | −4.5321 | 902 | 1 | 1% |
| 2 | −3.7959 | 908 | 0 | 0% | −3.7926 | 908 | 0 | 0% |
| 3 | −3.3429 | 913 | 0 | 0% | −3.3405 | 913 | 0 | 0% |
| 4 | −3.0073 | 917 | 0 | 0% | −3.0057 | 917 | 1 | 1% |
| 5 | −2.7358 | 920 | 1 | 3% | −2.7350 | 920 | 3 | 3% |
| 6 | −2.5046 | 923 | 0 | 0% | −2.5045 | 923 | 1 | 1% |
| 7 | −2.3007 | 925 | 1 | 3% | −2.3013 | 925 | 2 | 2% |
| 8 | −2.1166 | 927 | 0 | 0% | −2.1179 | 927 | 0 | 0% |
| 9 | −1.9472 | 929 | 0 | 0% | −1.9491 | 929 | 1 | 1% |
| 10 | −1.7891 | 931 | 0 | 0% | −1.7916 | 931 | 2 | 2% |
| 11 | −1.6397 | 933 | 0 | 0% | −1.6428 | 933 | 3 | 3% |
| 12 | −1.4971 | 935 | 1 | 3% | −1.5007 | 934 | 3 | 3% |
| 13 | −1.3597 | 936 | 3 | 9% | −1.3638 | 936 | 8 | 7% |
| 14 | −1.2263 | 938 | 1 | 3% | −1.2310 | 938 | 5 | 4% |
| 15 | −1.0958 | 939 | 0 | 0% | −1.1012 | 939 | 4 | 3% |
| 16 | −0.9674 | 941 | 1 | 3% | −0.9734 | 941 | 3 | 3% |
| 17 | −0.8402 | 942 | 0 | 0% | −0.8469 | 942 | 7 | 6% |
| 18 | −0.7134 | 944 | 0 | 0% | −0.7209 | 944 | 8 | 7% |
| 19 | −0.5862 | 945 | 0 | 0% | −0.5946 | 945 | 4 | 3% |
| 20 | −0.4579 | 947 | 1 | 3% | −0.4674 | 946 | 4 | 3% |
| 21 | −0.3276 | 948 | 2 | 6% | −0.3383 | 948 | 1 | 1% |
| 22 | −0.1944 | 950 | 5 | 15% | −0.2066 | 950 | 1 | 1% |
| 23 | −0.0575 | 951 | 1 | 3% | −0.0714 | 951 | 8 | 7% |
| 24 | 0.0843 | 953 | 0 | 0% | 0.0684 | 953 | 0 | 0% |
| 25 | 0.2325 | 955 | 1 | 3% | 0.2142 | 954 | 9 | 8% |
| 26 | 0.3886 | 956 | 2 | 6% | 0.3674 | 956 | 1 | 1% |
| 27 | 0.5547 | 958 | 1 | 3% | 0.5301 | 958 | 2 | 2% |
| 28 | 0.7335 | 960 | 1 | 3% | 0.7048 | 960 | 8 | 7% |
| 29 | 0.9288 | 963 | 0 | 0% | 0.8952 | 962 | 4 | 3% |
| 30 | 1.1459 | 965 | 1 | 3% | 1.1064 | 965 | 4 | 3% |
| 31 | 1.3928 | 968 | 1 | 3% | 1.3461 | 968 | 3 | 3% |
| 32 | 1.6828 | 971 | 2 | 6% | 1.6274 | 971 | 1 | 1% |
| 33 | 2.0403 | 976 | 0 | 0% | 1.9742 | 975 | 2 | 2% |
| 34 | 2.5191 | 981 | 3 | 9% | 2.4400 | 980 | 3 | 3% |
| 35 | 3.2898 | 990 | 0 | 0% | 3.1949 | 989 | 2 | 2% |
| 36 | 6.0000 | 999 | 0 | 0% | 6.0000 | 999 | 1 | 1% |

Table 7.C.7 Raw-Score-to-Scale-Score Distribution—Grade Eleven, Forms One and Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form One Theta** | **Form One Scale Score** | **Form One N** | **Form One Percent** | **Form Two Theta** | **Form Two Scale Score** | **Form Two N** | **Form Two Percent** |
| LOSS | N/A | 900 | 48 | 7% | N/A | 900 | 61 | 7% |
| LOSS+1 | N/A | 901 | 12 | 2% | N/A | 901 | 10 | 1% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 2 | 0% |
| 1 | −4.4036 | 902 | 1 | 0% | −4.3833 | 902 | 2 | 0% |
| 2 | −3.6611 | 909 | 6 | 1% | −3.6394 | 910 | 4 | 0% |
| 3 | −3.2065 | 915 | 5 | 1% | −3.1832 | 915 | 8 | 1% |
| 4 | −2.8696 | 919 | 7 | 1% | −2.8448 | 919 | 9 | 1% |
| 5 | −2.5970 | 922 | 4 | 1% | −2.5707 | 922 | 5 | 1% |
| 6 | −2.3649 | 924 | 3 | 0% | −2.3368 | 925 | 0 | 0% |
| 7 | −2.1605 | 927 | 3 | 0% | −2.1305 | 927 | 6 | 1% |
| 8 | −1.9759 | 929 | 13 | 2% | −1.9439 | 929 | 6 | 1% |
| 9 | −1.8062 | 931 | 5 | 1% | −1.7721 | 931 | 9 | 1% |
| 10 | −1.6479 | 933 | 11 | 2% | −1.6113 | 933 | 3 | 0% |
| 11 | −1.4984 | 935 | 18 | 3% | −1.4593 | 935 | 16 | 2% |
| 12 | −1.3559 | 936 | 12 | 2% | −1.3138 | 937 | 19 | 2% |
| 13 | −1.2187 | 938 | 21 | 3% | −1.1736 | 938 | 21 | 2% |
| 14 | −1.0857 | 939 | 20 | 3% | −1.0372 | 940 | 41 | 5% |
| 15 | −0.9558 | 941 | 23 | 3% | −0.9036 | 941 | 42 | 5% |
| 16 | −0.8281 | 942 | 36 | 5% | −0.7720 | 943 | 43 | 5% |
| 17 | −0.7018 | 944 | 25 | 4% | −0.6415 | 944 | 51 | 6% |
| 18 | −0.5760 | 945 | 26 | 4% | −0.5114 | 946 | 60 | 7% |
| 19 | −0.4499 | 947 | 28 | 4% | −0.3808 | 947 | 56 | 7% |
| 20 | −0.3228 | 948 | 29 | 4% | −0.2491 | 949 | 44 | 5% |
| 21 | −0.1937 | 950 | 33 | 5% | −0.1155 | 951 | 45 | 5% |
| 22 | −0.0618 | 951 | 42 | 6% | 0.0208 | 952 | 30 | 4% |
| 23 | 0.0740 | 953 | 31 | 5% | 0.1607 | 954 | 37 | 4% |
| 24 | 0.2149 | 954 | 26 | 4% | 0.3053 | 955 | 30 | 4% |
| 25 | 0.3623 | 956 | 23 | 3% | 0.4559 | 957 | 21 | 2% |
| 26 | 0.5179 | 958 | 23 | 3% | 0.6138 | 959 | 30 | 4% |
| 27 | 0.6838 | 960 | 20 | 3% | 0.7812 | 961 | 25 | 3% |
| 28 | 0.8629 | 962 | 28 | 4% | 0.9606 | 963 | 22 | 3% |
| 29 | 1.0588 | 964 | 20 | 3% | 1.1554 | 965 | 24 | 3% |
| 30 | 1.2769 | 967 | 23 | 3% | 1.3707 | 968 | 22 | 3% |
| 31 | 1.5251 | 970 | 24 | 4% | 1.6142 | 971 | 14 | 2% |
| 32 | 1.8165 | 973 | 11 | 2% | 1.8988 | 974 | 12 | 1% |
| 33 | 2.1754 | 977 | 12 | 2% | 2.2484 | 978 | 12 | 1% |
| 34 | 2.6557 | 983 | 6 | 1% | 2.7162 | 983 | 3 | 0% |
| 35 | 3.4276 | 992 | 0 | 0% | 3.4724 | 992 | 0 | 0% |
| 36 | 6.0000 | 999 | 0 | 0% | 6.0000 | 999 | 0 | 0% |

Table 7.C.8 Raw-Score-to-Scale-Score Distribution—Grade Eleven, Forms Three and Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form Three Theta** | **Form Three Scale Score** | **Form Three N** | **Form Three Percent** | **Form Four Theta** | **Form Four Scale Score** | **Form Four N** | **Form Four Percent** |
| LOSS | N/A | 900 | 62 | 9% | N/A | 900 | 56 | 6% |
| LOSS+1 | N/A | 901 | 11 | 2% | N/A | 901 | 9 | 1% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 3 | 0% |
| 1 | −4.5362 | 902 | 0 | 0% | −4.5321 | 902 | 1 | 0% |
| 2 | −3.7959 | 908 | 1 | 0% | −3.7926 | 908 | 2 | 0% |
| 3 | −3.3429 | 913 | 2 | 0% | −3.3405 | 913 | 1 | 0% |
| 4 | −3.0073 | 917 | 3 | 0% | −3.0057 | 917 | 5 | 1% |
| 5 | −2.7358 | 920 | 2 | 0% | −2.7350 | 920 | 3 | 0% |
| 6 | −2.5046 | 923 | 3 | 0% | −2.5045 | 923 | 3 | 0% |
| 7 | −2.3007 | 925 | 5 | 1% | −2.3013 | 925 | 5 | 1% |
| 8 | −2.1166 | 927 | 6 | 1% | −2.1179 | 927 | 6 | 1% |
| 9 | −1.9472 | 929 | 3 | 0% | −1.9491 | 929 | 5 | 1% |
| 10 | −1.7891 | 931 | 4 | 1% | −1.7916 | 931 | 8 | 1% |
| 11 | −1.6397 | 933 | 6 | 1% | −1.6428 | 933 | 5 | 1% |
| 12 | −1.4971 | 935 | 12 | 2% | −1.5007 | 934 | 17 | 2% |
| 13 | −1.3597 | 936 | 22 | 3% | −1.3638 | 936 | 14 | 2% |
| 14 | −1.2263 | 938 | 16 | 2% | −1.2310 | 938 | 20 | 2% |
| 15 | −1.0958 | 939 | 27 | 4% | −1.1012 | 939 | 25 | 3% |
| 16 | −0.9674 | 941 | 28 | 4% | −0.9734 | 941 | 15 | 2% |
| 17 | −0.8402 | 942 | 33 | 5% | −0.8469 | 942 | 40 | 5% |
| 18 | −0.7134 | 944 | 32 | 5% | −0.7209 | 944 | 37 | 4% |
| 19 | −0.5862 | 945 | 24 | 4% | −0.5946 | 945 | 40 | 5% |
| 20 | −0.4579 | 947 | 25 | 4% | −0.4674 | 946 | 43 | 5% |
| 21 | −0.3276 | 948 | 27 | 4% | −0.3383 | 948 | 39 | 4% |
| 22 | −0.1944 | 950 | 22 | 3% | −0.2066 | 950 | 27 | 3% |
| 23 | −0.0575 | 951 | 32 | 5% | −0.0714 | 951 | 30 | 3% |
| 24 | 0.0843 | 953 | 24 | 4% | 0.0684 | 953 | 31 | 4% |
| 25 | 0.2325 | 955 | 23 | 3% | 0.2142 | 954 | 45 | 5% |
| 26 | 0.3886 | 956 | 28 | 4% | 0.3674 | 956 | 45 | 5% |
| 27 | 0.5547 | 958 | 23 | 3% | 0.5301 | 958 | 31 | 4% |
| 28 | 0.7335 | 960 | 28 | 4% | 0.7048 | 960 | 47 | 5% |
| 29 | 0.9288 | 963 | 34 | 5% | 0.8952 | 962 | 45 | 5% |
| 30 | 1.1459 | 965 | 22 | 3% | 1.1064 | 965 | 34 | 4% |
| 31 | 1.3928 | 968 | 27 | 4% | 1.3461 | 968 | 30 | 3% |
| 32 | 1.6828 | 971 | 20 | 3% | 1.6274 | 971 | 34 | 4% |
| 33 | 2.0403 | 976 | 12 | 2% | 1.9742 | 975 | 37 | 4% |
| 34 | 2.5191 | 981 | 16 | 2% | 2.4400 | 980 | 17 | 2% |
| 35 | 3.2898 | 990 | 7 | 1% | 3.1949 | 989 | 16 | 2% |
| 36 | 6.0000 | 999 | 0 | 0% | 6.0000 | 999 | 5 | 1% |

Table 7.C.9 Raw-Score-to-Scale-Score Distribution—Grade Twelve, Forms One and Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form One Theta** | **Form One Scale Score** | **Form One N** | **Form One Percent** | **Form Two Theta** | **Form Two Scale Score** | **Form Two N** | **Form Two Percent** |
| LOSS | N/A | 900 | 31 | 7% | N/A | 900 | 13 | 3% |
| LOSS+1 | N/A | 901 | 7 | 2% | N/A | 901 | 11 | 3% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 1 | 0% |
| 1 | −4.4036 | 902 | 2 | 0% | −4.3833 | 902 | 1 | 0% |
| 2 | −3.6611 | 909 | 3 | 1% | −3.6394 | 910 | 0 | 0% |
| 3 | −3.2065 | 915 | 3 | 1% | −3.1832 | 915 | 1 | 0% |
| 4 | −2.8696 | 919 | 3 | 1% | −2.8448 | 919 | 6 | 1% |
| 5 | −2.5970 | 922 | 2 | 0% | −2.5707 | 922 | 4 | 1% |
| 6 | −2.3649 | 924 | 3 | 1% | −2.3368 | 925 | 3 | 1% |
| 7 | −2.1605 | 927 | 0 | 0% | −2.1305 | 927 | 1 | 0% |
| 8 | −1.9759 | 929 | 2 | 0% | −1.9439 | 929 | 1 | 0% |
| 9 | −1.8062 | 931 | 2 | 0% | −1.7721 | 931 | 4 | 1% |
| 10 | −1.6479 | 933 | 7 | 2% | −1.6113 | 933 | 2 | 0% |
| 11 | −1.4984 | 935 | 10 | 2% | −1.4593 | 935 | 7 | 2% |
| 12 | −1.3559 | 936 | 9 | 2% | −1.3138 | 937 | 9 | 2% |
| 13 | −1.2187 | 938 | 14 | 3% | −1.1736 | 938 | 20 | 5% |
| 14 | −1.0857 | 939 | 19 | 4% | −1.0372 | 940 | 21 | 5% |
| 15 | −0.9558 | 941 | 21 | 5% | −0.9036 | 941 | 20 | 5% |
| 16 | −0.8281 | 942 | 23 | 5% | −0.7720 | 943 | 28 | 7% |
| 17 | −0.7018 | 944 | 23 | 5% | −0.6415 | 944 | 25 | 6% |
| 18 | −0.5760 | 945 | 18 | 4% | −0.5114 | 946 | 19 | 5% |
| 19 | −0.4499 | 947 | 20 | 4% | −0.3808 | 947 | 12 | 3% |
| 20 | −0.3228 | 948 | 20 | 4% | −0.2491 | 949 | 21 | 5% |
| 21 | −0.1937 | 950 | 20 | 4% | −0.1155 | 951 | 21 | 5% |
| 22 | −0.0618 | 951 | 26 | 6% | 0.0208 | 952 | 15 | 4% |
| 23 | 0.0740 | 953 | 20 | 4% | 0.1607 | 954 | 17 | 4% |
| 24 | 0.2149 | 954 | 17 | 4% | 0.3053 | 955 | 16 | 4% |
| 25 | 0.3623 | 956 | 17 | 4% | 0.4559 | 957 | 14 | 3% |
| 26 | 0.5179 | 958 | 18 | 4% | 0.6138 | 959 | 21 | 5% |
| 27 | 0.6838 | 960 | 20 | 4% | 0.7812 | 961 | 9 | 2% |
| 28 | 0.8629 | 962 | 10 | 2% | 0.9606 | 963 | 14 | 3% |
| 29 | 1.0588 | 964 | 14 | 3% | 1.1554 | 965 | 8 | 2% |
| 30 | 1.2769 | 967 | 10 | 2% | 1.3707 | 968 | 11 | 3% |
| 31 | 1.5251 | 970 | 17 | 4% | 1.6142 | 971 | 12 | 3% |
| 32 | 1.8165 | 973 | 13 | 3% | 1.8988 | 974 | 11 | 3% |
| 33 | 2.1754 | 977 | 6 | 1% | 2.2484 | 978 | 2 | 0% |
| 34 | 2.6557 | 983 | 2 | 0% | 2.7162 | 983 | 2 | 0% |
| 35 | 3.4276 | 992 | 2 | 0% | 3.4724 | 992 | 1 | 0% |
| 36 | 6.0000 | 999 | 4 | 1% | 6.0000 | 999 | 1 | 0% |

Table 7.C.10 Raw-Score-to-Scale-Score Distribution—Grade Twelve, Forms Three and Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form Three Theta** | **Form Three Scale Score** | **Form Three N** | **Form Three Percent** | **Form Four Theta** | **Form Four Scale Score** | **Form Four N** | **Form Four Percent** |
| LOSS | N/A | 900 | 21 | 5% | N/A | 900 | 21 | 7% |
| LOSS+1 | N/A | 901 | 8 | 2% | N/A | 901 | 6 | 2% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 0 | 0% |
| 1 | −4.5362 | 902 | 0 | 0% | −4.5321 | 902 | 1 | 0% |
| 2 | −3.7959 | 908 | 1 | 0% | −3.7926 | 908 | 1 | 0% |
| 3 | −3.3429 | 913 | 4 | 1% | −3.3405 | 913 | 2 | 1% |
| 4 | −3.0073 | 917 | 2 | 1% | −3.0057 | 917 | 2 | 1% |
| 5 | −2.7358 | 920 | 1 | 0% | −2.7350 | 920 | 2 | 1% |
| 6 | −2.5046 | 923 | 1 | 0% | −2.5045 | 923 | 1 | 0% |
| 7 | −2.3007 | 925 | 0 | 0% | −2.3013 | 925 | 1 | 0% |
| 8 | −2.1166 | 927 | 4 | 1% | −2.1179 | 927 | 6 | 2% |
| 9 | −1.9472 | 929 | 1 | 0% | −1.9491 | 929 | 3 | 1% |
| 10 | −1.7891 | 931 | 4 | 1% | −1.7916 | 931 | 5 | 2% |
| 11 | −1.6397 | 933 | 3 | 1% | −1.6428 | 933 | 3 | 1% |
| 12 | −1.4971 | 935 | 8 | 2% | −1.5007 | 934 | 6 | 2% |
| 13 | −1.3597 | 936 | 9 | 2% | −1.3638 | 936 | 6 | 2% |
| 14 | −1.2263 | 938 | 12 | 3% | −1.2310 | 938 | 4 | 1% |
| 15 | −1.0958 | 939 | 14 | 4% | −1.1012 | 939 | 10 | 3% |
| 16 | −0.9674 | 941 | 19 | 5% | −0.9734 | 941 | 11 | 4% |
| 17 | −0.8402 | 942 | 15 | 4% | −0.8469 | 942 | 11 | 4% |
| 18 | −0.7134 | 944 | 17 | 4% | −0.7209 | 944 | 9 | 3% |
| 19 | −0.5862 | 945 | 17 | 4% | −0.5946 | 945 | 7 | 2% |
| 20 | −0.4579 | 947 | 20 | 5% | −0.4674 | 946 | 9 | 3% |
| 21 | −0.3276 | 948 | 15 | 4% | −0.3383 | 948 | 14 | 5% |
| 22 | −0.1944 | 950 | 8 | 2% | −0.2066 | 950 | 8 | 3% |
| 23 | −0.0575 | 951 | 19 | 5% | −0.0714 | 951 | 9 | 3% |
| 24 | 0.0843 | 953 | 9 | 2% | 0.0684 | 953 | 15 | 5% |
| 25 | 0.2325 | 955 | 16 | 4% | 0.2142 | 954 | 7 | 2% |
| 26 | 0.3886 | 956 | 13 | 3% | 0.3674 | 956 | 16 | 5% |
| 27 | 0.5547 | 958 | 8 | 2% | 0.5301 | 958 | 11 | 4% |
| 28 | 0.7335 | 960 | 14 | 4% | 0.7048 | 960 | 14 | 5% |
| 29 | 0.9288 | 963 | 13 | 3% | 0.8952 | 962 | 12 | 4% |
| 30 | 1.1459 | 965 | 23 | 6% | 1.1064 | 965 | 12 | 4% |
| 31 | 1.3928 | 968 | 18 | 5% | 1.3461 | 968 | 12 | 4% |
| 32 | 1.6828 | 971 | 20 | 5% | 1.6274 | 971 | 14 | 5% |
| 33 | 2.0403 | 976 | 13 | 3% | 1.9742 | 975 | 7 | 2% |
| 34 | 2.5191 | 981 | 12 | 3% | 2.4400 | 980 | 10 | 3% |
| 35 | 3.2898 | 990 | 5 | 1% | 3.1949 | 989 | 8 | 3% |
| 36 | 6.0000 | 999 | 0 | 0% | 6.0000 | 999 | 5 | 2% |

Table 7.C.11 Raw-Score-to-Scale-Score Distribution—High School, Forms One and Two

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form One Theta** | **Form One Scale Score** | **Form One N** | **Form One Percent** | **Form Two Theta** | **Form Two Scale Score** | **Form Two N** | **Form Two Percent** |
| LOSS | N/A | 900 | 92 | 7% | N/A | 900 | 75 | 6% |
| LOSS+1 | N/A | 901 | 22 | 2% | N/A | 901 | 21 | 2% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 3 | 0% |
| 1 | −4.4036 | 902 | 3 | 0% | −4.3833 | 902 | 3 | 0% |
| 2 | −3.6611 | 909 | 9 | 1% | −3.6394 | 910 | 4 | 0% |
| 3 | −3.2065 | 915 | 9 | 1% | −3.1832 | 915 | 9 | 1% |
| 4 | −2.8696 | 919 | 13 | 1% | −2.8448 | 919 | 15 | 1% |
| 5 | −2.5970 | 922 | 8 | 1% | −2.5707 | 922 | 9 | 1% |
| 6 | −2.3649 | 924 | 7 | 1% | −2.3368 | 925 | 3 | 0% |
| 7 | −2.1605 | 927 | 6 | 0% | −2.1305 | 927 | 7 | 1% |
| 8 | −1.9759 | 929 | 18 | 1% | −1.9439 | 929 | 7 | 1% |
| 9 | −1.8062 | 931 | 11 | 1% | −1.7721 | 931 | 13 | 1% |
| 10 | −1.6479 | 933 | 20 | 2% | −1.6113 | 933 | 5 | 0% |
| 11 | −1.4984 | 935 | 34 | 3% | −1.4593 | 935 | 23 | 2% |
| 12 | −1.3559 | 936 | 23 | 2% | −1.3138 | 937 | 28 | 2% |
| 13 | −1.2187 | 938 | 37 | 3% | −1.1736 | 938 | 41 | 3% |
| 14 | −1.0857 | 939 | 42 | 3% | −1.0372 | 940 | 63 | 5% |
| 15 | −0.9558 | 941 | 50 | 4% | −0.9036 | 941 | 64 | 5% |
| 16 | −0.8281 | 942 | 67 | 5% | −0.7720 | 943 | 71 | 6% |
| 17 | −0.7018 | 944 | 51 | 4% | −0.6415 | 944 | 78 | 6% |
| 18 | −0.5760 | 945 | 54 | 4% | −0.5114 | 946 | 79 | 6% |
| 19 | −0.4499 | 947 | 54 | 4% | −0.3808 | 947 | 70 | 6% |
| 20 | −0.3228 | 948 | 57 | 4% | −0.2491 | 949 | 65 | 5% |
| 21 | −0.1937 | 950 | 57 | 4% | −0.1155 | 951 | 67 | 5% |
| 22 | −0.0618 | 951 | 69 | 5% | 0.0208 | 952 | 45 | 4% |
| 23 | 0.0740 | 953 | 59 | 5% | 0.1607 | 954 | 54 | 4% |
| 24 | 0.2149 | 954 | 46 | 4% | 0.3053 | 955 | 46 | 4% |
| 25 | 0.3623 | 956 | 44 | 3% | 0.4559 | 957 | 35 | 3% |
| 26 | 0.5179 | 958 | 43 | 3% | 0.6138 | 959 | 51 | 4% |
| 27 | 0.6838 | 960 | 43 | 3% | 0.7812 | 961 | 34 | 3% |
| 28 | 0.8629 | 962 | 44 | 3% | 0.9606 | 963 | 36 | 3% |
| 29 | 1.0588 | 964 | 41 | 3% | 1.1554 | 965 | 32 | 3% |
| 30 | 1.2769 | 967 | 40 | 3% | 1.3707 | 968 | 33 | 3% |
| 31 | 1.5251 | 970 | 52 | 4% | 1.6142 | 971 | 26 | 2% |
| 32 | 1.8165 | 973 | 29 | 2% | 1.8988 | 974 | 23 | 2% |
| 33 | 2.1754 | 977 | 27 | 2% | 2.2484 | 978 | 14 | 1% |
| 34 | 2.6557 | 983 | 10 | 1% | 2.7162 | 983 | 6 | 0% |
| 35 | 3.4276 | 992 | 2 | 0% | 3.4724 | 992 | 1 | 0% |
| 36 | 6.0000 | 999 | 4 | 0% | 6.0000 | 999 | 1 | 0% |

Table 7.C.12 Raw-Score-to-Scale-Score Distribution—High School, Forms Three and Four

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Raw Score** | **Form Three Theta** | **Form Three Scale Score** | **Form Three N** | **Form Three Percent** | **Form Four Theta** | **Form Four Scale Score** | **Form Four N** | **Form Four Percent** |
| LOSS | N/A | 900 | 88 | 8% | N/A | 900 | 85 | 7% |
| LOSS+1 | N/A | 901 | 19 | 2% | N/A | 901 | 15 | 1% |
| 0 | −6.0000 | 902 | 0 | 0% | −6.0000 | 902 | 3 | 0% |
| 1 | −4.5362 | 902 | 0 | 0% | −4.5321 | 902 | 3 | 0% |
| 2 | −3.7959 | 908 | 2 | 0% | −3.7926 | 908 | 3 | 0% |
| 3 | −3.3429 | 913 | 6 | 1% | −3.3405 | 913 | 3 | 0% |
| 4 | −3.0073 | 917 | 5 | 0% | −3.0057 | 917 | 8 | 1% |
| 5 | −2.7358 | 920 | 4 | 0% | −2.7350 | 920 | 8 | 1% |
| 6 | −2.5046 | 923 | 4 | 0% | −2.5045 | 923 | 5 | 0% |
| 7 | −2.3007 | 925 | 6 | 1% | −2.3013 | 925 | 8 | 1% |
| 8 | −2.1166 | 927 | 10 | 1% | −2.1179 | 927 | 12 | 1% |
| 9 | −1.9472 | 929 | 4 | 0% | −1.9491 | 929 | 9 | 1% |
| 10 | −1.7891 | 931 | 8 | 1% | −1.7916 | 931 | 15 | 1% |
| 11 | −1.6397 | 933 | 9 | 1% | −1.6428 | 933 | 11 | 1% |
| 12 | −1.4971 | 935 | 21 | 2% | −1.5007 | 934 | 26 | 2% |
| 13 | −1.3597 | 936 | 34 | 3% | −1.3638 | 936 | 28 | 2% |
| 14 | −1.2263 | 938 | 29 | 3% | −1.2310 | 938 | 29 | 2% |
| 15 | −1.0958 | 939 | 41 | 4% | −1.1012 | 939 | 39 | 3% |
| 16 | −0.9674 | 941 | 48 | 4% | −0.9734 | 941 | 29 | 2% |
| 17 | −0.8402 | 942 | 48 | 4% | −0.8469 | 942 | 58 | 4% |
| 18 | −0.7134 | 944 | 49 | 4% | −0.7209 | 944 | 54 | 4% |
| 19 | −0.5862 | 945 | 41 | 4% | −0.5946 | 945 | 51 | 4% |
| 20 | −0.4579 | 947 | 46 | 4% | −0.4674 | 946 | 56 | 4% |
| 21 | −0.3276 | 948 | 44 | 4% | −0.3383 | 948 | 54 | 4% |
| 22 | −0.1944 | 950 | 35 | 3% | −0.2066 | 950 | 36 | 3% |
| 23 | −0.0575 | 951 | 52 | 5% | −0.0714 | 951 | 47 | 4% |
| 24 | 0.0843 | 953 | 33 | 3% | 0.0684 | 953 | 46 | 4% |
| 25 | 0.2325 | 955 | 40 | 4% | 0.2142 | 954 | 61 | 5% |
| 26 | 0.3886 | 956 | 43 | 4% | 0.3674 | 956 | 62 | 5% |
| 27 | 0.5547 | 958 | 32 | 3% | 0.5301 | 958 | 44 | 3% |
| 28 | 0.7335 | 960 | 43 | 4% | 0.7048 | 960 | 69 | 5% |
| 29 | 0.9288 | 963 | 47 | 4% | 0.8952 | 962 | 61 | 5% |
| 30 | 1.1459 | 965 | 46 | 4% | 1.1064 | 965 | 50 | 4% |
| 31 | 1.3928 | 968 | 46 | 4% | 1.3461 | 968 | 45 | 3% |
| 32 | 1.6828 | 971 | 42 | 4% | 1.6274 | 971 | 49 | 4% |
| 33 | 2.0403 | 976 | 25 | 2% | 1.9742 | 975 | 46 | 4% |
| 34 | 2.5191 | 981 | 31 | 3% | 2.4400 | 980 | 30 | 2% |
| 35 | 3.2898 | 990 | 12 | 1% | 3.1949 | 989 | 26 | 2% |
| 36 | 6.0000 | 999 | 0 | 0% | 6.0000 | 999 | 11 | 1% |

### Appendix 7.D: Scale Scores of Assessments

Table 7.D.1 Percentiles of Scale Scores

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Percentile** | **Grade 5** | **Grade 8** | **HS Grade 10** | **HS Grade 11** | **HS Grade 12** | **HS All Grades** |
| p1 | 500 | 800 | 900 | 900 | 900 | 900 |
| p10 | 512 | 824 | 917 | 917 | 922 | 919 |
| p20 | 536 | 838 | 933 | 938 | 938 | 938 |
| p30 | 540 | 843 | 939 | 942 | 941 | 942 |
| p40 | 544 | 846 | 942 | 945 | 945 | 945 |
| p50 | 547 | 850 | 946 | 948 | 948 | 948 |
| p60 | 551 | 854 | 951 | 951 | 952 | 951 |
| p70 | 555 | 859 | 956 | 956 | 956 | 956 |
| p80 | 560 | 864 | 964 | 960 | 962 | 961 |
| p90 | 566 | 871 | 970 | 968 | 970 | 968 |
| p99 | 580 | 887 | 983 | 983 | 990 | 989 |

**Note:** In table 7.D.2 through table 7.D.7, an expression that opens and closes with a bracket indicates that a value is greater than or equal to the first number and is less than or equal to the second number. For example, “[545, 547]” indicates a value greater than or equal to 545 but less than or equal to 547.

Table 7.D.2 Frequency Distribution of Overall Scale Scores, Grade Five

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **N** | **Cumulative Frequency** | **Percent** | **Cumulative Percent** |
| [500, 501] | 419 | 419 | 8% | 8% |
| [502, 505] | 27 | 446 | 1% | 9% |
| [506, 509] | 39 | 485 | 1% | 10% |
| [510, 513] | 32 | 517 | 1% | 10% |
| [514, 517] | 35 | 552 | 1% | 11% |
| [518, 521] | 52 | 604 | 1% | 12% |
| [522, 525] | 50 | 654 | 1% | 13% |
| [526, 529] | 87 | 741 | 2% | 15% |
| [530, 533] | 127 | 868 | 3% | 18% |
| [534, 537] | 302 | 1,170 | 6% | 24% |
| [538, 541] | 481 | 1,651 | 10% | 33% |
| [542, 545] | 635 | 2,286 | 13% | 46% |
| [546, 549] | 453 | 2,739 | 9% | 55% |
| [550, 553] | 558 | 3,297 | 11% | 67% |
| [554, 557] | 403 | 3,700 | 8% | 75% |
| [558, 561] | 425 | 4,125 | 9% | 83% |
| [562, 565] | 276 | 4,401 | 6% | 89% |
| [566, 569] | 280 | 4,681 | 6% | 94% |
| [570, 573] | 122 | 4,803 | 2% | 97% |
| [574, 577] | 42 | 4,845 | 1% | 98% |
| [578, 581] | 77 | 4,922 | 2% | 99% |
| [582, 585] | 0 | 4,922 | 0% | 99% |
| [586, 589] | 26 | 4,948 | 1% | 100% |
| [590, 593] | 0 | 4,948 | 0% | 100% |
| [594, 597] | 0 | 4,948 | 0% | 100% |
| [598, 599] | 6 | 4,954 | 0% | 100% |

Table 7.D.3 Frequency Distribution of Overall Scale Scores, Grade Eight

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **N** | **Cumulative Frequency** | **Percent** | **Cumulative Percent** |
| [800, 801] | 344 | 344 | 7% | 7% |
| [802, 805] | 21 | 365 | 0% | 8% |
| [806, 809] | 12 | 377 | 0% | 8% |
| [810, 813] | 13 | 390 | 0% | 8% |
| [814, 817] | 35 | 425 | 1% | 9% |
| [818, 821] | 24 | 449 | 1% | 10% |
| [822, 825] | 46 | 495 | 1% | 11% |
| [826, 829] | 54 | 549 | 1% | 12% |
| [830, 833] | 87 | 636 | 2% | 14% |
| [834, 837] | 210 | 846 | 4% | 18% |
| [838, 841] | 401 | 1,247 | 9% | 27% |
| [842, 845] | 575 | 1,822 | 12% | 39% |
| [846, 849] | 472 | 2,294 | 10% | 49% |
| [850, 853] | 436 | 2,730 | 9% | 58% |
| [854, 857] | 452 | 3,182 | 10% | 68% |
| [858, 861] | 409 | 3,591 | 9% | 77% |
| [862, 865] | 307 | 3,898 | 7% | 83% |
| [866, 869] | 286 | 4,184 | 6% | 90% |
| [870, 873] | 188 | 4,372 | 4% | 94% |
| [874, 877] | 68 | 4,440 | 1% | 95% |
| [878, 881] | 93 | 4,533 | 2% | 97% |
| [882, 885] | 33 | 4,566 | 1% | 98% |
| [886, 889] | 67 | 4,633 | 1% | 99% |
| [890, 893] | 0 | 4,633 | 0% | 99% |
| [894, 897] | 0 | 4,633 | 0% | 99% |
| [898, 899] | 39 | 4,672 | 1% | 100% |

Table 7.D.4 Frequency Distribution of Overall Scale Scores, Grade Ten

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **N** | **Cumulative Frequency** | **Percent** | **Cumulative Percent** |
| [900, 901] | 30 | 30 | 9% | 9% |
| [902, 905] | 1 | 31 | 0% | 10% |
| [906, 909] | 0 | 31 | 0% | 10% |
| [910, 913] | 0 | 31 | 0% | 10% |
| [914, 917] | 2 | 33 | 1% | 10% |
| [918, 921] | 7 | 40 | 2% | 12% |
| [922, 925] | 7 | 47 | 2% | 15% |
| [926, 929] | 7 | 54 | 2% | 17% |
| [930, 933] | 11 | 65 | 3% | 20% |
| [934, 937] | 23 | 88 | 7% | 27% |
| [938, 941] | 28 | 116 | 9% | 36% |
| [942, 945] | 42 | 158 | 13% | 49% |
| [946, 949] | 24 | 182 | 7% | 56% |
| [950, 953] | 29 | 211 | 9% | 65% |
| [954, 957] | 20 | 231 | 6% | 72% |
| [958, 961] | 17 | 248 | 5% | 77% |
| [962, 965] | 22 | 270 | 7% | 84% |
| [966, 969] | 11 | 281 | 3% | 87% |
| [970, 973] | 19 | 300 | 6% | 93% |
| [974, 977] | 11 | 311 | 3% | 96% |
| [978, 981] | 6 | 317 | 2% | 98% |
| [982, 985] | 3 | 320 | 1% | 99% |
| [986, 989] | 2 | 322 | 1% | 100% |
| [990, 993] | 0 | 322 | 0% | 100% |
| [994, 997] | 0 | 322 | 0% | 100% |
| [998, 999] | 1 | 323 | 0% | 100% |

Table 7.D.5 Frequency Distribution of Overall Scale Scores, Grade Eleven

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **N** | **Cumulative Frequency** | **Percent** | **Cumulative Percent** |
| [900, 901] | 269 | 269 | 9% | 9% |
| [902, 905] | 9 | 278 | 0% | 9% |
| [906, 909] | 9 | 287 | 0% | 9% |
| [910, 913] | 7 | 294 | 0% | 10% |
| [914, 917] | 21 | 315 | 1% | 10% |
| [918, 921] | 21 | 336 | 1% | 11% |
| [922, 925] | 28 | 364 | 1% | 12% |
| [926, 929] | 48 | 412 | 2% | 13% |
| [930, 933] | 51 | 463 | 2% | 15% |
| [934, 937] | 130 | 593 | 4% | 19% |
| [938, 941] | 299 | 892 | 10% | 29% |
| [942, 945] | 388 | 1,280 | 13% | 42% |
| [946, 949] | 351 | 1,631 | 11% | 53% |
| [950, 953] | 347 | 1,978 | 11% | 64% |
| [954, 957] | 278 | 2,256 | 9% | 73% |
| [958, 961] | 227 | 2,483 | 7% | 81% |
| [962, 965] | 229 | 2,712 | 7% | 88% |
| [966, 969] | 102 | 2,814 | 3% | 92% |
| [970, 973] | 103 | 2,917 | 3% | 95% |
| [974, 977] | 73 | 2,990 | 2% | 97% |
| [978, 981] | 45 | 3,035 | 1% | 99% |
| [982, 985] | 9 | 3,044 | 0% | 99% |
| [986, 989] | 16 | 3,060 | 1% | 100% |
| [990, 993] | 7 | 3,067 | 0% | 100% |
| [994, 997] | 0 | 3,067 | 0% | 100% |
| [998, 999] | 5 | 3,072 | 0% | 100% |

Table 7.D.6 Frequency Distribution of Overall Scale Scores, Grade Twelve

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **N** | **Cumulative Frequency** | **Percent** | **Cumulative Percent** |
| [900, 901] | 118 | 118 | 8% | 8% |
| [902, 905] | 5 | 123 | 0% | 8% |
| [906, 909] | 5 | 128 | 0% | 8% |
| [910, 913] | 6 | 134 | 0% | 9% |
| [914, 917] | 8 | 142 | 1% | 9% |
| [918, 921] | 12 | 154 | 1% | 10% |
| [922, 925] | 15 | 169 | 1% | 11% |
| [926, 929] | 18 | 187 | 1% | 12% |
| [930, 933] | 30 | 217 | 2% | 14% |
| [934, 937] | 64 | 281 | 4% | 18% |
| [938, 941] | 185 | 466 | 12% | 30% |
| [942, 945] | 193 | 659 | 12% | 42% |
| [946, 949] | 150 | 809 | 10% | 52% |
| [950, 953] | 170 | 979 | 11% | 63% |
| [954, 957] | 134 | 1,113 | 9% | 72% |
| [958, 961] | 115 | 1,228 | 7% | 79% |
| [962, 965] | 106 | 1,334 | 7% | 86% |
| [966, 969] | 51 | 1,385 | 3% | 89% |
| [970, 973] | 76 | 1,461 | 5% | 94% |
| [974, 977] | 37 | 1,498 | 2% | 97% |
| [978, 981] | 24 | 1,522 | 2% | 98% |
| [982, 985] | 4 | 1,526 | 0% | 98% |
| [986, 989] | 8 | 1,534 | 1% | 99% |
| [990, 993] | 8 | 1,542 | 1% | 99% |
| [994, 997] | 0 | 1,542 | 0% | 99% |
| [998, 999] | 10 | 1,552 | 1% | 100% |

Table 7.D.7 Frequency Distribution of Overall Scale Scores, High School

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **N** | **Cumulative Frequency** | **Percent** | **Cumulative Percent** |
| [900, 901] | 417 | 417 | 8% | 8% |
| [902, 905] | 15 | 432 | 0% | 9% |
| [906, 909] | 14 | 446 | 0% | 9% |
| [910, 913] | 13 | 459 | 0% | 9% |
| [914, 917] | 31 | 490 | 1% | 10% |
| [918, 921] | 40 | 530 | 1% | 11% |
| [922, 925] | 50 | 580 | 1% | 12% |
| [926, 929] | 73 | 653 | 1% | 13% |
| [930, 933] | 92 | 745 | 2% | 15% |
| [934, 937] | 217 | 962 | 4% | 19% |
| [938, 941] | 512 | 1,474 | 10% | 30% |
| [942, 945] | 623 | 2,097 | 13% | 42% |
| [946, 949] | 525 | 2,622 | 11% | 53% |
| [950, 953] | 546 | 3,168 | 11% | 64% |
| [954, 957] | 432 | 3,600 | 9% | 73% |
| [958, 961] | 359 | 3,959 | 7% | 80% |
| [962, 965] | 357 | 4,316 | 7% | 87% |
| [966, 969] | 164 | 4,480 | 3% | 91% |
| [970, 973] | 198 | 4,678 | 4% | 95% |
| [974, 977] | 121 | 4,799 | 2% | 97% |
| [978, 981] | 75 | 4,874 | 2% | 99% |
| [982, 985] | 16 | 4,890 | 0% | 99% |
| [986, 989] | 26 | 4,916 | 1% | 99% |
| [990, 993] | 15 | 4,931 | 0% | 100% |
| [994, 997] | 0 | 4,931 | 0% | 100% |
| [998, 999] | 16 | 4,947 | 0% | 100% |

### Appendix 7.E: Demographic Student Group Summaries

**Notes:**

* To protect privacy when the number of students in a student group is 10 or fewer, the summary statistics at the assessment and reporting levels are not reported and are presented as “N/A” in the tables in appendix 7.E.
* Percentages in these tables may not sum up to 100 because of rounding.

Table 7.E.1 Demographic Summary for Grade Five

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student Group** | **Number Valid Scores** | **Mean Scale Score** | **SD of Scale Scores** | **Percent in Achievement Level 1** | **Percent in Achievement Level 2** | **Percent in Achievement Level 3** |
| All students with valid scores | 4,954 | 545 | 19 | 42% | 37% | 21% |
| Male | 3,407 | 545 | 19 | 42% | 36% | 22% |
| Female | 1,547 | 545 | 19 | 42% | 39% | 19% |
| Nonbinary | 0 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native | 29 | 545 | 23 | 38% | 31% | 31% |
| Asian | 467 | 540 | 19 | 54% | 34% | 12% |
| Native Hawaiian or Other Pacific Islander | 15 | 542 | 19 | 47% | 40% | 13% |
| Filipino | 156 | 542 | 18 | 49% | 40% | 10% |
| Hispanic or Latino | 2,874 | 546 | 19 | 40% | 38% | 22% |
| Black or African American | 381 | 544 | 19 | 43% | 36% | 21% |
| White | 782 | 545 | 21 | 41% | 34% | 25% |
| Two or more races | 250 | 544 | 20 | 43% | 36% | 21% |
| English only | 3,048 | 545 | 20 | 42% | 35% | 22% |
| IFEP | 46 | 539 | 18 | 54% | 35% | 11% |
| EL | 1,297 | 544 | 18 | 45% | 38% | 16% |
| RFEP | 562 | 547 | 19 | 35% | 39% | 27% |
| ADEL | 0 | N/A | N/A | N/A | N/A | N/A |
| To be determined | 0 | N/A | N/A | N/A | N/A | N/A |
| English proficiency unknown | 1 | N/A | N/A | N/A | N/A | N/A |
| Intellectual disability | 1,642 | 545 | 17 | 43% | 39% | 18% |
| Hearing impairment | 29 | 549 | 22 | 38% | 28% | 34% |
| Speech or language impairment | 70 | 558 | 14 | 11% | 41% | 47% |
| Visual impairment | 10 | N/A | N/A | N/A | N/A | N/A |
| Emotional disturbance | 18 | 562 | 13 | 11% | 28% | 61% |
| Orthopedic impairment | 78 | 535 | 25 | 54% | 33% | 13% |
| Other health impairment | 253 | 554 | 16 | 21% | 41% | 38% |
| Specific learning disability | 161 | 564 | 10 | 3% | 29% | 68% |
| Deaf-blindness | 2 | N/A | N/A | N/A | N/A | N/A |
| Multiple disabilities | 312 | 523 | 23 | 79% | 15% | 5% |
| Autism | 2,365 | 545 | 18 | 43% | 38% | 19% |
| Traumatic brain injury | 14 | 545 | 20 | 36% | 50% | 14% |
| Not classified | 0 | N/A | N/A | N/A | N/A | N/A |
| Not economically disadvantaged | 1,691 | 542 | 20 | 48% | 35% | 17% |
| Economically disadvantaged | 3,263 | 546 | 19 | 39% | 37% | 23% |
| Migrant education | 32 | 548 | 14 | 34% | 47% | 19% |
| Not migrant education | 4,922 | 545 | 19 | 42% | 36% | 21% |
| Foster youth | 55 | 542 | 20 | 47% | 31% | 22% |
| Not foster youth | 4,899 | 545 | 19 | 42% | 37% | 21% |
| American Indian or Alaska Native—Not economically disadvantaged | 6 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native—Economically disadvantaged | 23 | 544 | 23 | 39% | 30% | 30% |
| Asian—Not economically disadvantaged | 252 | 539 | 19 | 56% | 35% | 9% |
| Asian—Economically disadvantaged | 215 | 541 | 20 | 52% | 33% | 15% |
| Native Hawaiian or Other Pacific Islander—Not economically disadvantaged | 3 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Economically disadvantaged | 12 | 539 | 20 | 58% | 33% | 8% |
| Filipino—Not economically disadvantaged | 96 | 541 | 17 | 49% | 44% | 7% |
| Filipino—Economically disadvantaged | 60 | 542 | 19 | 50% | 35% | 15% |
| Hispanic or Latino—Not economically disadvantaged | 702 | 544 | 20 | 47% | 34% | 19% |
| Hispanic or Latino—Economically disadvantaged | 2,172 | 547 | 18 | 38% | 39% | 23% |
| Black or African American—Not economically disadvantaged | 101 | 539 | 20 | 54% | 34% | 12% |
| Black or African American—Economically disadvantaged | 280 | 546 | 19 | 39% | 38% | 24% |
| White—Not economically disadvantaged | 392 | 543 | 21 | 44% | 34% | 21% |
| White—Economically disadvantaged | 390 | 548 | 20 | 38% | 33% | 29% |
| Two or more races—Not economically disadvantaged | 139 | 543 | 19 | 47% | 35% | 18% |
| Two or more races—Economically disadvantaged | 111 | 546 | 21 | 38% | 37% | 25% |

Table 7.E.2 Demographic Summary for Grade Eight

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student Group** | **Number Valid Scores** | **Mean Scale Score** | **SD of Scale Scores** | **Percent in Achievement Level 1** | **Percent in Achievement Level 2** | **Percent in Achievement Level 3** |
| All students with valid scores | 4,672 | 849 | 20 | 36% | 37% | 27% |
| Male | 3,190 | 849 | 20 | 36% | 35% | 28% |
| Female | 1,482 | 848 | 20 | 35% | 40% | 24% |
| Nonbinary | 0 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native | 29 | 846 | 24 | 28% | 41% | 31% |
| Asian | 364 | 845 | 19 | 45% | 37% | 18% |
| Native Hawaiian or Other Pacific Islander | 21 | 846 | 18 | 38% | 38% | 24% |
| Filipino | 120 | 845 | 15 | 48% | 39% | 13% |
| Hispanic or Latino | 2,810 | 849 | 20 | 35% | 37% | 28% |
| Black or African American | 363 | 849 | 20 | 35% | 39% | 26% |
| White | 771 | 850 | 21 | 34% | 33% | 33% |
| Two or more races | 194 | 848 | 20 | 37% | 39% | 24% |
| English only | 2,638 | 849 | 20 | 35% | 37% | 28% |
| IFEP | 36 | 844 | 20 | 58% | 22% | 19% |
| EL | 1,037 | 847 | 20 | 40% | 36% | 24% |
| RFEP | 960 | 850 | 20 | 33% | 38% | 29% |
| ADEL | 0 | N/A | N/A | N/A | N/A | N/A |
| To be determined | 0 | N/A | N/A | N/A | N/A | N/A |
| English proficiency unknown | 1 | N/A | N/A | N/A | N/A | N/A |
| Intellectual disability | 1,762 | 849 | 18 | 35% | 39% | 27% |
| Hearing impairment | 39 | 852 | 15 | 15% | 59% | 26% |
| Speech or language impairment | 26 | 862 | 10 | 4% | 46% | 50% |
| Visual impairment | 9 | N/A | N/A | N/A | N/A | N/A |
| Emotional disturbance | 15 | 866 | 17 | 13% | 13% | 73% |
| Orthopedic impairment | 81 | 842 | 25 | 40% | 32% | 28% |
| Other health impairment | 242 | 858 | 16 | 15% | 41% | 44% |
| Specific learning disability | 203 | 867 | 12 | 3% | 25% | 72% |
| Deaf-blindness | 3 | N/A | N/A | N/A | N/A | N/A |
| Multiple disabilities | 316 | 827 | 24 | 73% | 20% | 6% |
| Autism | 1,953 | 848 | 18 | 38% | 39% | 23% |
| Traumatic brain injury | 23 | 851 | 25 | 30% | 39% | 30% |
| Not classified | 0 | N/A | N/A | N/A | N/A | N/A |
| Not economically disadvantaged | 1,496 | 846 | 20 | 42% | 36% | 23% |
| Economically disadvantaged | 3,176 | 850 | 19 | 33% | 37% | 29% |
| Migrant education | 23 | 847 | 18 | 39% | 43% | 17% |
| Not migrant education | 4,649 | 849 | 20 | 36% | 37% | 27% |
| Foster youth | 49 | 845 | 21 | 39% | 31% | 31% |
| Not foster youth | 4,623 | 849 | 20 | 36% | 37% | 27% |
| American Indian or Alaska Native—Not economically disadvantaged | 8 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native—Economically disadvantaged | 21 | 849 | 23 | 24% | 38% | 38% |
| Asian—Not economically disadvantaged | 173 | 842 | 20 | 51% | 33% | 16% |
| Asian—Economically disadvantaged | 191 | 847 | 18 | 39% | 40% | 21% |
| Native Hawaiian or Other Pacific Islander—Not economically disadvantaged | 6 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Economically disadvantaged | 15 | 851 | 9 | 27% | 47% | 27% |
| Filipino—Not economically disadvantaged | 76 | 845 | 14 | 55% | 32% | 13% |
| Filipino—Economically disadvantaged | 44 | 845 | 17 | 36% | 52% | 11% |
| Hispanic or Latino—Not economically disadvantaged | 620 | 846 | 20 | 41% | 38% | 21% |
| Hispanic or Latino—Economically disadvantaged | 2,190 | 850 | 19 | 33% | 37% | 29% |
| Black or African American—Not economically disadvantaged | 98 | 844 | 22 | 37% | 42% | 21% |
| Black or African American—Economically disadvantaged | 265 | 850 | 19 | 34% | 38% | 28% |
| White—Not economically disadvantaged | 412 | 850 | 21 | 37% | 33% | 30% |
| White—Economically disadvantaged | 359 | 851 | 22 | 30% | 34% | 35% |
| Two or more races—Not economically disadvantaged | 103 | 847 | 21 | 40% | 40% | 20% |
| Two or more races—Economically disadvantaged | 91 | 849 | 19 | 33% | 38% | 29% |

Table 7.E.3 Demographic Summary for Grade Ten

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student Group** | **Number Valid Scores** | **Mean Scale Score** | **SD of Scale Scores** | **Percent in Achievement Level 1** | **Percent in Achievement Level 2** | **Percent in Achievement Level 3** |
| All students with valid scores | 323 | 946 | 21 | 45% | 28% | 27% |
| Male | 227 | 946 | 22 | 46% | 25% | 30% |
| Female | 96 | 945 | 18 | 42% | 38% | 21% |
| Nonbinary | 0 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native | 1 | N/A | N/A | N/A | N/A | N/A |
| Asian | 12 | 944 | 10 | 50% | 50% | 0% |
| Native Hawaiian or Other Pacific Islander | 1 | N/A | N/A | N/A | N/A | N/A |
| Filipino | 4 | N/A | N/A | N/A | N/A | N/A |
| Hispanic or Latino | 205 | 944 | 21 | 49% | 23% | 27% |
| Black or African American | 33 | 948 | 20 | 36% | 33% | 30% |
| White | 58 | 949 | 23 | 34% | 34% | 31% |
| Two or more races | 9 | N/A | N/A | N/A | N/A | N/A |
| English only | 198 | 947 | 21 | 43% | 29% | 28% |
| IFEP | 3 | N/A | N/A | N/A | N/A | N/A |
| EL | 45 | 938 | 21 | 60% | 24% | 16% |
| RFEP | 77 | 947 | 21 | 42% | 29% | 30% |
| ADEL | 0 | N/A | N/A | N/A | N/A | N/A |
| To be determined | 0 | N/A | N/A | N/A | N/A | N/A |
| English proficiency unknown | 0 | N/A | N/A | N/A | N/A | N/A |
| Intellectual disability | 140 | 944 | 18 | 54% | 27% | 19% |
| Hearing impairment | 12 | 966 | 9 | 0% | 17% | 83% |
| Speech or language impairment | 2 | N/A | N/A | N/A | N/A | N/A |
| Visual impairment | 1 | N/A | N/A | N/A | N/A | N/A |
| Emotional disturbance | 3 | N/A | N/A | N/A | N/A | N/A |
| Orthopedic impairment | 6 | N/A | N/A | N/A | N/A | N/A |
| Other health impairment | 9 | N/A | N/A | N/A | N/A | N/A |
| Specific learning disability | 11 | 969 | 12 | 0% | 18% | 82% |
| Deaf-blindness | 0 | N/A | N/A | N/A | N/A | N/A |
| Multiple disabilities | 27 | 924 | 24 | 70% | 26% | 4% |
| Autism | 109 | 948 | 19 | 39% | 31% | 29% |
| Traumatic brain injury | 3 | N/A | N/A | N/A | N/A | N/A |
| Not classified | 0 | N/A | N/A | N/A | N/A | N/A |
| Not economically disadvantaged | 104 | 945 | 20 | 42% | 30% | 28% |
| Economically disadvantaged | 219 | 946 | 21 | 46% | 28% | 26% |
| Migrant education | 0 | N/A | N/A | N/A | N/A | N/A |
| Not migrant education | 323 | 946 | 21 | 45% | 28% | 27% |
| Foster youth | 11 | 936 | 28 | 55% | 9% | 36% |
| Not foster youth | 312 | 946 | 21 | 44% | 29% | 27% |
| American Indian or Alaska Native—Not economically disadvantaged | 0 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native—Economically disadvantaged | 1 | N/A | N/A | N/A | N/A | N/A |
| Asian—Not economically disadvantaged | 4 | N/A | N/A | N/A | N/A | N/A |
| Asian—Economically disadvantaged | 8 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Not economically disadvantaged | 1 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Economically disadvantaged | 0 | N/A | N/A | N/A | N/A | N/A |
| Filipino—Not economically disadvantaged | 1 | N/A | N/A | N/A | N/A | N/A |
| Filipino—Economically disadvantaged | 3 | N/A | N/A | N/A | N/A | N/A |
| Hispanic or Latino—Not economically disadvantaged | 48 | 943 | 20 | 50% | 23% | 27% |
| Hispanic or Latino—Economically disadvantaged | 157 | 945 | 21 | 49% | 24% | 27% |
| Black or African American—Not economically disadvantaged | 11 | 945 | 27 | 55% | 0% | 45% |
| Black or African American—Economically disadvantaged | 22 | 950 | 15 | 27% | 50% | 23% |
| White—Not economically disadvantaged | 33 | 947 | 21 | 36% | 33% | 30% |
| White—Economically disadvantaged | 25 | 950 | 25 | 32% | 36% | 32% |
| Two or more races—Not economically disadvantaged | 6 | N/A | N/A | N/A | N/A | N/A |
| Two or more races—Economically disadvantaged | 3 | N/A | N/A | N/A | N/A | N/A |

Table 7.E.4 Demographic Summary for Grade Eleven

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student Group** | **Number Valid Scores** | **Mean Scale Score** | **SD of Scale Scores** | **Percent in Achievement Level 1** | **Percent in Achievement Level 2** | **Percent in Achievement Level 3** |
| All students with valid scores | 3,072 | 946 | 19 | 39% | 38% | 23% |
| Male | 2,038 | 947 | 19 | 37% | 38% | 25% |
| Female | 1,033 | 945 | 19 | 41% | 39% | 20% |
| Nonbinary | 1 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native | 12 | 949 | 21 | 50% | 17% | 33% |
| Asian | 248 | 941 | 18 | 53% | 36% | 11% |
| Native Hawaiian or Other Pacific Islander | 8 | N/A | N/A | N/A | N/A | N/A |
| Filipino | 92 | 942 | 20 | 48% | 41% | 11% |
| Hispanic or Latino | 1,854 | 947 | 19 | 37% | 39% | 24% |
| Black or African American | 234 | 946 | 19 | 36% | 43% | 21% |
| White | 523 | 948 | 20 | 38% | 34% | 28% |
| Two or more races | 101 | 945 | 22 | 38% | 37% | 26% |
| English only | 1,655 | 947 | 19 | 37% | 38% | 25% |
| IFEP | 33 | 941 | 17 | 67% | 21% | 12% |
| EL | 553 | 944 | 21 | 44% | 36% | 20% |
| RFEP | 831 | 946 | 19 | 38% | 41% | 21% |
| ADEL | 0 | N/A | N/A | N/A | N/A | N/A |
| To be determined | 0 | N/A | N/A | N/A | N/A | N/A |
| English proficiency unknown | 0 | N/A | N/A | N/A | N/A | N/A |
| Intellectual disability | 1,305 | 947 | 17 | 38% | 42% | 20% |
| Hearing impairment | 32 | 954 | 13 | 19% | 53% | 28% |
| Speech or language impairment | 13 | 959 | 10 | 15% | 31% | 54% |
| Visual impairment | 5 | N/A | N/A | N/A | N/A | N/A |
| Emotional disturbance | 12 | 962 | 15 | 8% | 42% | 50% |
| Orthopedic impairment | 68 | 944 | 24 | 38% | 35% | 26% |
| Other health impairment | 99 | 952 | 18 | 22% | 49% | 28% |
| Specific learning disability | 125 | 965 | 12 | 4% | 25% | 71% |
| Deaf-blindness | 2 | N/A | N/A | N/A | N/A | N/A |
| Multiple disabilities | 265 | 927 | 23 | 72% | 21% | 7% |
| Autism | 1,123 | 947 | 18 | 38% | 39% | 24% |
| Traumatic brain injury | 23 | 939 | 25 | 48% | 35% | 17% |
| Not classified | 0 | N/A | N/A | N/A | N/A | N/A |
| Not economically disadvantaged | 945 | 945 | 19 | 42% | 38% | 20% |
| Economically disadvantaged | 2,127 | 947 | 19 | 37% | 38% | 24% |
| Migrant education | 15 | 948 | 18 | 40% | 33% | 27% |
| Not migrant education | 3,057 | 946 | 19 | 39% | 38% | 23% |
| Foster youth | 27 | 949 | 21 | 37% | 22% | 41% |
| Not foster youth | 3,045 | 946 | 19 | 39% | 38% | 23% |
| American Indian or Alaska Native—Not economically disadvantaged | 4 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native—Economically disadvantaged | 8 | N/A | N/A | N/A | N/A | N/A |
| Asian—Not economically disadvantaged | 133 | 942 | 17 | 53% | 38% | 10% |
| Asian—Economically disadvantaged | 115 | 939 | 20 | 54% | 34% | 12% |
| Native Hawaiian or Other Pacific Islander—Not economically disadvantaged | 5 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Economically disadvantaged | 3 | N/A | N/A | N/A | N/A | N/A |
| Filipino—Not economically disadvantaged | 53 | 941 | 20 | 51% | 38% | 11% |
| Filipino—Economically disadvantaged | 39 | 943 | 20 | 44% | 46% | 10% |
| Hispanic or Latino—Not economically disadvantaged | 349 | 946 | 18 | 38% | 39% | 23% |
| Hispanic or Latino—Economically disadvantaged | 1,505 | 947 | 19 | 37% | 39% | 24% |
| Black or African American—Not economically disadvantaged | 71 | 940 | 21 | 48% | 41% | 11% |
| Black or African American—Economically disadvantaged | 163 | 949 | 18 | 31% | 44% | 25% |
| White—Not economically disadvantaged | 274 | 946 | 21 | 41% | 35% | 24% |
| White—Economically disadvantaged | 249 | 949 | 19 | 35% | 33% | 33% |
| Two or more races—Not economically disadvantaged | 56 | 945 | 19 | 38% | 41% | 21% |
| Two or more races—Economically disadvantaged | 45 | 945 | 25 | 38% | 31% | 31% |

Table 7.E.5 Demographic Summary for Grade Twelve

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student Group** | **Number Valid Scores** | **Mean Scale Score** | **SD of Scale Scores** | **Percent in Achievement Level 1** | **Percent in Achievement Level 2** | **Percent in Achievement Level 3** |
| All students with valid scores | 1,552 | 947 | 19 | 40% | 36% | 25% |
| Male | 1,022 | 948 | 19 | 40% | 34% | 26% |
| Female | 530 | 946 | 20 | 39% | 39% | 22% |
| Nonbinary | 0 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native | 8 | N/A | N/A | N/A | N/A | N/A |
| Asian | 137 | 946 | 19 | 39% | 42% | 18% |
| Native Hawaiian or Other Pacific Islander | 7 | N/A | N/A | N/A | N/A | N/A |
| Filipino | 50 | 943 | 16 | 52% | 36% | 12% |
| Hispanic or Latino | 929 | 948 | 19 | 39% | 36% | 26% |
| Black or African American | 121 | 948 | 19 | 40% | 34% | 26% |
| White | 246 | 947 | 21 | 42% | 33% | 25% |
| Two or more races | 54 | 948 | 22 | 39% | 31% | 30% |
| English only | 794 | 948 | 19 | 38% | 36% | 26% |
| IFEP | 15 | 940 | 20 | 40% | 40% | 20% |
| EL | 332 | 944 | 20 | 46% | 35% | 19% |
| RFEP | 411 | 949 | 19 | 37% | 36% | 27% |
| ADEL | 0 | N/A | N/A | N/A | N/A | N/A |
| To be determined | 0 | N/A | N/A | N/A | N/A | N/A |
| English proficiency unknown | 0 | N/A | N/A | N/A | N/A | N/A |
| Intellectual disability | 684 | 948 | 17 | 41% | 39% | 20% |
| Hearing impairment | 9 | N/A | N/A | N/A | N/A | N/A |
| Speech or language impairment | 4 | N/A | N/A | N/A | N/A | N/A |
| Visual impairment | 5 | N/A | N/A | N/A | N/A | N/A |
| Emotional disturbance | 9 | N/A | N/A | N/A | N/A | N/A |
| Orthopedic impairment | 30 | 940 | 24 | 47% | 37% | 17% |
| Other health impairment | 67 | 960 | 16 | 13% | 37% | 49% |
| Specific learning disability | 71 | 965 | 11 | 4% | 20% | 76% |
| Deaf-blindness | 0 | N/A | N/A | N/A | N/A | N/A |
| Multiple disabilities | 109 | 925 | 24 | 72% | 21% | 6% |
| Autism | 551 | 947 | 18 | 41% | 37% | 23% |
| Traumatic brain injury | 13 | 960 | 13 | 8% | 46% | 46% |
| Not classified | 0 | N/A | N/A | N/A | N/A | N/A |
| Not economically disadvantaged | 540 | 945 | 21 | 44% | 34% | 22% |
| Economically disadvantaged | 1,012 | 948 | 19 | 38% | 37% | 26% |
| Migrant education | 12 | 953 | 9 | 25% | 50% | 25% |
| Not migrant education | 1,540 | 947 | 20 | 40% | 36% | 25% |
| Foster youth | 12 | 945 | 24 | 25% | 50% | 25% |
| Not foster youth | 1,540 | 947 | 19 | 40% | 36% | 25% |
| American Indian or Alaska Native—Not economically disadvantaged | 4 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native—Economically disadvantaged | 4 | N/A | N/A | N/A | N/A | N/A |
| Asian—Not economically disadvantaged | 70 | 947 | 18 | 37% | 47% | 16% |
| Asian—Economically disadvantaged | 67 | 945 | 19 | 42% | 37% | 21% |
| Native Hawaiian or Other Pacific Islander—Not economically disadvantaged | 2 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Economically disadvantaged | 5 | N/A | N/A | N/A | N/A | N/A |
| Filipino—Not economically disadvantaged | 30 | 939 | 17 | 63% | 27% | 10% |
| Filipino—Economically disadvantaged | 20 | 949 | 13 | 35% | 50% | 15% |
| Hispanic or Latino—Not economically disadvantaged | 210 | 946 | 21 | 42% | 33% | 24% |
| Hispanic or Latino—Economically disadvantaged | 719 | 948 | 19 | 37% | 37% | 26% |
| Black or African American—Not economically disadvantaged | 44 | 945 | 20 | 48% | 25% | 27% |
| Black or African American—Economically disadvantaged | 77 | 949 | 19 | 36% | 39% | 25% |
| White—Not economically disadvantaged | 146 | 946 | 22 | 42% | 33% | 25% |
| White—Economically disadvantaged | 100 | 949 | 18 | 43% | 32% | 25% |
| Two or more races—Not economically disadvantaged | 34 | 945 | 23 | 44% | 35% | 21% |
| Two or more races—Economically disadvantaged | 20 | 952 | 18 | 30% | 25% | 45% |

Table 7.E.6 Demographic Summary for High School

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Student Group** | **Number Valid Scores** | **Mean Scale Score** | **SD of Scale Scores** | **Percent in Achievement Level 1** | **Percent in Achievement Level 2** | **Percent in Achievement Level 3** |
| All students with valid scores | 4,947 | 947 | 19 | 39% | 37% | 24% |
| Male | 3,287 | 947 | 20 | 39% | 36% | 25% |
| Female | 1,659 | 945 | 19 | 41% | 39% | 20% |
| Nonbinary | 1 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native | 21 | 947 | 23 | 48% | 19% | 33% |
| Asian | 397 | 943 | 18 | 48% | 39% | 13% |
| Native Hawaiian or Other Pacific Islander | 16 | 955 | 11 | 13% | 56% | 31% |
| Filipino | 146 | 942 | 19 | 49% | 38% | 12% |
| Hispanic or Latino | 2,988 | 947 | 19 | 38% | 37% | 25% |
| Black or African American | 388 | 947 | 19 | 38% | 39% | 23% |
| White | 827 | 947 | 20 | 39% | 33% | 27% |
| Two or more races | 164 | 946 | 21 | 38% | 37% | 26% |
| English only | 2,647 | 947 | 19 | 38% | 36% | 26% |
| IFEP | 51 | 941 | 18 | 55% | 29% | 16% |
| EL | 930 | 944 | 20 | 45% | 35% | 20% |
| RFEP | 1,319 | 947 | 19 | 38% | 39% | 23% |
| ADEL | 0 | N/A | N/A | N/A | N/A | N/A |
| To be determined | 0 | N/A | N/A | N/A | N/A | N/A |
| English proficiency unknown | 0 | N/A | N/A | N/A | N/A | N/A |
| Intellectual disability | 2,129 | 947 | 17 | 40% | 40% | 20% |
| Hearing impairment | 53 | 955 | 15 | 17% | 42% | 42% |
| Speech or language impairment | 19 | 956 | 10 | 16% | 42% | 42% |
| Visual impairment | 11 | 944 | 25 | 27% | 64% | 9% |
| Emotional disturbance | 24 | 962 | 13 | 13% | 21% | 67% |
| Orthopedic impairment | 104 | 942 | 24 | 42% | 35% | 23% |
| Other health impairment | 175 | 955 | 17 | 18% | 45% | 37% |
| Specific learning disability | 207 | 965 | 11 | 4% | 23% | 73% |
| Deaf-blindness | 2 | N/A | N/A | N/A | N/A | N/A |
| Multiple disabilities | 401 | 926 | 24 | 72% | 21% | 6% |
| Autism | 1,783 | 947 | 18 | 39% | 38% | 24% |
| Traumatic brain injury | 39 | 945 | 25 | 36% | 36% | 28% |
| Not classified | 0 | N/A | N/A | N/A | N/A | N/A |
| Not economically disadvantaged | 1,589 | 945 | 20 | 43% | 36% | 21% |
| Economically disadvantaged | 3,358 | 947 | 19 | 38% | 37% | 25% |
| Migrant education | 27 | 950 | 15 | 33% | 41% | 26% |
| Not migrant education | 4,920 | 947 | 20 | 39% | 37% | 24% |
| Foster youth | 50 | 945 | 24 | 38% | 26% | 36% |
| Not foster youth | 4,897 | 947 | 19 | 39% | 37% | 24% |
| American Indian or Alaska Native—Not economically disadvantaged | 8 | N/A | N/A | N/A | N/A | N/A |
| American Indian or Alaska Native—Economically disadvantaged | 13 | 953 | 21 | 38% | 15% | 46% |
| Asian—Not economically disadvantaged | 207 | 944 | 17 | 46% | 42% | 12% |
| Asian—Economically disadvantaged | 190 | 941 | 19 | 51% | 35% | 15% |
| Native Hawaiian or Other Pacific Islander—Not economically disadvantaged | 8 | N/A | N/A | N/A | N/A | N/A |
| Native Hawaiian or Other Pacific Islander—Economically disadvantaged | 8 | N/A | N/A | N/A | N/A | N/A |
| Filipino—Not economically disadvantaged | 84 | 941 | 19 | 55% | 33% | 12% |
| Filipino—Economically disadvantaged | 62 | 945 | 19 | 42% | 45% | 13% |
| Hispanic or Latino—Not economically disadvantaged | 607 | 946 | 19 | 40% | 36% | 24% |
| Hispanic or Latino—Economically disadvantaged | 2,381 | 947 | 19 | 38% | 38% | 25% |
| Black or African American—Not economically disadvantaged | 126 | 942 | 21 | 48% | 32% | 20% |
| Black or African American—Economically disadvantaged | 262 | 949 | 18 | 32% | 43% | 25% |
| White—Not economically disadvantaged | 453 | 946 | 21 | 41% | 34% | 25% |
| White—Economically disadvantaged | 374 | 949 | 19 | 37% | 33% | 30% |
| Two or more races—Not economically disadvantaged | 96 | 945 | 20 | 40% | 41% | 20% |
| Two or more races—Economically disadvantaged | 68 | 947 | 23 | 35% | 31% | 34% |

## Psychometric Analyses

This chapter contains the item- and test-level statistics from the analyses conducted for the California Alternate Assessment (CAA) for Science administered during the 2022–23 California Assessment of Student Performance and Progress administration.

### Overview

This chapter describes the psychometric analyses conducted by ETS for the CAA for Science, including classical item analyses, differential item functioning (DIF) analyses, item response theory (IRT) analyses, and response time analyses, as well as analyses to support reliability and validity evidence.

#### Summary of the Analyses

ETS conducts the following analyses for the CAA for Science. Each analysis is described in the body of this chapter, and the corresponding analysis results are provided in the appendices.

1. **Classical Item Analyses—**Classical item analyses for the CAA for Science are discussed in section [*8.2 Classical Item Analyses*](#_Classical_Item_Analyses).
2. **Omission and Completion Analyses—**The omit rate and item difficulty information for the CAA for Science are described in subsection [*8.2.4 Omit Rates*](#_Omit_Rates_3), and the completion rate information for the CAA for Science is described in subsection [*8.2.5 Completion Rates*](#_Completion_Rates_3).
3. **DIF Analyses—**DIF analyses for the CAA for Science are described in section [*8.3 Differential Item Functioning Analyses*](#_Differential_Item_Functioning).
4. **IRT Analyses—**IRT calibration analyses for the CAA for Science are described in section [*8.4 Item Response Theory Analyses*](#_Item_Response_Theory).
5. **Response Time Analyses—**Response time analyses for the CAA for Science are described in section [*8.5 Response Time Analyses*](#_Testing_Time_Analyses_3).
6. **Reliability Analyses—**Reliability estimation for the CAA for Science is illustrated in section [*8.6 Reliability Analyses*](#_Reliability_Analyses).
7. **Validity Evidence—**Validity evidence related to the CAA for Science is discussed in section [*8.7 Validity Evidence*](#_Validity_Evidence).

#### Samples Used for the Analyses

In general, analyses included in a CAA for Science technical report are based on all students in the tested population with valid scores available at the time of the analyses. The actual data sample used depends on both the time the data became available as well as the information (e.g., student demographic information, scores for each embedded performance task [PT], etc.) contained in that data at the time of the analyses.

The IRT analyses ([appendix 8.E](#_Appendix_8.E:_Item)) were based on data files available in June 2023. The classical item analyses ([appendix 8.B](#_Appendix_8.B:_Classical)) and item-level DIF analyses ([appendix 8.D](#_Appendix_8.D:_Differential_1)) were based on data files available in July 2023. All other analyses, such as the reliability analyses, used the final version of the production data file for student reports, which became available in September 2023. All data sources include all valid student scores. A small number of student scores were excluded from the final production data as a result of the data validation process.

For psychometric analyses, a more stringent rule was implemented when classifying an assessment as “complete” than required by the scoring and reporting specifications illustrated in subsection [*7.1.1 Scoring of Incomplete Cases*](#_Scoring_of_Incomplete). Students must also respond to at least one item per embedded PT for inclusion in the psychometric analyses.

For the psychometric analyses involving the field test embedded PT items, students must respond to at least one item in each of the four embedded PTs. These analyses include the classical item analyses and the item-level DIF analyses. Psychometric analyses involving only items on the operational form excluded any students who did not respond to at least one item for each of the three operational embedded PTs.

The first IRT item calibrations consisted only of items in the operational embedded PTs, and the second calibrations consisted of items from all four embedded PTs. The first set of calibrations excluded students who did not respond to at least one item for each of the three operational embedded PTs. The second set of calibrations excluded students who did not answer at least one item for each of the four embedded PTs.

Table 8.1 shows small differences in student counts between the four data sources (i.e., the analysis sample and the final production data file). Note that the student sample used for the final item analyses (FIA) and the item-level DIF analyses included more students than the student sample used for the field test IRT calibration. Both student samples included only students who responded to at least one item for each of the four embedded PTs, but the student sample used for FIA and DIF was based on a data file available at a later date than the student sample used for the field test IRT calibration.

Table 8.1 Analysis Data Sources

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Students in FIA and DIF Sample** | **Number of Students in Operational IRT Calibration Sample** | **Number of Students in Field Test IRT Calibration Sample** | **Number of Students in Final Data Sample** |
| Grade 5 | 4,339 | 3,604 | 3,587 | 4,342 |
| Grade 8 | 4,205 | 3,683 | 3,672 | 4,204 |
| High school—Grade 10 | 285 | 256 | 256 | 285 |
| High school—Grade 11 | 2,728 | 2,326 | 2,321 | 2,728 |
| High school—Grade 12 | 1,400 | 1,220 | 1,208 | 1,397 |
| High school—All grades | 4,413 | 3,802 | 3,785 | 4,410 |

#### Test-Taking Rates

The decision to assign a student to take the CAA for Science is determined by the student’s individualized education program (IEP) team using the information in the California Department of Education (CDE) Alternate Assessment Decision-Making Tool for California web document. This web document describes the criteria for taking alternate assessments and the students who should be identified to take alternate assessments (CDE, 2023).

All students who were identified by an IEP team to take the CAA for Science were required to test. Students repeating grade twelve were not eligible to test (CDE, 2022). A vast majority of students assigned to take the CAA for Science did start at least one of the embedded PTs during the 2022–23 administration. Across all grade levels, most students who started the CAA for Science completed all four embedded PTs.

Table 8.2 presents the number of test takers assigned to take the CAA for Science and the number of students who started the CAA for Science. Table 8.2 also presents the number of students whose assessment expired, whose assessment was force-completed, or who submitted all four embedded PTs. Students with an expired assessment started one or more embedded PTs but did not complete the started embedded PT(s); these embedded PTs that were not submitted by a student were submitted for processing by the system. Students who had their assessment force-completed had incomplete embedded PTs that required additional, manual steps to submit for processing after the end of the statewide testing window.

Note that, in table 8.2, the percentages of students with force-completed, expired, or submitted assessment may not sum to the percentage of students who started the assessment because of rounding.

Table 8.2 CAA for Science Test-Taking Rates—Registered Students

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Grade 5** | **Grade 8** | **HS Grade 10** | **HS Grade 11** | **HS Grade 12** | **HS All Grades** |
| Number Assigned | 5,785 | 5,626 | 434 | 4,183 | 2,267 | 6,884 |
| Number Started | 5,175 | 4,858 | 335 | 3,210 | 1,630 | 5,175 |
| Percent Started | 89% | 86% | 77% | 77% | 72% | 75% |
| Number of Force-Completed | 220 | 186 | 12 | 136 | 74 | 222 |
| Percent Force-Completed | 4% | 3% | 3% | 3% | 3% | 3% |
| Number of Expired | 14 | 16 | 1 | 8 | 5 | 14 |
| Percent Expired | 0% | 0% | 0% | 0% | 0% | 0% |
| Number of Submitted | 4,941 | 4,656 | 322 | 3,066 | 1,551 | 4,939 |
| Percent Submitted | 85% | 83% | 74% | 73% | 68% | 72% |

Table 8.A.1 through table 8.A.3 in [appendix 8.A](#_Appendix_8.A:_Test-Taking_1) present the number of registered students, the number of test takers, and the percentage of registered students taking the CAA for Science, grouped by demographic characteristics, including gender, ethnicity, English language fluency, economic status, primary disability type, migrant status, and foster youth status. For most student groups, between 85 and 90 percent of registered students for grade five, between 75 and 88 percent of registered students for grade eight, and between 65 and 78 percent of registered students for the high school grade band were administered the CAA for Science during the 2022–23 administration.

### Classical Item Analyses

Classical item analyses are conducted to evaluate the performance of all test items with respect to item difficulty, item-total correlation, and distractor analysis. The associated flagging rules of these statistics are used to identify items that are not performing as expected.

#### Classical Item Difficulty Indices (*p*-value and Average Item Score)

Items scored as one (correct) or zero (incorrect) are referred to as dichotomous items. Items scored from zero to some number of points greater than one are called polytomous items.

For dichotomous items, item difficulty is indicated by its *p*-value, which is the proportion of students who answer the item correctly. The range of *p*-values is from 0.00 to 1.00. Items with high *p*-values are easier items; those with low *p*-values are more difficult. Dichotomous items are flagged for review if their *p*-values are above 0.95 (i.e., too easy). Two-choice dichotomous single-select items, three-choice dichotomous single-select items, and all other dichotomous items are flagged as too difficult if their *p*-values are below 0.50, 0.30, and 0.20, respectively.

The formula for the *p*-value for a dichotomous item is presented in equation 8.1. *Refer to the* [*Alternative Text for Equation 8.1*](#_Alternative_Text_for) *for a description of this equation.*

 (8.1)

where,

*Xij* is the score (0 or 1) received for a given dichotomous item *i* for student *j*, and

*Ji* is the total number of students who were presented with item *i*.

For polytomous items, the difficulty is indicated by either the average item score (AIS) or *p*-‍value. The AIS can range from 0.00 to the maximum total possible points for an item. Desired AIS values for polytomous items generally fall within the range of 20 percent to 80 percent of the maximum obtainable item score; items with values outside this range are flagged for review. To facilitate the interpretation, the AIS values for polytomous items are often expressed as the proportion of the maximum possible score, which are equivalent to the *p-*values for dichotomous items.

For polytomous items, the *p-*value is defined as presented in equation 8.2. *Refer to the* [*Alternative Text for Equation 8.2*](#_Alternative_Text_for_38) *for a description of this equation.*

 (8.2)

where,

*Xij* is the score assigned for a given polytomous item *i* and student *j*,

*Ji* is the total number of students who were presented with item *i*, and

*Mi* is the maximum possible score for item *i*.

#### Item-Total Correlation

An important indicator of item discrimination is the item-total correlation, defined as the correlation between student scores on an individual item and student “total” scores on the assessment.

The item-total correlation statistic describes the relationship between students’ performance on a specific item and students’ performance on the total assessment. It is calculated as the correlation coefficient between the item score and total score—specifically, the polyserial correlation is used as the index of item-total correlation for both polytomous and dichotomous items. Statistically, it is calculated as the correlation between an observed continuous variable and an unobserved continuous variable hypothesized to underlie the variable with ordered categories (Olsson, Drasgow, & Dorans, 1982). The total scale score or the raw score is used as the criterion score for this analysis.

Theoretically, the polyserial correlation ranges from −1.0 (for a perfect negative relationship) to 1.0 (for a perfect positive relationship) and is estimated as presented in equation 8.3. *Refer to the* [*Alternative Text for Equation 8.3*](#_Alternative_Text_for_36) *for a description of this equation.*

 (8.3)

where,

*β* is the item parameter to be estimated from the data, with the estimate denoted as , using maximum likelihood estimation; it is a regression coefficient (slope) for predicting the continuous version of an item score onto the continuous version of the total score;

*s2tot* is the variance of the criterion (for example, the students’ total score); and

*stot* is the standard deviation of the criterion.

For a polytomous item, there is a regression for each boundary between item scores, with all regressions for the same item sharing a common slope, *β*. For a polytomous item with *m* possible score values, there are *m*−1 regressions.

Acceptable values for this correlation coefficient are positive and greater than 0.20. A relatively high item-total correlation coefficient value is preferred, as it indicates that higher-performing students tend to perform better on the item than lower-performing students. An item with a negative item-total correlation typically signifies a problem with the item, as that indicates that

* the higher-performing students on the overall assessment tend to respond incorrectly to the item if dichotomous, or are assigned a low score for the item if polytomous; or
* the lower-performing students on the overall assessment are responding correctly to the item if dichotomous, or are assigned a high score for that item if polytomous.

#### Distribution of Item Scores

For polytomous items, examination of the distribution of scores assists in showing how well items performed. If no students were given the highest possible score, the item may not be functioning as expected because the item may be confusing, poorly worded, or just unexpectedly difficult; the scoring rubric may be flawed; or students may not have had an opportunity to learn the content. If the rubric for an item allowed for partial credit but nearly all students received either full credit or partial credit, the rubric should be reviewed for whether the rubric for the partial credit score category should be revised.

Items with a low percentage (i.e., less than 3 percent) of students obtaining any score point were flagged for review. Such items may pose problems during IRT calibration. They need to be carefully reviewed and may need to be excluded from the item calibration analyses.

#### Omit Rates

If a student views an item, leaves it unanswered, and then goes on to view and answer another item, the missing response is classified as an “omit.” If the student omits an item—that is, leaves the item unanswered—and does not view additional items, the responses for the successive items are classified as “not seen.”

##### Rates for Dichotomous and Polytomous Items

For both dichotomous and polytomous items, examining the omit rate is useful for identifying potential problems with test features such as testing time and item or test layout. Items with high omit rates are flagged for further investigation by content specialists to ensure that no issues are found with these items. Omit rates for polytomous items tend to be higher than for dichotomous items.

##### No-Response Rate

The *Mark as No Response* contextual menu option is a specific case of an omitted item. The *Mark as No Response* option should be used when the item was presented to the student and the student did not provide a response despite the test examiner’s best efforts to elicit a response. Similar to the omit rate, the Mark as No Response information is useful for identifying potential problems with an item.

#### Completion Rates

Completion rates indicate the proportion of students who completed each of the four embedded PTs on the assessment. A student’s record for the CAA for Science is not considered complete unless the student logged on to each of the four embedded PTs.

#### Distractor Analyses

Distractor analyses were conducted on selected-response (SR) items (i.e., items that were not constructed response). The statistics for each item included the proportion of students selecting each distractor (incorrect response), computed for the group of all students in the analysis sample, and were also computed separately for the highest-performing 20 percent of students. Items were flagged for review if more high-performing students chose any distractor rather than the key. Such a result indicated that the item may have multiple correct answers or have the wrong key (i.e., the item was miskeyed).

For SR items, the distractor-total correlation describes the relationship between selecting a distractor for a specific item and performance on the total assessment. The polyserial correlation was calculated for the distractors, like the item-total correlation previously described, except that the regressions were implemented on the distractors rather than the keys. Items with distractor-total correlations not significantly below zero were flagged for review, as these items may have multiple correct answers, be miskeyed, or have other content issues.

#### Summary of Classical Item Analyses Flagging Criteria

An item was flagged for review if the item analysis yielded any of the following results. One item could have multiple flags if the statistics met the flagging criteria:

* **Difficulty flags** indicated extreme values of the proportion-correct (for dichotomous items) or the proportion of the possible maximum points earned (for polytomous items):
* A-flag: A *p-*value below 0.50 for two-choice dichotomous single-select items, below 0.30 for three-choice dichotomous single-select items, or below 0.20 for all other items
* H-flag: A *p*-value above 0.95 for dichotomous items or above 0.80 for polytomous items
* A **discrimination flag** (R-flag) indicated that the item did not discriminate effectively between high- and low-ability students. Items with a polyserial correlation less than 0.20 were flagged.
* An **omit flag** (O-flag) indicated an omission rate above 5 percent for dichotomous multiple-choice, single-select items or above 15 percent for all other items.
* A **distractor flag** (P-flag) was used for an item with any distractors having a correlation with the criterion score that is either positive, zero, or negative but not significantly below zero.
* A **miskey flag** (D-flag) was used for multiple-choice items when more of the high-ability examinee group—the top 20 percent of examinees on the total assessment—choose any distractor rather than the response keyed as correct.
* An **underrepresented score point flag** (L-flag) was used for any item that had less than 3 percent of the students at any score level.

ETS’ Psychometric Analysis & Research staff and Assessment & Learning Technology Development staff carefully reviewed each of the flagged items during and at the end of the item analyses. All flagged items were also reviewed by California educators at the data review meeting and then summarized for the CDE with recommendations for subsequent analyses.

#### Classical Item Analyses Results

This subsection presents tables of the classical item analyses results for the 2022–23 test items. These analyses include evaluations of the classical item difficulties and the item-total correlations, analyses of both the omit and no-response rate by item, and an analysis of the students’ completion rate.

##### Summary of Classical Item Difficulty Indices and Item-Total Correlations

Detailed results of the item analyses for each item by grade level or the high school grade band are presented in table 8.B.1 through table 8.B.3 in [appendix 8.B](#_Appendix_8.B:_Classical). The item statistics, including AIS, *p-*value, polyserial correlation, statistical flagging criteria, and item type are listed in those tables. The distribution of item scores of each item is presented in table 8.B.4 through table 8.B.6.

Table 8.3 presents the item difficulty distributions by grade level or the high school grade band. Most items have *p*-values of at least 0.6. The item difficulty distributions by item type and by embedded PT are presented in table 8.B.7 and in table 8.B.8, respectively.

Table 8.3 Item Difficulty Distributions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **0 ≤ *p* < 0.2** | **0.2 ≤ *p* < 0.4** | **0.4 ≤ *p* < 0.6** | **0.6 ≤ *p* < 0.8** | **0.8 ≤ *p* ≤ 1.0** | **Total Number of Items** |
| Grade 5 | 1 | 4 | 18 | 28 | 5 | 56 |
| Grade 8 | 0 | 3 | 18 | 27 | 10 | 58 |
| High school | 0 | 6 | 20 | 29 | 4 | 59 |

Table 8.4 presents the distribution of item-total correlations by grade level or the high school grade band. Most items effectively discriminated the high- and low-ability students, as most items have an item-total correlation of at least 0.5, and few items have an item-total correlation below 0.2. One operational field test item for grade five did not effectively discriminate the high- and low-ability students, as the item had an item-total correlation below zero. This item was carefully reviewed by California educators, ETS, and the CDE; it was confirmed that the item content was sound but was removed from the item bank for use in future administrations. The item-total correlation distributions by item type and by embedded PT are presented in table 8.B.9 and in table 8.B.10, respectively.

Table 8.4 Item-Total Correlation Distributions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **r < 0** | **0 ≤ r < 0.2** | **0.2 ≤ r < 0.3** | **0.3 ≤ r < 0.4** | **0.4 ≤ r < 0.5** | **r ≥ 0.5** | **Total Number of Items** |
| Grade 5 | 1 | 1 | 0 | 4 | 8 | 42 | 56 |
| Grade 8 | 0 | 1 | 0 | 3 | 1 | 53 | 58 |
| High school | 0 | 0 | 3 | 6 | 7 | 43 | 59 |

Table 8.5 presents a summary of *p-*value and item-total correlation by form. The mean *p-‍*value and mean item-total correlation do not vary significantly across forms within each grade level or the high school grade band.

Table 8.5 Classical Item Statistics for Each Form

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band and Form Number** | **No. of Unique Items** | **No. of Students** | **Mean *p-*value** | **Minimum *p-*value** | **Maximum *p-*value** | **Mean Item-Total Polyserial Correlation** | **Minimum Item-Total Polyserial Correlation** | **Maximum Item-Total Polyserial Correlation** |
| **Grade 5 Total:** | **56** | **4,339** | **0.62** | **0.19** | **0.87** | **0.58** | **−0.06** | **0.79** |
| Grade 5 Form 1 | 30 | 1,053 | 0.61 | 0.31 | 0.83 | 0.58 | 0.17 | 0.78 |
| Grade 5 Form 2 | 30 | 982 | 0.62 | 0.31 | 0.87 | 0.59 | 0.17 | 0.78 |
| Grade 5 Form 3 | 30 | 1,167 | 0.63 | 0.19 | 0.83 | 0.58 | −0.06 | 0.78 |
| Grade 5 Form 4 | 30 | 1,137 | 0.64 | 0.19 | 0.83 | 0.59 | −0.06 | 0.79 |
| **Grade 8 Total:** | **58** | **4,205** | **0.65** | **0.30** | **0.90** | **0.63** | **0.18** | **0.85** |
| Grade 8 Form 1 | 30 | 1,105 | 0.67 | 0.48 | 0.90 | 0.66 | 0.52 | 0.76 |
| Grade 8 Form 2 | 30 | 1,043 | 0.67 | 0.30 | 0.90 | 0.65 | 0.5 | 0.85 |
| Grade 8 Form 3 | 30 | 1,070 | 0.67 | 0.38 | 0.90 | 0.63 | 0.18 | 0.78 |
| Grade 8 Form 4 | 30 | 987 | 0.64 | 0.37 | 0.90 | 0.61 | 0.18 | 0.75 |
| **High school—Grade 10 Total:** | **59** | **285** | **0.57** | **0.24** | **0.91** | **0.65** | **0.21** | **0.95** |
| High school—Grade 10 Form 1 | 30 | 140 | 0.61 | 0.32 | 0.91 | 0.63 | 0.28 | 0.84 |
| High school—Grade 10 Form 2 | 30 | 9 | N/A | N/A | N/A | N/A | N/A | N/A |
| High school—Grade 10 Form 3 | 30 | 29 | 0.60 | 0.24 | 0.91 | 0.69 | 0.51 | 0.91 |
| High school—Grade 10 Form 4 | 30 | 107 | 0.61 | 0.32 | 0.91 | 0.67 | 0.49 | 0.84 |
| **High school—Grade 11 Total:** | **59** | **2,728** | **0.59** | **0.25** | **0.89** | **0.55** | **0.18** | **0.77** |
| High school—Grade 11 Form 1 | 30 | 597 | 0.61 | 0.27 | 0.89 | 0.57 | 0.27 | 0.77 |
| High school—Grade 11 Form 2 | 30 | 746 | 0.59 | 0.25 | 0.89 | 0.55 | 0.18 | 0.76 |
| High school—Grade 11 Form 3 | 30 | 590 | 0.64 | 0.37 | 0.89 | 0.60 | 0.29 | 0.76 |
| High school—Grade 11 Form 4 | 30 | 795 | 0.65 | 0.37 | 0.89 | 0.61 | 0.36 | 0.76 |
| **High school—Grade 12 Total:** | **59** | **1,400** | **0.60** | **0.27** | **0.88** | **0.58** | **0.23** | **0.79** |
| High school—Grade 12 Form 1 | 30 | 409 | 0.61 | 0.29 | 0.88 | 0.60 | 0.25 | 0.78 |
| High school—Grade 12 Form 2 | 30 | 369 | 0.60 | 0.27 | 0.88 | 0.57 | 0.23 | 0.78 |
| High school—Grade 12 Form 3 | 30 | 354 | 0.64 | 0.37 | 0.88 | 0.63 | 0.34 | 0.78 |
| High school—Grade 12 Form 4 | 30 | 268 | 0.65 | 0.39 | 0.88 | 0.65 | 0.33 | 0.79 |
| **High school—All grades Total:** | **59** | **4,413** | **0.59** | **0.26** | **0.89** | **0.57** | **0.21** | **0.77** |
| High school—All grades Form 1 | 30 | 1,146 | 0.61 | 0.28 | 0.89 | 0.59 | 0.29 | 0.77 |
| High school—All grades Form 2 | 30 | 1,124 | 0.59 | 0.26 | 0.89 | 0.56 | 0.21 | 0.77 |
| High school—All grades Form 3 | 30 | 973 | 0.64 | 0.37 | 0.89 | 0.61 | 0.32 | 0.77 |
| High school—All grades Form 4 | 30 | 1,170 | 0.65 | 0.37 | 0.89 | 0.63 | 0.37 | 0.77 |

##### Summary of Omit and No-Response Rate Analyses

Table 8.C.1 through table 8.C.3 in [appendix 8.C](#_Appendix_8.C:_Omission_1) provide the IRT item difficulty, omit rate, and no-response rate for each item. Most items have low omit rates—lower than 5 percent—and have no-response rates of no more than 1 percent. Overall, the omit rate for flagging individual items was 5 percent for dichotomous items and 15 percent for polytomous items.

The items with high omit rates were flagged. Omit rates for polytomous items tended to be much higher than for dichotomous items. An omit response was scored as zero and included in the n-count for that item (i.e., the number of students who answered the item) when calculating item statistics. A response that is considered omit-by-design was not scored or included in the n-count for the item.

Table 8.C.4 presents the average number of item omits per student by grade level or the high school grade band and embedded PT, and table 8.C.5 presents the average number of no-response selections per student by grade level or the high school grade band and embedded PT. The test examiner (on behalf of the student) was more likely to omit the item than to select the no-response option, given that the average number of item omits per embedded PT ranged between 0.09 and 0.31 across grade levels and the high school grade band, and that the average number of no-response selections per embedded PT ranged between 0.03 and 0.14.

##### Summary of Completion Rate Analyses

Table 8.C.6 in [appendix 8.C](#_Appendix_8.C:_Omission_1) presents the distribution of the total number of answered items by achievement level among students who completed the assessment. No-response selections were not included among each student’s total number of answered items. Most students answered all 40 items across the four embedded PTs.

Table 8.C.7 lists the percentage of students in each grade level or the high school grade band by the number of embedded PTs submitted. For grade five and grade eight, more than 80 percent of registered students’ records were considered complete by submitting all four embedded PTs during the 2022–23 administration, whereas 72 percent of registered students in the high school grade band were considered complete.

Table 8.C.8 lists the submission rate by grade level or the high school grade band for each embedded PT. Within each grade level or the high school grade band, the submission rates by embedded PT were similar across embedded PTs.

### Differential Item Functioning Analyses

DIF is used to evaluate the consistency of individual item performance for students in different demographic student groups who have the same level of domain performance. For example, DIF evaluates whether female and male students matched to have the same test score perform similarly on each item in the assessment.

In examining the DIF between groups, the reference group is often designated as the group that is assumed to have an advantage, while the focal group refers to the group anticipated to possibly be disadvantaged by the assessment.

DIF analyses were conducted for field test items that met the sample size requirements. The sample size requirements for the DIF analyses were 100 in the smaller of either the focal group or the reference group and 400 in the combined focal and reference groups. These sample size requirements are based on standard operating procedures with respect to DIF analyses at ETS.

If an item performs differentially across identifiable student groups—for example, gender or ethnicity—when students are matched on ability, the item may be measuring something else other than the intended construct (i.e., possible evidence of bias). It is important, however, to recognize that item performance differences flagged for DIF might be related to actual differences in relevant knowledge or skills between student groups (i.e., impact) or statistical Type I error, which might falsely find DIF in an item. As a result, DIF analysis is used mainly as a statistical tool to identify *potential* item bias. Subsequent reviews by content experts and bias and sensitivity experts are required to determine the source and meaning of performance differences.

There are many possible reasons for DIF. The wording of an item, for example, may be such that one group interprets the question differently than the other, or the reading demands of an item are such that, although reading is not being measured (e.g., in a mathematics assessment), reading differences between the groups lead to differential outcomes on the item.

DIF analyses were conducted on each assessment for designated comparison groups. Groups are defined on the basis of demographic variables, such as gender, race or ethnicity, and primary disabilities, if the number of students in the group meets the sample size requirements. These comparison groups are specified in table 8.8.

#### Differential Item Functioning Procedure for Dichotomous Items

The Mantel-Haenszel (MH) DIF (MH-DIF) statistic was calculated for dichotomous items (Mantel & Haenszel, 1959; Holland & Thayer, 1985). For this method, students are classified into relevant student groups of interest (e.g., gender or ethnicity). Students at each total score level in the focal group (e.g., females) are compared with students at each total score level in the reference group (e.g., males). The common odds ratio—that is, the proportion of correct response over the proportion of incorrect response—is estimated across all levels of matched student ability using the formula in equation 8.4 (Dorans & Holland, 1993). The resulting estimate is interpreted as the relative probability of success on a particular item for members of two groups when matched on ability. *Refer to the* [*Alternative Text for Equation 8.4*](#_Alternative_Text_for_39) *for a description of this equation.*

 (8.4)

where,

*M* is the highest score category of the criterion score (total raw score),

*m* indexes the score categories,

*Rrm* is the number of students in the reference group at score level *m* who answer the item correctly,

*Wfm* is the number of students in the focal group at score level *m* who answer the item incorrectly,

*Ntm* is the total number of students at score level *m*,

*Rfm* is the number of students in the focal group at score level *m* who answer the item correctly, and

*Wrm* is the number of students in the reference group at score level *m* who answer the item incorrectly.

To facilitate the interpretation of MH results, the common odds ratio is frequently transformed onto the delta scale using equation 8.5 (Holland & Thayer, 1985). *Refer to the [Alternative Text for Equation 8.5](#_Alternative_Text_for_40) for a description of this equation.*

 (8.5)

Positive values indicate DIF in favor of the focal group (i.e., positive DIF items are differentially easier for the focal group), whereas negative values indicate DIF in favor of the reference group (i.e., negative DIF items are differentially easier for the reference group).

#### Differential Item Functioning Procedure for Polytomous Items

The standardization DIF (Dorans & Schmitt, 1993; Zwick, Thayer, & Mazzeo, 1997; Dorans, 2013) in conjunction with the Mantel chi-square statistic (Mantel, 1963; Mantel & Haenszel, 1959) is calculated for polytomous items. The standardized mean difference (SMD) compares the item means of the two groups after adjusting for differences in the distribution of students across all items and is calculated using equation 8.6. *Refer to the* [*Alternative Text for Equation 8.6*](#_Alternative_Text_for_35) *for a description of this equation.*

 (8.6)

where,

*M* is the highest score category of the criterion score (total raw score),

*Nfm* is the number of students in the focal group at score level *m*,

*Erm* is the expected item score for the reference group at score level *m*,

*Efm* is the expected item score for the focal group at score level *m*, and

*Dm* is the difference in the distribution of students at score level *m*.

These statistics are indicators of the degree to which members of one group perform better or worse than expected on each polytomous item.

A positive SMDvalue means that, conditional on the criterion score, the focal group has a higher mean item score than the reference group (i.e., the item is differentially easier for the focal group). In contrast, a negative SMD value means that, conditional upon the criterion score, the focal group has a lower mean item score than the reference group (i.e., the item is differentially harder for the focal group).

#### Classification

Based on the DIF statistic values and significance tests, items are classified into three categories and assigned values of A, B, or C (Holland & Wainer, 1993). Category A items contain negligible DIF, Category B items exhibit slight to moderate DIF, and Category C items possess moderate to large DIF values.

The flagging criteria for dichotomous items are presented in table 8.6; the flagging criteria for polytomous items are provided in table 8.7. The determination of all significant differences is based on *p*-value < 0.05.

Table 8.6 DIF Categories for Dichotomous Items

|  |  |
| --- | --- |
| **DIF Category** | **Criteria** |
| A (negligible) | * Absolute value of MH D-DIF is less than one or is not significantly different from zero. * Positive values are classified as “A+” and negative values as “A−.” |
| B (moderate) | * Absolute value of MH D-DIF is significantly different from zero but not from one and is at least one; *or* absolute value of MH D-DIF is significantly different from one but is less than 1.5. * Positive values are classified as “B+” and negative values as “B−.” |
| C (large) | * Absolute value of MH D-DIF is at least 1.5 and is significantly different from one. * Positive values are classified as “C+” and negative values as “C−.” |

Table 8.7 DIF Categories for Polytomous Items

|  |  |
| --- | --- |
| **DIF Category** | **Criteria** |
| A (negligible) | Mantel chi-square *p-*value≥ 0.05 or |SMD/SD| ≤ 0.17 |
| B (moderate) | Mantel chi-square *p-*value *<* 0.05 and 0.17 < |SMD/SD| ≤ 0.25 |
| C (large) | Mantel chi-square *p-*value *<* 0.05 and |SMD*/*SD| > 0.25 |

**Note:** SMD = standardized mean difference; SD = total group standard deviation of item score

DIF analyses were conducted on each assessment for designated comparison groups on the basis of demographic variables, including gender, race or ethnicity, and primary disability type, if the number of students in the group was sufficient. These comparison groups are specified in table 8.8.

Table 8.8 Student Groups for DIF Comparison

|  |  |  |
| --- | --- | --- |
| **DIF Type** | **Reference Group** | **Focal Group** |
| **Gender** | Male | * Female |
| **Race or Ethnicity** | White | * American Indian or Alaska Native * Asian * Black or African American * Filipino * Hispanic or Latino * Native Hawaiian or Other Pacific Islander * Two or more races |
| **Primary Disability Type** | Intellectual Disability | * Autism * Deaf-blindness * Emotional disturbance * Hearing impairment * Multiple disabilities * Orthopedic impairment * Other health impairment * Specific learning disability * Speech or language impairment * Traumatic brain injury * Visual impairment |
| **High School Grade Level** | Grade eleven | * Grade ten * Grade twelve |
| **Intellectual Disability Group Versus Autism** | Intellectual Disability Group, which includes the following:   * Intellectual disability * Multiple disabilities * Traumatic brain injury | * Autism |
| **Intellectual Disability Group Versus Other Learning Disability** | Intellectual Disability Group, which includes the following:   * Intellectual disability * Multiple disabilities * Traumatic brain injury | Other Learning Disability Group, which includes the following:   * Emotional disturbance * Orthopedic impairment * Other health impairment * Specific learning disability * Speech or language impairment |

#### Differential Item Functioning Analysis Results

The DIF results can be found in [appendix 8.D](#_Appendix_8.D:_Differential_1). Table 8.D.1 through table 8.D.3 shows the number of items classified into each DIF category. Overall, most items are in Category A, with a small percentage of items in Category B, and very few items in Category C. The number of items for which the DIF analysis was not performed because of an insufficient sample size is presented in the *Insufficient Counts* column.

### Item Response Theory Analyses

IRT is a family of mathematical models that characterizes the probability of a given response as a function of a test taker’s true ability and one or more features of the items, such as its difficulty or discrimination. IRT can be used to calibrate items, link item parameter estimates, scale or equate test scores across different forms or test administrations, evaluate item performance, build an item bank, and assemble test forms.

This section describes how IRT models were used to calibrate and equate operational forms onto the base IRT scale established during the 2021–22 administration as well as to link the field test items onto the base scale. Items that were rejected by both the data review committees and the CDE were typically not included in the calibration process. Exceptions may be made when such items are needed to meet the test blueprint and the item has the correct key but was rejected for other reasons.

#### Item Response Theory Model

The one-parameter logistic item response theory (1PL-IRT) model was used for the item calibration and was selected after consultation with the CDE. In particular, the generalized partial credit model (GPCM) (Muraki, 1992) restricted for 1PL-IRT, which is essentially the partial credit model (Masters, 1982), was applied to both dichotomous and polytomous items.

The mathematical form of the GPCM is presented in equation 8.7. *Refer to the* [*Alternative Text for Equation 8.7*](#_Alternative_Text_for_41) *for a description of this equation.*

 (8.7)

where,

 is the probability of student with proficiency  obtaining score *h* on item *i*,

*Mi* is the maximum number of score points for item *i*,

*ai* is the discrimination parameter, which is fixed to 0.588 for every item,

*bi* is the location parameter for item *i*,

*div* is the category parameter for item *i* on item score *v*,

*D* is a scaling constant of 1.7,

*c* indexes the item score, and

*v* indexes the non-zero item score.

When *Mi* = 1, equation 8.7 becomes an expression of the one-parameter logistic model for dichotomous items.

#### Data Preparation

Prior to IRT calibration analyses, ETS’ psychometricians reviewed the results of the classical item analyses to decide whether any items were of poor quality and needed to be removed from calibration. The results also were reviewed by ETS’ content experts and the CDE. The decision whether to remove items from calibration was made in consultation with the CDE.

For IRT calibration, scored item response data was used to create the IRT analysis input data files for each grade level. The IRT analysis input data file for the calibration of the operational items was a full matrix containing item-level scores for students who submitted at least one scorable response for each one of the three operational embedded PTs. For the calibration of the field test items, students needed to also submit at least one scorable response for the field test embedded PT for inclusion into the IRT analysis input data file.

Similar to the classical item analyses, “omit” items were treated as incorrect and “not presented” items were treated as blank.

#### Equating

Equating is a procedure where test scores, from different test forms assembled on the basis of the same specifications, are placed onto a reference scale so that scores from different test administrations are comparable. There are two approaches to equate the test forms: preequating and postequating.

A preequating design allows for conversion tables that describe the relationship between raw scores and scale scores, or theta scores and scale scores, to be established prior to the current test administration using data from prior administrations. Preequating relies on having a well-calibrated item bank, robust embedded field-testing processes, and stability in item performance over time.

A postequating design uses the data from the current administration to establish the raw-to-scale-score relationship for the current administration’s form.

Both preequating and postequating involve a common‑item nonequivalent groups design (Kolen & Brennan, 2004).

For all assessments, regardless of whether they are preequated or postequated, IRT calibration and linking were conducted to put the field test item parameters onto the base IRT scale.

The CAA for Science was postequated to the baseline scale established in the 2021–22 administration using the data from the 2022–23 administration.

##### Calibration

After the 2022–23 CAA for Science administration, all operational items within each assessment (grade level and content area) were calibrated using all available data.

FlexMIRT (Cai, 2017), a multilevel and multiple-group IRT software package for item analysis and test scoring, was used for item calibration analysis. This software can fit a variety of IRT models to both single-level and multilevel data that are dichotomous, polytomous, or both, and was chosen for its superior flexibility among IRT software programs.

The evaluation of the calibration results includes the following steps:

1. Reviewing the item parameter estimates to examine whether these estimates were reasonable
   1. At the form level, the summary statistics for the *b*-parameter estimates (location difficulty) and *d*-parameter estimates (step parameter) were examined, including the mean, standard deviation (SD), median, minimum, maximum, and goodness-of-fit.
   2. At the item level, statistics of individual items were examined, including item difficulty estimates, model-fit statistics, and the IRT-based item parameters.
2. Flagging items that did not perform as expected (All flagged items were discussed thoroughly with the CDE to decide whether those items should be removed from calibration or whether the scoring categories need to be collapsed.)

The calibration process was paralleled by two ETS psychometricians to ensure quality and accuracy of results. Specifically, two psychometricians independently created flexMIRT control files and ran the same input data files and then compared the calibration results. Any differences in the output were investigated. Refer to section [*9.6 Quality Control of Psychometric Processes*](#_Quality_Control_of_1) for more details of this procedure.

##### Equating of the Operational Form

The new items in the assessments for each grade level and the grade band were linked to a calibrated item pool using a common-item nonequivalent groups design (Kolen & Brennan, 2004). The base scales for the CAA for Science were established on the basis of data from the 2021–22 administration. The linking of the new operational form onto the 2021–22 base scale is done through a set of linking items (i.e., anchor set) selected from the calibrated item pool and readministered in the current test administration for each grade level or the grade band.

After IRT calibration was performed with the 2022–23 test administration’s items, the complete set of anchor items was used to calculate the linking constants to place the item parameters onto the 2021–22 scale by using the mean-to-mean method described in the next subsection. The linking process was carried out iteratively by inspecting differences between the transformed 2022–23 item estimates and base estimates for the anchor items and by removing items for which the item difficulty estimates changed significantly; this is called the robust-z procedure. Robust-z is also described in more detail in subsection [*8.4.3.2.2 Robust-Z Procedure*](#_Robust-Z_Procedure_2).

###### Mean-to-Mean Transformation

The item difficulty estimates from a new form of calibration may not be comparable to those from the 2021–22 calibration. The difficulty estimates based on a typical year’s data need to be transformed onto the base scale to make them comparable to the item bank parameters.

The mean-to-mean transformation assumes that the item bank and the new form difficulty values differ by a constant; that is, the item bank and the new form difficulty values can be made comparable by adding the same constant for all items. If this assumption is correct, then that constant is the difference between the means of the anchor items from the item bank and the new form difficulty values for the anchor items.

An iterative procedure was implemented to calculate the linking constants using common items in the item bank and the typical year’s administration. For each iteration of linking constants computation, the procedure described in subsection [*8.4.3.2.2 Robust-Z Procedure*](#_Robust-Z_Procedure_2)is intended to inspect the differences between the transformed new (current administration) and base (2021–22) estimates for the anchor items and remove anchor items for which the item difficulty estimates changed significantly.

There were eight steps involved in making mean-to-mean transformation:

1. Identify the anchor items in both the item bank (2021–22 administration) and the current administration.
2. Obtain the item difficulty parameters (*b*-values) of these anchor items that are on the base scale from the item bank.
3. Obtain the item difficulty parameters (*b*-values) of these anchor items from the calibration of the new form.
4. Calculate the average item difficulty for the anchor set on the base scale.
5. Calculate the average item difficulty for the anchor set from the calibration of the new form.
6. Obtain the transformation constant by taking the difference between the two average item difficulties (*b*-values)—using the average item difficulty for the anchor set on the base scale and subtracting the average item difficulty for the anchor set from the calibration of the new form.
7. Obtain a set of adjusted item difficulty parameters (*b*-values) by applying the linking constant to the item difficulty parameters of the anchor items from the new form.
8. Remove anchor items by following the procedure as described in subsection [*8.4.3.2.2 Robust-Z Procedure*](#_Robust-Z_Procedure_2). The iteration process continues by removing one unstable anchor in each round until no additional items are identified with significant differences between the item difficulty estimates for adjusted new and base items.

###### Robust-Z Procedure

To identify any unstable anchor items, ETS used an outlier detection procedure based on the robust-z statistic (Huynh, 2000; Huynh & Rawls, 2009). In this application, robust-z, as described in equation 8.8, was calculated on the basis of the distribution of the difficulty difference for the anchor items between the item bank and the new form in a typical-year administration. *Refer to the* [*Alternative Text for Equation 8.8*](#_Alternative_Text_for_42) *for a description of this equation.*

 (8.8)

where,

*D* is the difference between the base and transformed new item difficulty of an anchor item;

*MdD* is the median of a distribution of *D* for all anchor items; and

*IQR* is the interquartile range of a distribution of *D* for all anchor items, which is defined as the difference between the third quartile (Q3) and the first quartile (Q1) when all the *D* values are rank ordered.

A large value of this statistic for any anchor item indicates that the reference item difficulty parameter and the new form item difficulty parameter for that item differed substantially.

The criterion for removing anchor items is that the robust-z value is greater than 1.645. One anchor item was removed at each iteration. The following criteria were evaluated at each iteration:

* The correlation between the reference item difficulty estimates and new form item difficulty estimates for the anchor sets should be no less than 0.95.
* The ratio of standard deviations (RSD) of the reference item difficulty estimates and the new form item difficulty estimates for the anchor items should be between 0.90 and 1.1.

After each iteration, the mean difference of the anchor sets between the base item-difficulty estimates and the new form item difficulty estimates was recomputed on the basis of the remaining anchor items. Once the final anchor item set was obtained and the linking constant was calculated, ETS will evaluate the percentage of the final anchor items in the form. It is desired that the final anchor set is at least 40 percent of all items in the form. When the equating work was completed, ETS discussed the equating results with the CDE and received approval from the CDE. Removed anchor items were not used in the computation of the linking constants but were still included in calibration and for deriving raw-to-theta conversions.

After equating, the item parameters were linked to the base IRT scale. The raw-to-scale-score conversion table can be established using these parameter estimates. For detailed information on the method to establish the raw-to-scale-score conversion table, refer to subsection [*8.4.6 Scaling the Scores*](#_Scaling_the_Scores)*.*

#### Calibration and Linking for the Field Test Items

After each administration, the field test items will be calibrated and linked to the base scale.

##### Calibration

The calibration will be conducted using a sparse matrix combining all operational items and field test items from all versions within a grade level. Refer to subsection [*8.4.1 Item Response Theory Model*](#_Item_Response_Theory_2) for the IRT models and the software used in the calibration, subsection [*8.4.2 Data Preparation*](#_Data_Preparation_1) for the creation of the sparse matrix.

##### Linking

The item parameters obtained through the calibration are on a different scale and will be linked to the baseline scale using all operational items as anchors. The mean-to-mean linking procedures were used to link the item parameters to the baseline scale, and the robust-z method was used to check the stability of the anchors. Refer to subsection [*8.4.3.2.1 Mean-to-Mean Transformation*](#_Mean-to-Mean_Transformation_1) and subsection [*8.4.3.2.2 Robust-Z Procedure*](#_Robust-Z_Procedure_2) for more details on these methods.

#### Parameter Estimates

Table 8.9 shows a summary of the procedure described in subsection[*8.4.3.2. Equating of the Operational Form*](#_Equating_of_the_1)*,* which includes the number of all anchor items prior to the anchor stability check; both the number of anchor items that were removed and the number of anchor items remaining after the anchor stability check; and the linking constants of the final iteration of each assessment. The relationship between the item bank IRT *b-*parameters (calibrated in either 2018–19 or 2021–22) and the equated IRT *b*-parameters from 2022–23 is shown in table 8.E.1 through table 8.E.3 of [appendix 8.E](#_Appendix_8.E:_Item).

Table 8.9 Final Linking Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Items in Initial Anchor Set** | **Number of Items Removed from the Anchor Set** | **Number of Items in Final Linking Set** | **Linking Constant** |
| Grade Five | 15 | 2 | 13 | −0.0596 |
| Grade Eight | 15 | 1 | 14 | −0.0210 |
| High School | 15 | 0 | 15 | −0.0397 |

Table 8.10 presents the summary statistics of the final equating and linking results after items with unstable parameters were detected and removed from the anchor set. The statistics provide the number of remaining items in the final anchor set; the average item difficulty of the anchor set both in the item bank and from the 2022–23 test administration, along with their differences; as well as the criteria for evaluating the differences. The absolute difference of the average *b*-‍parameters for grades five and eight and for the high school grade band is all less than the criterion value of 0.1; thus, all meet the criteria.

Table 8.10 Linked Item Parameter Results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **N Anchor Items** | **Item Bank Baseline Scale Average *b*-‍parameter** | **Linked 2022–23 Average *b*-parameter** | **Difference of Average *b*-‍parameters** | **Criteria for the Acceptable Absolute Difference** |
| Grade Five | 13 | −0.86 | −0.94 | 0.08 | <0.1 |
| Grade Eight | 14 | −0.91 | −0.92 | 0.01 | <0.1 |
| High School | 15 | −0.90 | −0.90 | 0.00 | <0.1 |

Once the 2022–23 *b*-parameters of the operational embedded PT items were placed on the 2021–22 baseline scale for the CAA for Science, analyses were performed to assess the overall test difficulty and the distribution of item difficulty. For the polytomous items, the difference between the item’s *b*-parameter estimate and each of the item’s *d*-step parameter estimates was treated as a separate *b*-parameter estimate for these analyses. Given that each polytomous item on the CAA for Science test forms has two *d-*step parameters, these analyses consider each polytomous item as having two *b*-parameter estimates.

The overall summary of the 2022–23 linked *b*-parameter estimates for 2022–23 operational embedded PT items is shown in table 8.11. The mean, SD, minimum, and maximum values are presented, in addition to the number of unique operational embedded PT items for each assessment. Given that each polytomous item has two *b*-parameter estimates, the number of unique operational embedded PT items will be less than the number of *b*-parameter estimates for each grade level or the grade band. The means of *b*-parameter estimates were −0.66, −0.74, and −0.44 for grades five and eight and for the high school grade band, respectively, indicating that the mean item difficulty level decreased slightly as the grade level increased. All items had *b*-‍parameter estimates within the acceptable range of −4 to +4.

Table 8.11 Item Difficulty Parameter Distribution

|  |  |  |  |
| --- | --- | --- | --- |
| **IRT-b Range** | **Grade 5** | **Grade 8** | **High School** |
| b < −3.5 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 0 | 1 | 1 |
| −2.5 ≤ b < −2.0 | 4 | 5 | 1 |
| −2.0 ≤ b < −1.5 | 6 | 12 | 6 |
| −1.5 ≤ b < −1.0 | 20 | 10 | 11 |
| −1.0 ≤ b < −0.5 | 7 | 15 | 22 |
| −0.5 ≤ b < 0 | 13 | 17 | 10 |
| 0 ≤ b < 0.5 | 7 | 6 | 10 |
| 0.5 ≤ b < 1.0 | 6 | 3 | 5 |
| 1.0 ≤ b < 1.5 | 1 | 2 | 4 |
| 1.5 ≤ b < 2.0 | 2 | 0 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 1 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 |
| Minimum | −2.32 | −2.75 | −2.51 |
| Maximum | 1.77 | 2.05 | 2.14 |
| Mean | −0.66 | −0.74 | −0.44 |
| SD | 0.96 | 0.96 | 0.97 |
| **Number of Items:** | 56 | 58 | 59 |

The summaries of *b*-parameter estimates are shown in [appendix 8.E](#_Appendix_8.E:_Item). Table 8.E.4 through table 8.E.6 list the IRT parameter estimates for each item. Table 8.E.7 summarizes the *b-‍*parameter estimates in the three operational embedded PTs by content complexity, and table 8.E.8 summarizes the *b*-parameter estimates in the field test embedded PT by content complexity. The distribution of the *b*-parameter estimates of operational embedded PT items is further summarized by content complexity in table 8.E.9 through table 8.E.11, by item type in table 8.E.12 through table 8.E.14, and by content domain in table 8.E.15 through table 8.E.17 for grades five and eight and for the high school grade band, respectively.

##### Evaluation of Equating

As described in subsection [*8.4.3 Equating*](#_Equating_3), calibrations for the 2022–23 CAA for Science were linked to the reference scale of 2021–22 through a mean-to-mean transformation. As mentioned previously in subsection [*8.4.3.2.2. Robust-Z Procedure*](#_Robust-Z_Procedure_2), two indices were used for the CAA for Science to evaluate the quality of such linking procedures: the RSD of the two sets of item difficulty estimates for the anchor items (i.e., the 2021–22 and 2022–23 estimates), and the correlation (CORR) between the two sets of item difficulty estimates for the anchor items (Huynh & Rawls, 2009). If the CORR is at least 0.95 and the RSD is between 0.9 and 1.1, the linking results are considered acceptable, and all anchor items are regarded as stable in the linking process.

Anchor items account for at least 23 percent of the total number of items, which is above the minimum requirement of 20 percent (Kolen & Brennan, 2004). The two sets of item parameters for anchor items are highly correlated, with the lowest correlation exceeding 0.98. RSD values range from approximately 1.01 to 1.09. As both CORR and RSD values meet the criteria proposed by Huynh and Rawls (2009), it is concluded that the linking results are acceptable.

Table 8.12 presents the following information:

* Total number of operational embedded PT items
* Number of remaining anchor items after robust-z evaluation
* Percentage of remaining anchor items out of all the operational items
* Correlation between the final set of the transformed new (2022–23) and reference (2021–22) difficulty estimates for the anchor items
* RSD between the final set of the transformed new (2022–23) and reference (2021–‍22) item parameters for anchor items

Table 8.12 Evaluation of Anchor Set Between Item Bank and 2022–‍23

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level and Grade Band** | **Number of Unique Operational Items** | **Anchor Items Remaining After Deletions** | **Remaining Anchor Items as Percentage of All Operational Items** | **Correlation Between Item Bank Item Parameters and 2022–23 Item Parameters** | **RSD of Item Parameters Between Item Bank and 2022–‍23 Administration** |
| Grade Five | 56 | 13 | 23% | 0.9834 | 1.0875 |
| Grade Eight | 58 | 14 | 24% | 0.9931 | 1.0089 |
| High School | 59 | 15 | 25% | 0.9968 | 1.0284 |

#### Scaling the Scores

The raw scores on each new form were transformed to scale scores on the reference scale using a two-step procedure. First, the number-correct scores (raw scores) were transformed to ability (theta) scores on the reference scale by the inverse test characteristic curve (TCC) procedure described in the next subsection. Then, these ability (theta) scores were transformed to scale scores through the linear transformation described in subsection [*8.4.6.2 Transformation from Theta Scores to Scale Scores*](#_Transformation_from_Theta_3).

##### Inverse Test Characteristic Curve Procedure

After all the item difficulty estimates are transformed to the reference scale, students’ overall ability estimates can be derived from the input data file that was described in subsection [*8.4.2 Data Preparation*](#_Data_Preparation_1)*,* through the IRT inverse TCC method (Stocking, 1996). This method transforms the sum of the student’s item scores into an ability estimate. That estimate is the ability value that makes the sum of the expected scores on the items administered to the student equal to the sum of the scores that the student actually received on those items.

The TCC expresses the expected total score on a set of items as a function of the student’s ability, which is shown in equation 8.9. *Refer to the* [*Alternative Text for Equation 8.9*](#_Alternative_Text_for_43) *for a description of this equation.*

 (8.9)

where,

*i* indexes dichotomous items,

*j* indexes polytomous items,

*ndich* is the number of dichotomous items in the assessment,

*pi(θ)* is the probability of a correct response to item *i* at ability *θ* on the dichotomous item in equation 8.7,

*npoly* is the number of polytomous items in the assessment,

*m* is the number of score categories for each polytomous item,

*sxj* is the value for score category x for the polytomous item *j*,

*pxj(θ)* is the probability that an examinee with ability *θ* obtains score sx on the polytomous item *j* in equation 8.7, and

*ξ(θ)* is the corresponding expected total score.

##### Transformation from Theta Scores to Scale Scores

Students’ ability estimates (theta scores) were transformed to the scale score metric by applying a linear transformation based on threshold theta values. Those threshold values were determined after standard setting and approved by the California State Board of Education (SBE). There were two threshold theta values (for Level 2 and Level 3) for each grade level or high school. The scaling transformation was the linear transformation that transformed the Level 2 threshold to scale score 45 and the Level 3 threshold to scale score 60 (refer to equations 8.10, 8.11, and 8.12). *Refer to the* [*Alternative Text for Equation 8.10*](#_Alternative_Text_for_44) *for a description of this equation.*

 (8.10)

where,

 denotes the scale score for student *j*,

 represents student ability estimate for student *j*,

*A* is the slope parameter (scaling factor) needed to transform theta to the scale score metric, and

*B* is the intercept parameter needed to transform theta to the scale score metric.

The slope and intercept parameters are derived by mapping the equated Level 2 and Level 3 threshold scores from the standard setting to the prespecified scale score threshold scores.

Specifically, if the IRT calibration is used, the slope and intercept in equation 8.10 are derived using the threshold scores from standard setting approved by the SBE ( and  in equations 8.11 and 8.12) and the desired threshold scale scores (two-digit scale score) ( and  in equations 8.11 and 8.12) using the following two formulas:

*Refer to the* [*Alternative Text for Equation 8.11*](#_Alternative_Text_for_10) *for a description of this equation.*

 (8.11)

*Refer to the* [*Alternative Text for Equation 8.12*](#_Alternative_Text_for_11) *for a description of this equation.*

 (8.12)

where,

 represents the threshold score for Level 3—Understanding on the reporting scale, which is set to be 60;

 represents the threshold score for Level 2—Foundational Understanding on the reporting scale, which is set to be 45;

 represents the threshold score for Level 3—Understanding on the theta scale; and

 represents the threshold score for Level 2—Foundational Understanding on the theta scale. (For more information on  and , refer to [*Chapter 6: Standard Setting*](#_Standard_Setting).)

The slopes and intercepts for each grade level and content area are shown in table 8.13. Also, refer to subsection [*7.1.3 Scale Scores for the Total Assessment*](#_Achievement_Levels)for the special requirements for the CAA for Science reporting scale.

Table 8.13 Slopes and Intercepts That Convert Theta Scores to Scale Scores

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Threshold Theta Score for Level 2** | **Threshold Theta Score for Level 3** | **Reporting Scale Score for Level 2** | **Reporting Scale Score for Level 3** | **Slope** | **Intercept** |
| Grade 5 | −0.517 | 0.813 | 45 | 60 | 11.28 | 50.8 |
| Grade 8 | −0.770 | 0.614 | 45 | 60 | 10.84 | 53.3 |
| High school | −0.593 | 0.699 | 45 | 60 | 11.61 | 51.9 |

The 2022–23 student ability estimates that were derived from the IRT models using the linked item parameters were converted to the established score scales using the procedures and conversion constants described previously. The scale scores can be found through the raw-to-scale-score conversion tables presented in table 7.C.1 through table 7.C.12 in [appendix 7.C](#_Appendix_7.C:_Raw).

### Response Time Analyses

The length of time it takes students to complete an assessment, which includes three operational embedded PTs and one field test embedded PT, is collected and analyzed to build a profile describing what a typical testing event looks like for each grade level or the high school grade band. In addition, variability in testing time is investigated to determine whether a student’s testing time should be viewed as unusual or irregular. It should be noted that the CAA for Science is untimed.

Response times for alternate assessments—the Summative Alternate English Language Proficiency Assessments for California and the CAAs for English language arts/literacy (ELA), mathematics, and science—should be interpreted with caution. These assessments are administered as a one-on-one interaction between test examiner and test taker. The test examiner reads the items to the student, following the *Directions for Administration;* then the student takes time to respond to the item; and finally, the test examiner records the responses or scores into the test delivery system (TDS). Some individualized instruction may also be used to provide support for students to respond to the items. The response times captured by the TDS may depend on how a test examiner administered the assessment and how the time was recorded by the TDS, which, given the one-on-one nature for these assessments, could have very different meanings for different students. Therefore, the response time information provided in this report is for information only and may not provide accurate indicators of how long it takes for students to complete the assessments.

When analyzing the testing time, students who did not answer at least one item from each of the four embedded PTs were removed from these analyses. Table 8.14 presents summary statistics of the testing time for the total assessment for each grade level or the high school grade band. The unit of testing time is minutes. Approximately 90 percent of the students’ testing times were less than 30 minutes, given the ninetieth percentile in testing time is approximately 30 minutes. The median testing time across all grade levels was approximately 16 minutes.

Some cases of extremely long testing time may be attributed to students with special needs taking longer to complete the assessments, or the assessment not being exited properly. Therefore, the results should be interpreted with caution. The medians (fiftieth percentile) are more meaningful in the interpretation of the time comparisons because medians are less impacted by extreme values than means.

Table 8.14 Testing Time (in Minutes) for the Total Assessment

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **N** | **Mean** | **SD** | **Min** | **Max** | **1st Percentile** | **10th Percentile** | **25th Percentile** | **50th Percentile** | **75th Percentile** | **90th Percentile** | **99th Percentile** |
| Grade 5 | 4,341 | 18.17 | 10.92 | 1.31 | 178.82 | 3.99 | 8.81 | 11.72 | 15.93 | 21.77 | 29.93 | 53.78 |
| Grade 8 | 4,204 | 17.51 | 9.68 | 1.13 | 123.77 | 3.95 | 8.55 | 11.25 | 15.60 | 21.04 | 28.97 | 54.88 |
| High school—Grade 10 | 285 | 16.94 | 8.36 | 2.29 | 69.19 | 3.59 | 8.28 | 11.78 | 15.52 | 20.54 | 27.74 | 40.06 |
| High school—Grade 11 | 2,728 | 17.80 | 8.84 | 1.05 | 95.91 | 3.41 | 8.57 | 12.33 | 16.44 | 21.56 | 27.38 | 49.63 |
| High school—Grade 12 | 1,395 | 19.02 | 10.64 | 1.03 | 165.01 | 3.12 | 9.34 | 12.43 | 16.83 | 23.41 | 30.29 | 56.90 |
| High school—All grades | 4,408 | 18.13 | 9.44 | 1.03 | 165.01 | 3.37 | 8.70 | 12.34 | 16.50 | 22.03 | 28.38 | 52.30 |

Table 8.F.1, in [appendix 8.F](#_Appendix_8.F:_Testing_1), provides the descriptive statistics (mean, SD, minimum, maximum, and percentiles) for testing time per embedded PT. The median testing time for each embedded PT at each grade level or the high school grade band is about four minutes. Table 8.F.2 presents the descriptive statistics for testing time by item type and the median testing time by item type, which is under one minute.

The remaining testing population was partitioned into quartiles based on reported scale scores. These quartile groupings are not the same as achievement levels. Descriptive statistics of the time required to complete the total assessment were computed for each of the four quartile groups for each grade level or the high school grade band.

Table 8.F.3 presents total testing time and percentile information at each student performance quartile level. Overall, students at the lowest quartile level (Q1) have slightly shorter testing times than students in the other quartile groups, although the median total testing time is nearly the same across all four quartile groups within each grade level or the high school grade band.

### Reliability Analyses

The reliability for a particular group of students’ test scores is the extent to which the scores would remain consistent if those same students were retested with a parallel version of the same assessment. There are many definitions of reliability (Haertel, 2006) that have their genesis in classical test theory and a variety of methods that can be used to estimate reliability.

The general concept of reliability concerns the extent to which the test scores measure *a particular construct* consistently. The variance in the distribution of test scores—essentially, the observed differences among individuals—is partly due to differences that are consistent and partly due to differences that are not consistent. The measure of variation associated with the first kind of differences—consistent differences—is called “true variance”; this would include actual differences in students’ knowledge. The measure of variation associated with the remaining differences—those that operate essentially at random—is called “error variance.” Error variance includes a variety of underlying differences such as selections of test content, which may cause a student’s test score to be slightly higher in one evaluation and slightly lower in another. Reliability is the proportion of total variance that is due to true variance. The standard error of measurement (SEM) is a statistic that characterizes the error variance.

Reliability coefficients range from zero to one. The higher the reliability coefficient for a set of scores, the more likely individuals are to obtain very similar scores upon repeated testing occasions, if the students do not change in their level of the knowledge or skills measured by the assessment.

#### Sample for Reliability Analyses

The reliability analyses performed for the CAA for Science require that the sample be screened on the basis of the requirement, listed in subsection [*8.1.2 Samples Used for the Analyses*](#_Samples_Used_for), that students must have responded to at least one item in each of the three operational embedded PTs to be included in any psychometric analyses involving only items in the operational forms.

#### Reliability Measures

In a specified population of students, the reliability of test scores, *X*, is defined as the proportion of the test score variance that is attributable to true differences in student abilities and is sometimes operationalized as the correlation between scores on two replications of the same testing procedure, .

Reliability coefficients may range from 0 to 1. The higher the reliability coefficient for a set of scores, the more likely students would be to obtain very similar scores if they were retested. In applied settings, the requirement of repeated administrations is impractical, and methodologies estimating reliability from relationships among student performances on items within a single test form are often used.

An IRT-based approach called marginal reliability (Green et al., 1984) can be used to estimate the reliability of the scores. The estimates of reliability coefficients reported here are for IRT-based ability estimates.

This reliability coefficient for theta estimates, , is defined on the basis of a single test administration, as shown in equation 8.13. *Refer to the* [*Alternative Text for Equation 8.13*](#_Alternative_Text_for_34) *for a description of this equation.*

 (8.13)

where,

*J* is the number of students who took the assessment,

 is the measure of variance in ability estimates, and

 is the squared conditional standard error of measurement (CSEM) (i.e., error variances) for student *j* with ability estimate .

#### Standard Error of Measurement

The SEM is a measure of how much students’ scores would vary from the scores they would earn on a perfectly reliable assessment. If it were possible to compute the error of measurement for each student’s score in a large group of students, these errors of measurement would have a mean of zero. These SEMs are an indication of how much the errors of measurement affect the students’ scores. The SEM is expressed in the same units as the test score, whether the units are in raw score or scale score metric.

The SEM is the square root of the error variance in the scores (i.e., the SD of the distribution of the differences between students’ observed scores and their true scores). The SEM is calculated using equation 8.14. *Refer to the* [*Alternative Text for Equation 8.14*](#_Alternative_Text_for_14) *for a description of this equation.*

 (8.14)

where,

 is the reliability estimated in equation 8.13,

 is the SD of the total test theta score, and

*A* is the slope of the scaling transformation of theta scoresto the reporting scale.

The SEM is useful in determining the confidence interval (CI) that likely captures a student’s true score. A student’s true score can be thought of as the mean of observed scores a student would earn over an infinite number of independent administrations of the assessment. Across those administrations, approximately 95 percent of the time the interval ranging from the student’s observed score minus 1.96 SEMs to the student’s observed score plus 1.96 SEMs would contain that student’s true score (Crocker & Algina, 1986). Therefore, this interval is called a 95 percent CI for the student’s true score. For example, if a student’s observed score on a given assessment equals 545 points, and the SEM equals 5, one can be 95 percent confident that the student’s true score lies between 535 and 555 points (i.e., 545 ± 10).

#### Reliability and Standard Error of Measurement Results

Table 8.15 gives marginal reliability as well as the mean, SD, and SEM of both theta and scale scores for each form number by grade level or the grade band, along with the number of student results upon which those analyses were performed. Note that in the case of the total test reliability, the reliability is for the whole assessment on the theta score scale; it is calculated using the total test theta score of individual students. All the test forms for grades five and eight and for the high school grade band have reliability greater than 0.80, except for two forms for grade eight. All are at least 0.74.

Table 8.15 Summary Statistics for Scale Scores and Theta Scores, Reliability, and SEMs

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band and Form Number** | **Number of Unique Operational Items** | **Number of Students** | **Marginal Reliability** | **Scale Score Mean** | **Scale Score SD** | **Scale Score SEM** | **Theta Score Mean** | **Theta Score SD** | **Theta Score SEM** |
| Grade 5 Form 1 | 30 | 1,054 | 0.86 | 549 | 13.13 | 4.99 | −0.12 | 1.18 | 0.45 |
| Grade 5 Form 2 | 30 | 987 | 0.82 | 550 | 12.34 | 5.17 | −0.07 | 1.12 | 0.47 |
| Grade 5 Form 3 | 30 | 1,174 | 0.85 | 550 | 12.41 | 4.81 | −0.06 | 1.11 | 0.43 |
| Grade 5 Form 4 | 30 | 1,144 | 0.85 | 552 | 13.64 | 5.29 | 0.07 | 1.23 | 0.48 |
| Grade 8 Form 1 | 30 | 1,106 | 0.74 | 853 | 15.20 | 7.79 | 0.01 | 1.52 | 0.78 |
| Grade 8 Form 2 | 30 | 1,042 | 0.83 | 853 | 13.95 | 5.82 | −0.01 | 1.33 | 0.56 |
| Grade 8 Form 3 | 30 | 1,076 | 0.79 | 854 | 13.89 | 6.38 | 0.09 | 1.34 | 0.62 |
| Grade 8 Form 4 | 30 | 991 | 0.82 | 853 | 12.84 | 5.39 | −0.01 | 1.22 | 0.51 |
| High school—Grade 10 Form 1 | 30 | 140 | 0.89 | 952 | 15.05 | 5.10 | 0.03 | 1.30 | 0.44 |
| High school—Grade 10 Form 2 | 30 | 9 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| High school—Grade 10 Form 3 | 30 | 29 | 0.89 | 952 | 15.83 | 5.30 | 0.03 | 1.37 | 0.46 |
| High school—Grade 10 Form 4 | 30 | 107 | 0.83 | 949 | 15.30 | 6.37 | −0.23 | 1.39 | 0.58 |
| High school—Grade 11 Form 1 | 30 | 597 | 0.85 | 951 | 12.33 | 4.77 | −0.12 | 1.06 | 0.41 |
| High school—Grade 11 Form 2 | 30 | 749 | 0.83 | 950 | 11.37 | 4.71 | −0.19 | 0.99 | 0.41 |
| High school—Grade 11 Form 3 | 30 | 590 | 0.85 | 952 | 13.06 | 5.03 | −0.01 | 1.13 | 0.44 |
| High school—Grade 11 Form 4 | 30 | 796 | 0.80 | 954 | 13.71 | 6.09 | 0.18 | 1.23 | 0.55 |
| High school—Grade 12 Form 1 | 30 | 415 | 0.81 | 951 | 13.50 | 5.84 | −0.09 | 1.24 | 0.54 |
| High school—Grade 12 Form 2 | 30 | 372 | 0.82 | 950 | 11.96 | 5.02 | −0.13 | 1.05 | 0.44 |
| High school—Grade 12 Form 3 | 30 | 352 | 0.86 | 953 | 14.17 | 5.23 | 0.10 | 1.23 | 0.45 |
| High school—Grade 12 Form 4 | 30 | 269 | 0.78 | 954 | 16.20 | 7.60 | 0.22 | 1.51 | 0.71 |
| High school—All grades Form 1 | 30 | 1,152 | 0.84 | 951 | 13.11 | 5.25 | −0.09 | 1.16 | 0.46 |
| High school—All grades Form 2 | 30 | 1,130 | 0.83 | 950 | 11.58 | 4.81 | −0.17 | 1.01 | 0.42 |
| High school—All grades Form 3 | 30 | 971 | 0.86 | 952 | 13.56 | 5.12 | 0.03 | 1.17 | 0.44 |
| High school—All grades Form 4 | 30 | 1,172 | 0.80 | 953 | 14.52 | 6.50 | 0.15 | 1.32 | 0.59 |

##### Student Group Reliabilities and Standard Errors of Measurement

The reliabilities of the total test scores were also examined for various student groups within the student population. The student groups included in these analyses were defined by gender, economic status, English language fluency, primary ethnicity, migrant status, foster youth status, primary disability type, accommodation, designated support, and a crosstab of primary ethnicity and economic status.

Table 8.G.1 through table 8.G.6 in [appendix 8.G](#_Appendix_8.G:_Reliability_1) provide reliabilities, scale-score-based SEMs, and scale score variances for the total test scores for each student group for each grade level and for the high school grade band overall. Most student groups have reliability greater than 0.70 across all grade levels or the high school grade band except for some student groups with fewer than 100 students. The student group with at least 100 students and reliabilities below 0.70 includes students with a specific learning disability. That student group’s reliability coefficients are 0.60, 0.43, and 0.67, respectively, for grade five, grade eight, and the high school grade band. It should be noted that in this case, the low reliability was likely due to the lack of variation in student performance in relation to other student with disability groups.

Note that reliabilities are reported only for samples that comprise 11 or more students. Also, in some cases, score reliabilities are not estimable and are presented in the tables as “N/A.” The reliability estimates for some of the student groups can be negative because of small variation in scale scores and large CSEMs for extreme score values.

#### Conditional Standard Errors of Measurement

Classical test theory assumes that the standard error of a test score is constant throughout the score range. While the assumption is probably reasonable in the mid-score ranges, it is less reasonable at the extremes of the score distribution. IRT expands the concept by providing estimates of the standard error at each score point on the distribution.

##### Methodology

CSEMs are estimated as part of the IRT-based scoring procedure. CSEMs for scale scores are based on IRT and are estimated as a function of measured ability. The CSEMs of theta scores (or of linearly transformed theta scores) are smaller at points of the scale in the test metric where more items are located. A student’s CSEM under the IRT framework is equal to the reciprocal of the square root of the test information function (TIF) based on the items taken by each student. The CSEM for a student with proficiency  is calculated using equation 8.15. *Refer to the* [*Alternative Text for Equation 8.15*](#_Alternative_Text_for_23) *for a description of this equation.*

 (8.15)

where,

 is the test information for student *j* and is calculated using equation 8.16. *Refer to the* [*Alternative Text for Equation 8.16*](#_Alternative_Text_for_24) *for a description of this equation.*

 (8.16)

where,

*I* is the number of items on the test form, and

 is the item information of item *i* for student *j*.

Item information is calculated as presented in equation 8.17. *Refer to the* [*Alternative Text for Equation 8.17*](#_Alternative_Text_for_25) *for a description of this equation.*

 (8.17)

where,

 and  are the first and second order moments of the item score for item *i* for a student with theta score .

The expected score of item *i* for student *j* is calculated as presented in equation 8.18. *Refer to the* [*Alternative Text for Equation 8.18*](#_Alternative_Text_for_26) *for a description of this equation.*

 (8.18)

The expected squared score of item *i* for student *j* is calculated as presented in equation 8.19. *Refer to the* [*Alternative Text for Equation 8.19*](#_Alternative_Text_for_27) *for a description of this equation.*

 (8.19)

where,

is the probability of a student with proficiency  obtaining score *h* on item *i*, the computation of which is shown in equation 8.7; and

*Mi* is the maximum number of score points for item *i*.

CSEMs for scale scores are computed by transforming CSEMs of theta scores onto the reporting scale. Refer to subsection [*8.4.6.2* *Transformation from Theta Scores to Scale Scores*](#_Transformation_from_Theta_3)for scaling procedures. A student’s CSEM for scale scores under the IRT framework is equal to the CSEM for the theta score multiplied by the scaling factor *A*, as presented in equation 8.20. *Refer to the* [*Alternative Text for Equation 8.20*](#_Alternative_Text_for_28) *for a description of this equation.*

 (8.20)

where,

 is the CSEM on the scale score metric for student *j*;

 is the CSEM on the theta score metric for student *j* estimated in equation 8.15;

 is the  test information for student *j* as calculated in equation 8.16; and

*A* is the scaling factor (the slope) needed to transform theta to the scale score metric calculated in equation 8.11.

##### Results

Refer to the slope values in table 8.13 for the value of *a* by grade level and the high school grade band.

CSEMs vary across the scale and are typically smaller in scale score units toward the center of the scale where more items are located, whereas they are larger at the extreme ends of the scale. When an assessment has threshold scores, it is important to provide CSEMs at the threshold scores.

Table 8.16 presents the scale score CSEMs at the lowest score required for a student to be classified in the Level 2—Foundational Understanding and Level 3—Understanding achievement levels for each CAA for Science grade level or the grade band by form number for the 2022–23 administration.

Table 8.16 Scale Score CSEM at Achievement-Level Threshold

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band and Form Number** | **Level 2 Scale Score Threshold** | **Level 2 CSEM** | **Level 3 Scale Score Threshold** | **Level 3 CSEM** |
| Grade 5 Form 1 | 545 | 4 | 560 | 5 |
| Grade 5 Form 2 | 545 | 4 | 560 | 5 |
| Grade 5 Form 3 | 545 | 4 | 560 | 5 |
| Grade 5 Form 4 | 545 | 4 | 560 | 5 |
| Grade 8 Form 1 | 845 | 4 | 860 | 5 |
| Grade 8 Form 2 | 845 | 4 | 860 | 5 |
| Grade 8 Form 3 | 845 | 4 | 860 | 5 |
| Grade 8 Form 4 | 845 | 4 | 860 | 5 |
| High school Form 1 | 945 | 4 | 960 | 5 |
| High school Form 2 | 945 | 4 | 960 | 5 |
| High school Form 3 | 945 | 4 | 960 | 5 |
| High school Form 4 | 945 | 4 | 960 | 5 |

Table 8.G.7 through table 8.G.18 in [appendix 8.G](#_Appendix_8.G:_Reliability_1) present the raw-score-to-scale-score conversion tables with the theta score CSEM and scale score CSEM listed for each respective theta score and scale score.

Refer to figure 8.G.1 through figure 8.G.6 for TIF curves by theta level and by scale score level for grade five, grade eight, and the high school grade band based on the spring 2023 observed data. The TIFs were calculated by the inverse of estimated CSEMs of theta (estimated ability) values for the spring 2023 sample. Table 8.G.19 through table 8.G.24 present the TIF values by theta level and by scale score level for grade five, grade eight, and the high school grade band.

#### Decision Classification Analyses

When an assessment uses achievement levels as the primary method to report test results, accuracy and consistency of decisions become key indicators of the quality of the assessment.

##### Methodology

The reliabilities of achievement-level classifications, which are criterion referenced, are related to the reliabilities of the test scores on which they are based; however, they are not exactly the same. Glaser (1963) was among the first to draw attention to this distinction, and Feldt and Brennan (1989) reviewed the topic extensively. While test reliability evaluates the consistency of test scores, decision classification reliability evaluates the consistency of classification.

Decision accuracy is the extent to which students are classified in the same way as they would be if each student’s score were the average over all possible forms of the assessment (the student’s true score). Decision accuracy answers the following question: How closely does the actual classification of test takers, based on their single-form scores, agree with the classification that would be made on the basis of their true scores, if their true scores could somehow be known?

Decision consistency is the extent to which students are classified in the same way as they would be on the basis of a single form of an assessment other than the one for which data is available. Decision consistency answers the following question: What is the agreement between the classifications based on two nonoverlapping, equally difficult forms of the assessment?

The methodology used for estimating the reliability of classification decisions is described in Livingston and Lewis (1995). The necessary input information includes only the maximum and minimum possible scores on the assessment and the observed score distribution and the reliability coefficient for the group of students referenced by the estimates. The method was implemented by the ETS proprietary computer program RELCLASS-COMP (Version 4.14).

Reliability of classification at a threshold is estimated by combining the achievement levels above a particular threshold and combining the achievement levels below that threshold. The result is a two-by-two table indicating whether the students are above or below the threshold. The sum of the entries in the main diagonal is the number of students accurately (or consistently) classified as above or below that threshold.

Table 8.17 and table 8.18 illustrate these two-by-two contingency tables. The proportion of students being accurately classified is determined by summing across the diagonals of the upper tables. The proportion of consistently classified students is determined by summing the diagonals of the lower tables.

Table 8.17 Decision Accuracy for Reaching an Achievement Level

|  |  |  |
| --- | --- | --- |
| **Achievement Level Status** | **Does Not Reach an Achievement Level Based on True Score** | **Reaches an Achievement Level Based on True Score** |
| Does not reach an achievement level | Correct classification | Incorrect classification |
| Reaches an achievement level | Incorrect classification | Correct classification |

Table 8.18 Decision Consistency for Reaching an Achievement Level

|  |  |  |
| --- | --- | --- |
| **Achievement Level Status** | **Does Not Reach an Achievement Level Based on an Alternate Form** | **Reaches an Achievement Level Based on an Alternate Form** |
| Does not reach an achievement level | Consistent classification | Inconsistent classification |
| Reaches an achievement level | Inconsistent classification | Consistent classification |

##### Results

The results of these analyses are presented in table 8.G.25 through table 8.G.30 in [appendix 8.G](#_Appendix_8.G:_Reliability_1). Included are the contingency tables for both accuracy and consistency of the various achievement-level classifications. The overall decision accuracy is greater than 0.70 for all three assessments, with the highest accuracy of 0.79 occurring in grade five and the lowest level of accuracy of 0.73 occurring in grade eight. The overall decision consistency is lower, with the lowest consistency of 0.64 occurring for grade eight and the highest consistency of 0.70 occurring for grade five.

### Validity Evidence

Validity refers to the degree to which each interpretation or use of a test score is supported by the accumulated evidence (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014; ETS, 2014). Concerns about validity drive the development, administration, and scoring of an assessment. Validity evidence also determines the appropriateness of test score interpretations and uses.

Validation is the process of accumulating evidence to support each proposed score interpretation or use. This validation process does not rely on a single study or gathering only one type of evidence. Rather, validation involves multiple investigations and different kinds of supporting evidence (AERA, APA, & NCME, 2014; Cronbach, 1971; ETS, 2014; Kane, 2006). It begins with the test design and is implicit throughout the entire assessment process, which includes item development and field testing, analyses of items, standard setting, test scaling and linking, scoring, reporting, and score usage.

In this section, the evidence gathered is presented to support the intended uses and interpretations of scores for the CAA for Science. This section discusses some of the principles prescribed by AERA, APA, and NCME’s *Standards for Educational and Psychological Testing* (2014). These *Standards* require a clear definition of the purpose of the assessment, a description of the constructs to be assessed, and the population to be assessed, as well as how the scores are to be interpreted and used.

The *Standards* identify five kinds of evidence that can provide support for score interpretations and uses:

1. Evidence based on test content
2. Evidence based on relations to other variables
3. Evidence based on response processes
4. Evidence based on internal structure
5. Evidence based on the consequences of testing

The next subsection defines the purpose of the CAA for Science, followed by a description and discussion of different kinds of validity evidence that have been gathered.

#### Design of the CAA for Science

##### Purpose

The CAA for Science is designed to assess students with the most significant cognitive disabilities whose IEP teams have designated the use of an alternate assessment on the statewide summative assessments.

The CAA for Science is designed to show how well students perform relative to the Science Core Content Connectors (Science Connectors), which were developed by the National Center and State Collaborative, California educators, ETS, and EdCount. These Science Connectors are content targets linked with the CA NGSS and yet are less complex than the CA NGSS, while focusing on the main academic content at each grade level or the high school grade band.

##### The Constructs to Be Measured

The Science Connectors provide learning goals aligned appropriately with the needs of students with the most significant cognitive disabilities and serve as the basis for the state’s CA NGSS alternate summative assessments for eligible students. The Science Connectors identify priorities to guide instruction for students in this population and for the alternate assessment.

The CAA for Science test blueprint is used to define the measurement of the Science Connectors (CDE, 2018a). The Science Connectors provide an operational definition of the construct to which each set of standards refers and define the following:

* Subject to be assessed
* Tasks to be presented
* Administration instructions to be given
* Rules used to score student responses

The test blueprint controls as many aspects of the measurement procedure as possible so that the testing conditions will remain the same over test administrations (Cronbach, 1971) to minimize construct-irrelevant score variance (Messick, 1989).

ETS developed all CAA for Science test items to conform to the SBE-approved Science Connectors and test blueprint.

##### The Intended Test Population

Only eligible students may participate in the administration of the CAA for Science, as described in [*5.1.1 Student Test-Taking Requirements*](#_Student_Test-Taking_Requirements_3). Any student identified for alternate testing in grades five and eight and in the high school grade band (i.e., grade ten, eleven, or twelve [if the student is not repeating grade twelve]) takes the CAA for Science. IEP teams “shall determine when a child with a significant cognitive disability shall participate in an alternate assessment aligned with the alternate academic achievement standards.”[[6]](#footnote-7)

#### Content

Evidence based on test content refers to traditional forms of content validity evidence, such as the rating of test specifications and test items (Crocker, Miller, & Franks, 1989; Sireci, 1998), as well as alignment methods for educational tests that evaluate the interactions between curriculum frameworks, testing, and instruction (Rothman, Slattery, Vranek, & Resnick, 2002; Bhola, Impara, & Buckendahl, 2003; Martone & Sireci, 2009).

*[Chapter 4: Test Assembly](#_Test_Assembly_1)* contains information on which the test forms administered in 2022–23 were built.

##### Description of the State Alternate Standards

The CAA for Science is aligned with the Science Connectors. The Science Connectors illustrate the necessary knowledge and skills needed to reach the learning targets for each grade level and the high school grade band. They also identify priorities to guide the instruction for students in this population and for the alternate assessment (CDE, 2018b).

##### Embedded Performance Task and Item Specifications

Item specifications describe the characteristics of items that are written to measure each content standard. The item specifications for science are described in [*Chapter 3: Item Development and Review*](#_Item_Development_and).

##### Test Blueprint

The CAA for Science test blueprint describes the content of the CAA for Science for all grade levels and the high school grade band tested and how that content is assessed (CDE, 2018a). The test blueprint addresses the core content domains; the Science Connectors, as derived from the CA NGSS; and the essential understanding for each standard. A description of the test blueprint is provided in [*Chapter 4: Test Assembly*](#_Test_Assembly_1).

##### Form Assembly Process

The content standards and blueprint are the basis for choosing items for each assessment. Additionally, item difficulty and the content complexity of items are provided to evaluate the statistical characteristics of test forms. Refer to [*Chapter 4: Test Assembly*](#_Test_Assembly_1) for information on the test assembly process.

#### Response Processes

Validity evidence based on response processes refers to “evidence concerning the fit between the construct and the detailed nature of performance or response actually engaged in by students” (AERA et al., 2014, p. 12). This type of evidence generally includes documentation of activities such as

* systematic observations of test response behavior;
* showing of the relationships of items intended to require demonstrations or applications of knowledge and skills to other measures that require similar levels of cognitive complexity in the content (i.e., teacher ratings of student performance); and
* evaluation of the reasoning processes students employ when solving test items (Embretson, 1983; Messick, 1989).

This type of evidence is used to confirm that the CAA for Science is measuring the cognitive skills that are intended as the objects of measurement and that these skills are used by students to respond to the items. For example, the survey questions administered after each embedded PT were analyzed as part of the research agenda, with the goal of understanding the CAA for Science embedded PTs.

This subsection describes analyses performed after each CAA for Science administration.

##### Response Time Analyses

Testing time for each administration can be evaluated for consistency by examining the expected response processes for the items presented to students. Refer to section [*8.5 Response Time Analyses*](#_Testing_Time_Analyses_3) for more information regarding the response time analyses conducted following the 2022–23 CAA for Science administration.

##### Analysis of Student Engagement

The relationship between test engagement (as reported by test examiners in the test examiner survey) and students’ performance on the CAA for Science can provide additional information on the students’ testing experience. The minimal levels of engagement for some students could be related to whether students could comprehend the test content while testing or whether the students had the opportunity to learn the content prior to testing. The students’ familiarity with the content or tasks would also impact the students’ level of engagement. Some students might be more engaged with familiar content, while other students might be more engaged when the content or task is unique (i.e., a novel experience). Refer to [*Chapter 10: Test Examiner Survey*](#_Test_Examiner_Survey_2) for summary results of the test examiner survey.

#### Internal Structure

Internal structure evidence evaluates the strength or salience of the major dimensions underlying an assessment using indices of measurement precision such as DIF analyses, test reliability, and SEMs.

Descriptions are based on analyses conducted after a typical test administration.

##### Differential Item Functioning

DIF analyses were conducted to assess differences in the item performance of groups of students who differ in their demographic characteristics. Refer to section [*8.3 Differential Item Functioning Analyses*](#_Differential_Item_Functioning) for a description of the DIF analyses.

##### Overall Reliability Estimates

The results of reliability analyses on the theta scores and scale score for each assessment are presented in subsection [*8.6.5 Conditional Standard Errors of Measurement*](#_Conditional_Standard_Errors).

##### Student Group Reliability Estimates

The reliability data was examined for various student groups that differ in their demographic characteristics within the student population. The characteristics considered are gender, ethnicity, economic status, migrant status, English language fluency, primary disability type, foster youth status, whether the student used an accommodation, whether the student used a designated support, and ethnicity by economic status (refer to table 7.5 for the demographic student groups reported). Table 8.G.1 through table 8.G.6 in [appendix 8.G](#_Appendix_8.G:_Reliability_1) present the reliability and SEM by student group for each grade level or the high school grade band.

#### Relations to Other Variables

Evidence based on relations to other variablescan be evaluated using the correlation between the CAA for Science assessment results and the CAAs for ELA and mathematics scores, as both target the same student population, and a large number of students take both annually. This type of evidence is essential for supporting the validity of certain inferences based on scores from the CAA for Science.

Table 8.H.1 and table 8.H.2 in [appendix 8.H](#_Appendix_8.H:_Validity_1) present the relationship between the CAA for Science scale scores and the CAAs for ELA and mathematics scale scores for all students in grades five, eight, and eleven. For the 2022–23 CAA for Science administration, the correlations between CAA for Science scale scores and CAAs for ELA and mathematics scale scores range from 0.67 to 0.74 for the three ELA assessments and from 0.57 to 0.68 for the three mathematics assessments, all with large effect sizes (Cohen, 1988). All correlations are significant, with p < 0.01. Results show a strong correlation between CAA for Science scale scores and CAAs for ELA and mathematics scale scores.

Table 8.H.3 through table 8.H.16 present the relationship between the CAA for Science scale scores and the CAAs for ELA and mathematics scale scores summarized by the student groups that differ in their demographic characteristics within the student population. The characteristics considered are gender, ethnicity, economic status, migrant status, English language fluency, disability group, and foster youth status (refer to table 7.5 for the demographic student groups reported). For most student groups with at least 100 students per grade level or within the high school grade band, the correlation between the CAA for Science scale scores and the CAAs for ELA and mathematics scale scores ranged from 0.50 and 0.80.

### References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing.* Washington, DC: American Educational Research Association.

Bhola, D. S., Impara, J. C., & Buckendahl, C. W. (2003). Aligning tests with states’ content standards: Methods and issues. *Educational Measurement: Issues and Practice, 22,* 21–‍29.

Cai, L. (2017). FlexMIRT®: *Flexible multilevel, multidimensional item analysis and test scoring* (Version 3.5) [computer software]. Chapel Hill, NC: Vector Psychometric Group.

California Department of Education. (2018a). *California Alternate Assessment for Science blueprint*. California Department of Education website.

California Department of Education. (2018b). *California Next Generation Science Standards Core Content Connectors for alternate assessments.* California Department of Education website.

California Department of Education. (2022). *Science test administration for high school students.* Sacramento, CA: California Department of Education.

California Department of Education. (2023). *Alternate assessment decision-making tool for California.* Sacramento, CA: California Department of Education.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* New York, NY: Routledge.

Crocker, L. & Algina, J. (1986). *Introduction to classical and modern test theory*. New York, NY: Holt.

Crocker, L. M., Miller, D., & Franks, E. A. (1989). Quantitative methods for assessing the fit between test and curriculum. *Applied Measurement in Education, 2,* 179–94.

Cronbach, L. J. (1971). Test validation. In R. L. Thorndike (Ed.), *Educational measurement* (2nd ed.). Washington, DC: American Council on Education.

Dorans, N. J. (2013). ETS contributions to the quantitative assessment of item, test, and score fairness. *ETS Research Report Series*, i–38.

Dorans, N. J., & Holland, P. W. (1993). DIF detection and description: Mantel-Haenszel and standardization. In P. W. Holland & H. Wainer (Eds.), *Differential item functioning* (pp. 35–66). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Dorans, N. J., & Schmitt, A. P. (1993). Constructed response and differential item functioning: A pragmatic approach. In R. E. Bennett & W. C. Ward (Eds.), *Construction versus choice in cognitive measurement* (pp. 135–65). Hillsdale, NH: Lawrence Erlbaum Associates, Inc.

Educational Testing Service. (2014). *ETS standards for quality and fairness.* Princeton, NJ: Educational Testing Service.

Embretson (Whitley), S. (1983). Construct validity: construct representation versus nomothetic span. *Psychological Bulletin, 93,* 179–97.

Feldt, L. S. & Brennan, R. L. (1989). Reliability. In R. L. Linn (Ed.), *Educational measurement* (3rd edition) (pp. 105–46). New York: Macmillan.

Glaser, R. (1963). Instructional technology and the measurement of learning outcomes. *American Psychologist,* 18. 519–32.

Green, B. F., Bock, R. D., Humphreys, L. G., Linn, R. L., & Reckase, M. D. (1984). Technical guidelines for assessing computerized adaptive tests. *Journal of Educational Measurement*, *21*(4), 347–60.

Haertel, E. H. (2006). Reliability. In R. L. Brennan (Ed.), *Educational measurement* (4th ed., pp. 65–110). Washington, DC: American Council on Education and National Council on Measurement in Education.

Holland, P. W., & Thayer, D. T. (1985). *An alternative definition of the ETS delta scale of item difficulty* (Research Report 85–43). Princeton, NJ: Educational Testing Service.

Holland, P. W., & Wainer, H. (1993). *Differential item functioning*. Hillsdale, NJ: Erlbaum.

Huynh, H. (2000, June). *Guidelines for Rasch linking for PACT*. Memorandum to Paul Sandifer on June 18, 2000. Columbia, SC: Available from Author.

Huynh, H., & Rawls, A. (2009). A comparison between robust z and 0.3-logit difference procedures in assessing stability of linking items for the Rasch model. In Everett V. Smith Jr. & Greg E. Stone (Eds.) *Applications of Rasch Measurement in Criterion-Reference Testing: Practice Analysis to Score Reporting.* Maple Grove, MN: JAM Press.

Kane, M. (2006). Validation. In R. L. Brennan (Ed.), *Educational measurement* (4th ed., pp. 17–64). Washington, DC: American Council on Education/Praeger.

Kolen, M. J., & Brennan, R. L. (2004). *Test equating, linking, and scaling: Methods and practices* (2nd ed.). New York, NY: Springer-Verlag.

Livingston, S. A. & Lewis, C. (1995). Estimating the consistency and accuracy of classification based on test scores. *Journal of Educational Measurement, 32*, 179–97.

Mantel, N. (1963). Chi-square tests with one degree of freedom: Extensions of the Mantel-Haenszel procedure. *Journal of the American Statistical Association*, *58*, 690–700.

Mantel, N. & Haenszel, W. (1959). Statistical aspects of the analyses of data from retrospective studies of disease. *Journal of the National Cancer Institute,* *22*, 719–48.

Martone, A., & Sireci, S. G. (2009). Evaluating alignment between curriculum, assessments, and instruction. *Review of Educational Research, 4,* 1332–61.

Masters, G. N. (1982). A Rasch model for partial credit scoring. *Psychometrika, 47*(2), 149–‍74.

Messick, S. (1989). Validity. In R. Linn (Ed.), *Educational measurement* (3rd ed.). Washington, DC: American Council on Education.

Muraki, E. (1992). A generalized partial credit model: Application of an EM algorithm. *Applied Psychological Measurement, 16*, 159–76.

Olsson, U., Drasgow, F., & Dorans, N. J. (1982). The polyserial correlation coefficient. *Psychometrika, 47*, 337–47.

Rothman, R., Slattery, J. B., Vranek, J. L., & Resnick, L. B. (2002). *Benchmarking and alignment of standards and testing* [Technical Report 566]. Washington, DC: Center for the Study of Evaluation.

Sireci, S. G. (1998). Gathering and analyzing content validity data. *Educational Assessment, 5,* 299–321.

Stocking, M. L. (1996). An alternative method for scoring adaptive tests. *Journal of Educational and Behavioral Statistics, 21*, 365–89.

Zwick, R., Thayer, D. T., & Mazzeo, J. (1997). Descriptive and inferential procedures for assessing differential item functioning in polytomous items. *Applied Measurement in Education, 10*(4), 321–44.

### Accessibility Information

#### Alternative Text for Equation 8.1

p value sub dich equals the fraction with the numerator the sum from j equals 1 to J sub i of X sub ij and the denominator J sub i end fraction. *(Return to* [*equation 8.1*](#EQ8_1)*.)*

#### Alternative Text for Equation 8.2

p value sub poly equals the fraction with the numerator the sum from j equals 1 to J sub i of X sub ij and the denominator J sub i times M sub i end fraction. *(Return to* [*equation 8.2*](#EQ8_2)*.)*

#### Alternative Text for Equation 8.3

r sub polyreg equals the fraction beta-hat times s sub tot divided by the square root of beta-hat squared times s squared sub tot plus 1. *(Return to* [*equation 8.3*](#EQ8_3)*.)*

#### Alternative Text for Equation 8.4

alpha sub MH equals the numerator open parenthesis the sum from m equals 1 to M of R sub rm times W sub fm divided by N sub tm close parenthesis divided by the denominator open parenthesis the sum from m equals 1 to M of R sub fm times W sub rm divided by N sub tm closed parenthesis. *(Return to* [*equation 8.4*](#EQ8_4)*.)*

#### Alternative Text for Equation 8.5

MH D-DIF equals negative 2.35 times the natural logarithm open bracket alpha sub MH close bracket. *(Return to* [*equation 8.5*](#EQ8_5)*.)*

#### Alternative Text for Equation 8.6

SMD equals the fraction with numerator the sum from m equals 1 to M of N sub fm times E sub fm and denominator the sum from m equals 1 to M of N sub fm end fraction minus the fraction with numerator the sum from m equals 1 to M of N sub fm times E sub rm and denominator the sum from m equals 1 to M of N sub fm end fraction equals the fraction with the numerator the sum from m equals 1 to M of D sub fm and the denominator m equals1 to M of N sub fm end fraction. *(Return to* [*equation 8.6*](#EQ8_6)*.)*

#### Alternative Text for Equation 8.7

p sub ih of theta-hat sub j equals the numerator exp open parenthesis the sum from v equals 1 to h of D times a sub i open parenthesis theta-hat sub j minus b sub i plus d sub iv close parenthesis close parenthesis divided by the denominator open parenthesis 1 plus the sum from c equals 1 to m sub i exp open parenthesis the sum from v equals 1 to c of D times a sub i open parenthesis theta-hat sub j minus b sub i plus d sub iv close parenthesis close parenthesis close parenthesis, if score h equals 1, 2, …, n sub i.

p sub ih of theta-hat sub j equals 1 divided by the denominator open parenthesis 1 plus the sum from c equals 1 to m sub i exp open parenthesis the sum from v equals 1 to c of D times a sub i open parenthesis theta-hat sub j minus b sub i plus d sub iv close parenthesis close parenthesis close parenthesis, if score h equals 0. *(Return to* [*equation 8.7*](#EQ8_7)*.)*

#### Alternative Text for Equation 8.8

z equals the numerator open absolute symbol, D subtracts Md sub D, close absolute symbol, divided by the denominator of 0.74 times IQR. *(Return to* [*equation 8.8*](#EQ8_8)*.)*

#### Alternative Text for Equation 8.9

epsilon of theta equals the sum from i equals 1 to n sub dich of P sub i of theta plus the sum from j equals 1 to n sub poly over each sum of x equals 1 to m of s sub xj times P sub xj of theta. *(Return to* [*equation 8.9*](#EQ8_9)*.)*

#### Alternative Text for Equation 8.10

SS sub j equals A times theta-hat plus B. *(Return to* [*equation 8.10*](#EQ8_10)*.)*

#### Alternative Text for Equation 8.11

A equals the numerator SS sub Level 3 minus SS sub Level 2 divided by the denominator theta-hat sub Level 3 minus theta-hat sub Level 2. *(Return to* [*equation 8.11*](#EQ8_11)*.)*

#### Alternative Text for Equation 8.12

B equals scale score sub Level 3 minus theta-hat sub Level 3 multiplied by the numerator open parentheses scale score sub Level 3 minus scale score sub Level 2 divided by the denominator theta-hat sub Level 3 minus theta-hat sub Level 2 close parentheses. *(Return to* [*equation 8.12*](#EQ8_12)*.)*

#### Alternative Text for Equation 8.13

rho sub theta-hat prime equals 1 minus the fraction with the numerator sum from j equals 1 to J of CSEM squared sub theta-hat sub j divided by the denominator J times s squared sub theta-hat. *(Return to* [*equation 8.13*](#EQ8_13)*.)*

#### Alternative Text for Equation 8.14

SEM sub scaled equals A times s sub theta-hat times the square root of 1 minus rho sub theta-hat prime. *(Return to* [*equation 8.14*](#EQ8_14)*.)*

#### Alternative Text for Equation 8.15

CSEM of theta-hat sub j equals 1 divided by the square root of I of theta sub j. *(Return to* [*equation 8.15*](#EQ8_15)*.)*

#### Alternative Text for Equation 8.16

I of theta-hat sub j equals the sum from i equals 1 to I of I sub i of theta-hat sub j. *(Return to* [*equation 8.16*](#EQ8_16)*.)*

#### Alternative Text for Equation 8.17

I sub i of theta-hat sub j equals open bracket s sub i2 of theta-hat sub j minus s sub i squared of theta-hat sub j. *(Return to* [*equation 8.17*](#EQ8_17)*.)*

#### Alternative Text for Equation 8.18

s sub i of theta-hat sub j equals the sum from h equals 0 to M sub i of h times p sub ih of theta-hat sub j. *(Return to* [*equation 8.18*](#EQ8_18)*.)*

#### Alternative Text for Equation 8.19

s sub i2 of theta-hat sub j equals the sum from h equals 0 to M sub I of h squared times p sub ih of theta-hat sub j. *(Return to* [*equation 8.19*](#EQ8_19)*.)*

#### Alternative Text for Equation 8.20

CSEM of SS sub j equals A times CSEM of theta-hat sub j. *(Return to* [*equation 8.20*](#EQ8_20)*.)*

### Appendix 8.A: Test-Taking Rates

Table 8.A.1 CAA for Science Test-Taking Rates by Student Group, Grade Five

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **Number of Students Registered** | **Number of Test Takers** | **Test Takers as a Percent of Students Registered** |
| All students | 5,785 | 4,954 | 85.6 |
| Male | 3,970 | 3,407 | 85.8 |
| Female | 1,815 | 1,547 | 85.2 |
| Nonbinary | 0 | 0 | N/A |
| American Indian or Alaska Native | 33 | 29 | 87.9 |
| Asian | 545 | 467 | 85.7 |
| Native Hawaiian or Other Pacific Islander | 18 | 15 | 83.3 |
| Filipino | 178 | 156 | 87.6 |
| Hispanic or Latino | 3,284 | 2,874 | 87.5 |
| Black or African American | 442 | 381 | 86.2 |
| White | 989 | 782 | 79.1 |
| Two or more races | 296 | 250 | 84.5 |
| Ethnicity unknown | 0 | 0 | N/A |
| English only | 3,632 | 3,048 | 83.9 |
| IFEP | 49 | 46 | 93.9 |
| EL | 1,482 | 1,297 | 87.5 |
| RFEP | 618 | 562 | 90.9 |
| ADEL | 0 | 0 | N/A |
| To be determined | 3 | 0 | N/A |
| English proficiency unknown | 1 | 1 | 100.0 |
| Intellectual disability | 1,843 | 1,642 | 89.1 |
| Hearing impairment | 35 | 29 | 82.9 |
| Speech or language impairment | 85 | 70 | 82.4 |
| Visual impairment | 16 | 10 | 62.5 |
| Emotional disturbance | 21 | 18 | 85.7 |
| Orthopedic impairment | 94 | 78 | 83.0 |
| Other health impairment | 310 | 253 | 81.6 |
| Specific learning disability | 176 | 161 | 91.5 |
| Deaf-blindness | 2 | 2 | 100.0 |
| Multiple disabilities | 426 | 312 | 73.2 |
| Autism | 2,756 | 2,365 | 85.8 |
| Traumatic brain injury | 21 | 14 | 66.7 |
| Not economically disadvantaged | 2,071 | 1,691 | 81.7 |
| Economically disadvantaged | 3,714 | 3,263 | 87.9 |
| Migrant education | 34 | 32 | 94.1 |
| Not migrant education | 5,751 | 4,922 | 85.6 |
| Foster youth | 57 | 55 | 96.5 |
| Not foster youth | 5,728 | 4,899 | 85.5 |

Table 8.A.2 CAA for Science Test-Taking Rates by Student Group, Grade Eight

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **Number of Students Registered** | **Number of Test Takers** | **Test Takers as a Percent of Students Registered** |
| All students | 5,626 | 4,672 | 83.0 |
| Male | 3,828 | 3,190 | 83.3 |
| Female | 1,798 | 1,482 | 82.4 |
| Nonbinary | 0 | 0 | N/A |
| American Indian or Alaska Native | 33 | 29 | 87.9 |
| Asian | 474 | 364 | 76.8 |
| Native Hawaiian or Other Pacific Islander | 27 | 21 | 77.8 |
| Filipino | 152 | 120 | 78.9 |
| Hispanic or Latino | 3,226 | 2,810 | 87.1 |
| Black or African American | 447 | 363 | 81.2 |
| White | 1,009 | 771 | 76.4 |
| Two or more races | 258 | 194 | 75.2 |
| Ethnicity unknown | 0 | 0 | N/A |
| English only | 3,297 | 2,638 | 80.0 |
| IFEP | 44 | 36 | 81.8 |
| EL | 1,213 | 1,037 | 85.5 |
| RFEP | 1,071 | 960 | 89.6 |
| ADEL | 0 | 0 | N/A |
| To be determined | 0 | 0 | N/A |
| English proficiency unknown | 1 | 1 | 100.0 |
| Intellectual disability | 2,041 | 1,762 | 86.3 |
| Hearing impairment | 44 | 39 | 88.6 |
| Speech or language impairment | 32 | 26 | 81.3 |
| Visual impairment | 14 | 9 | 64.3 |
| Emotional disturbance | 22 | 15 | 68.2 |
| Orthopedic impairment | 104 | 81 | 77.9 |
| Other health impairment | 289 | 242 | 83.7 |
| Specific learning disability | 231 | 203 | 87.9 |
| Deaf-blindness | 6 | 3 | 50.0 |
| Multiple disabilities | 474 | 316 | 66.7 |
| Autism | 2,339 | 1,953 | 83.5 |
| Traumatic brain injury | 30 | 23 | 76.7 |
| Not economically disadvantaged | 1,938 | 1,496 | 77.2 |
| Economically disadvantaged | 3,688 | 3,176 | 86.1 |
| Migrant education | 23 | 23 | 100.0 |
| Not migrant education | 5,603 | 4,649 | 83.0 |
| Foster youth | 62 | 49 | 79.0 |
| Not foster youth | 5,564 | 4,623 | 83.1 |

Table 8.A.3 CAA for Science Test-Taking Rates by Student Group, High School

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **Number of Students Registered** | **Number of Test Takers** | **Test Takers as a Percent of Students Registered** |
| All students | 6,884 | 4,947 | 71.9 |
| Male | 4,572 | 3,287 | 71.9 |
| Female | 2,308 | 1,659 | 71.9 |
| Nonbinary | 4 | 1 | 25.0 |
| American Indian or Alaska Native | 36 | 21 | 58.3 |
| Asian | 563 | 397 | 70.5 |
| Native Hawaiian or Other Pacific Islander | 27 | 16 | 59.3 |
| Filipino | 208 | 146 | 70.2 |
| Hispanic or Latino | 3,958 | 2,988 | 75.5 |
| Black or African American | 574 | 388 | 67.6 |
| White | 1,263 | 827 | 65.5 |
| Two or more races | 255 | 164 | 64.3 |
| Ethnicity unknown | 0 | 0 | N/A |
| English only | 3,782 | 2,647 | 70.0 |
| IFEP | 74 | 51 | 68.9 |
| EL | 1,335 | 930 | 69.7 |
| RFEP | 1,693 | 1,319 | 77.9 |
| ADEL | 0 | 0 | N/A |
| To be determined | 0 | 0 | N/A |
| English proficiency unknown | 0 | 0 | N/A |
| Intellectual disability | 2,867 | 2,129 | 74.3 |
| Hearing impairment | 74 | 53 | 71.6 |
| Speech or language impairment | 26 | 19 | 73.1 |
| Visual impairment | 22 | 11 | 50.0 |
| Emotional disturbance | 43 | 24 | 55.8 |
| Orthopedic impairment | 168 | 104 | 61.9 |
| Other health impairment | 262 | 175 | 66.8 |
| Specific learning disability | 294 | 207 | 70.4 |
| Deaf-blindness | 3 | 2 | 66.7 |
| Multiple disabilities | 602 | 401 | 66.6 |
| Autism | 2,470 | 1,783 | 72.2 |
| Traumatic brain injury | 51 | 39 | 76.5 |
| Not economically disadvantaged | 2,403 | 1,589 | 66.1 |
| Economically disadvantaged | 4,481 | 3,358 | 74.9 |
| Migrant education | 36 | 27 | 75.0 |
| Not migrant education | 6,848 | 4,920 | 71.8 |
| Foster youth | 76 | 50 | 65.8 |
| Not foster youth | 6,808 | 4,897 | 71.9 |

### Appendix 8.B: Classical Item Analyses

**Note 1:** In table 8.B.1 through table 8.B.6, the value in the *Item Use* column indicates the item use for analysis. Refer to table A.1 for descriptions of these values.

Table A.1 Item Use Value Descriptions

|  |  |
| --- | --- |
| **Item Use** | **Description** |
| O | Operational performance task items |
| P | Field test performance task items |

**Note 2:** Items with poor statistics are flagged. Refer to the table, next, for a description of each flag and possible values that will appear in the *Flag* column in table 8.B.1 through table 8.B.3. These are described in table A.2.

Table A.2 Item Analyses Flag and Possible Value Descriptions

|  |  |  |
| --- | --- | --- |
| **Flag** | **Description** | **Criteria** |
| A | Measured by a *p*-value, which is the proportion correct for dichotomous items and proportion of the possible maximum points earned for polytomous items (Items that are too difficult are flagged.) | * *p*-value < 0.5 for two-choice dichotomous single-select items * *p*-value < 0.3 for three-choice dichotomous single-select items * *p*-value < 0.2 for other items |
| H | Measured by a *p*-value, which is the proportion correct for dichotomous items and proportion of the possible maximum points earned for polytomous items (Items that are too easy are flagged.) | * *p*-value > 0.95 for dichotomous items * *p*-value > 0.8 for polytomous items |
| Rpoly | Measured by item-total correlation, which indicates whether the item discriminates effectively between high- and low-ability students | Polyserial correlation < 0.20 |
| P | Measured by the distractor-total score correlation (, which indicates how well the distractor effectively discriminates the high- and low-ability students | * Distractor-total score correlation > 0 * Distractor-total score correlation ≤ 0 but not significantly different from 0 |
| O | Omit or nonresponse rate that is not by design | * Omit or nonresponse rate > 5% for dichotomous multiple-choice, single-select items * Omit or nonresponse rate > 15% for other items |
| L | Percentage of students receiving a score category for polytomous items | Percentage of students receiving a score category < 3% |
| D | Measured by comparing the proportion of the high-ability student group (i.e., the top 20 percent of students) selecting a distractor or the key | A higher proportion of the high-ability student group selecting a distractor instead of selecting the key |

**Note 3:** Items that are not flagged are indicated with “[no flag]” in the *Flag* column in table 8.B.1 through table 8.B.3.

**Note 4:** The item types for items on the CAA for Science include the following:

* Multiple choice single select (MCSS)
* Multiple choice multiple select (MCMS)
* Match single select (MatchSS)
* Match multiple select (MatchMS)
* Grid single select (GridSS)
* Grid multiple select (GridMS)
* Composite objective

Table 8.B.1 AIS and Polyserial for Grade Five

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Use** | **AIS** | **Polyserial** | **Flag** | **Maximum Score Points** | **Item Type** |
| CNAE19S008187 | O | 0.83 | 0.56 | [no flag] | 1 | MCSS–Member |
| CNAE21D011122 | P | 0.79 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAE19S008185 | O | 0.76 | 0.55 | [no flag] | 1 | MCSS–Member |
| CNAE21D011120 | P | 0.75 | 0.54 | [no flag] | 1 | MCSS–Discrete |
| CNAE19S008190 | O | 0.41 | 0.33 | [no flag] | 1 | MCSS–Member |
| CNAE21D011125 | P | 0.52 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAE19S008189 | O | 0.49 | 0.47 | [no flag] | 1 | MCSS–Member |
| CNAE21D011123 | P | 0.52 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAE19S008191 | O | 1.16 | 0.66 | [no flag] | 2 | CompositeObjective–Member |
| CNAE21D011127 | P | 1.28 | 0.67 | [no flag] | 2 | MCMS–Member |
| CNAE21D009019 | P | 0.49 | 0.16 | A Rpoly | 1 | MCSS–Discrete |
| CNAE21D010228 | O | 0.70 | 0.75 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D009021 | P | 0.77 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D010227 | O | 0.78 | 0.67 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D009022 | P | 0.51 | 0.42 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D010230 | O | 0.43 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D009024 | P | 0.46 | 0.37 | [no flag] | 1 | MCSS–Member |
| CNAE21D010232 | O | 0.53 | 0.64 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D009025 | P | 0.88 | 0.15 | P Rpoly | 2 | MCMS–Discrete |
| CNAE21D010234 | O | 1.16 | 0.67 | [no flag] | 2 | MCMS–Member |
| CNAE19S004298 | O | 0.83 | 0.72 | [no flag] | 1 | MCSS–Member |
| CNAE19S004299 | O | 0.75 | 0.66 | [no flag] | 1 | MCSS–Member |
| CNAE19S004302 | O | 0.53 | 0.40 | [no flag] | 1 | MatchSS–Discrete |
| CNAE19S004301 | O | 0.76 | 0.77 | [no flag] | 1 | MCSS–Member |
| CNAE19S004304 | O | 1.06 | 0.43 | [no flag] | 2 | MCMS–Member |
| CNAE20D005039 | O | 0.62 | 0.57 | [no flag] | 1 | MCSS–Member |
| CNAE20D005038 | O | 0.73 | 0.73 | [no flag] | 1 | MCSS–Discrete |
| CNAE20D005034 | O | 0.43 | 0.46 | [no flag] | 1 | MCSS–Discrete |
| CNAE20D005033 | O | 0.68 | 0.50 | [no flag] | 1 | MatchSS–Member |
| CNAE20D005036 | O | 0.98 | 0.71 | [no flag] | 2 | CompositeObjective–Member |
| CNAE20D007041 | O | 0.52 | 0.17 | Rpoly | 1 | MCSS–Member |
| CNAE20D007043 | O | 0.69 | 0.56 | [no flag] | 1 | MCSS–Member |
| CNAE20D007045 | O | 0.32 | 0.47 | [no flag] | 1 | MCSS–Member |
| CNAE20D007046 | O | 0.35 | 0.34 | [no flag] | 1 | MCSS–Member |
| CNAE20D007047 | O | 0.62 | 0.41 | [no flag] | 2 | CompositeObjective–Member |
| CNAE19S007170 | O | 0.81 | 0.73 | [no flag] | 1 | MCSS–Member |
| CNAE19S007171 | O | 0.76 | 0.67 | [no flag] | 1 | MCSS–Member |
| CNAE19S007172 | O | 0.63 | 0.75 | [no flag] | 1 | GridSS–Discrete |
| CNAE19S007174 | O | 0.66 | 0.64 | [no flag] | 1 | MCSS–Discrete |
| CNAE19S007176 | O | 1.44 | 0.78 | [no flag] | 2 | GridMS–Discrete |
| CNAE21D011121 | P | 0.81 | 0.54 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D011126 | P | 1.12 | 0.54 | [no flag] | 2 | MCMS–Discrete |
| CNAE21D009020 | P | 0.72 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D010229 | O | 0.64 | 0.64 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D009027 | P | 0.76 | 0.37 | D | 2 | CompositeObjective–Member |
| CNAE20D005037 | O | 0.87 | 0.76 | [no flag] | 1 | MCSS–Discrete |
| CNAE20D005040 | O | 0.56 | 0.59 | O | 1 | MatchSS–Member |
| CNAE20D007042 | O | 0.82 | 0.68 | [no flag] | 1 | MCSS–Member |
| CNAE20D007044 | O | 0.72 | 0.73 | [no flag] | 1 | MCSS–Member |
| CNAE20D014105 | P | 0.66 | 0.50 | [no flag] | 1 | MCSS–Member |
| CNAE20D014106 | P | 0.72 | 0.51 | [no flag] | 1 | MCSS–Member |
| CNAE20D014109 | P | 0.34 | 0.40 | [no flag] | 1 | MCSS–Member |
| CNAE20D014110 | P | 0.63 | 0.62 | [no flag] | 1 | MCSS–Discrete |
| CNAE20D014111 | P | 1.12 | 0.58 | [no flag] | 2 | CompositeObjective–Member |
| CNAE21D012131 | P | 0.45 | 0.04 | A D P Rpoly | 1 | MCSS–Discrete |
| CNAE21D013191 | O | 0.71 | 0.47 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D012129 | P | 0.61 | 0.36 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D013192 | O | 0.48 | 0.38 | A | 1 | MCSS–Discrete |
| CNAE21D012132 | P | 0.41 | 0.29 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D013195 | O | 0.37 | 0.38 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D012133 | P | 0.42 | 0.35 | O | 1 | MCSS–Discrete |
| CNAE21D013196 | O | 0.19 | −0.06 | A D P Rpoly | 1 | MCSS–Discrete |
| CNAE21D012135 | P | 0.70 | 0.57 | [no flag] | 2 | MatchMS–Discrete |
| CNAE21D013199 | O | 1.06 | 0.50 | P | 2 | MatchMS–Discrete |
| CNAE21D002012 | O | 0.74 | 0.69 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D002010 | O | 0.68 | 0.58 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D002014 | O | 0.60 | 0.66 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D002013 | O | 0.69 | 0.72 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D002016 | O | 1.42 | 0.71 | [no flag] | 2 | MCMS–Discrete |
| CNAE20D009058 | O | 0.68 | 0.70 | [no flag] | 1 | MCSS–Member |
| CNAE20D009059 | O | 0.76 | 0.76 | [no flag] | 1 | MCSS–Member |
| CNAE20D009062 | O | 0.50 | 0.54 | [no flag] | 1 | MCSS–Member |
| CNAE20D009060 | O | 0.57 | 0.62 | [no flag] | 1 | MCSS–Member |
| CNAE20D009063 | O | 1.30 | 0.70 | [no flag] | 2 | MCMS–Member |
| CNAE20D014107 | P | 0.82 | 0.58 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D012130 | P | 0.58 | 0.29 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D013193 | O | 0.76 | 0.53 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D013194 | O | 0.59 | 0.57 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D012378 | P | 0.46 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D012136 | P | 1.00 | 0.46 | [no flag] | 2 | CompositeObjective–Member |
| CNAE21D002011 | O | 0.74 | 0.66 | [no flag] | 1 | MCSS–Discrete |
| CNAE21D002015 | O | 0.52 | 0.53 | [no flag] | 1 | MCSS–Discrete |
| CNAE20D009061 | O | 0.67 | 0.79 | [no flag] | 1 | MCSS–Member |
| CNAE20D009064 | O | 1.24 | 0.65 | [no flag] | 2 | MCMS–Discrete |

Table 8.B.2 AIS and Polyserial for Grade Eight

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Use** | **AIS** | **Polyserial** | **Flag** | **Maximum Score Points** | **Item Type** |
| CNAM19S010488 | O | 0.72 | 0.66 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S010485 | O | 0.58 | 0.56 | [no flag] | 1 | MCSS–Member |
| CNAM19S010483 | O | 0.63 | 0.74 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S010487 | O | 0.62 | 0.74 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S010489 | O | 1.24 | 0.62 | [no flag] | 2 | MCMS–Discrete |
| CNAM20D013209 | O | 0.77 | 0.64 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D013210 | O | 0.77 | 0.70 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D013212 | O | 0.50 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S007452 | O | 0.66 | 0.71 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D013215 | O | 0.96 | 0.69 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAM19S002354 | O | 0.88 | 0.68 | [no flag] | 1 | MCSS–Member |
| CNAM21D003182 | P | 0.84 | 0.69 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S002356 | O | 0.90 | 0.75 | [no flag] | 1 | MCSS–Member |
| CNAM21D003184 | P | 0.88 | 0.69 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S002357 | O | 0.65 | 0.69 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D003187 | P | 0.47 | 0.43 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S002358 | O | 0.48 | 0.54 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D003185 | P | 0.45 | 0.30 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S002360 | O | 1.14 | 0.52 | [no flag] | 2 | CompositeObjective–Member |
| CNAM21D003188 | P | 0.72 | 0.54 | D | 2 | MatchMS–Discrete |
| CNAM20D002121 | O | 0.81 | 0.70 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D004137 | P | 0.79 | 0.64 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D002122 | O | 0.78 | 0.70 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D004139 | P | 0.67 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D002124 | O | 0.79 | 0.73 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D004142 | P | 0.56 | 0.51 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D002125 | O | 0.66 | 0.67 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D004141 | P | 0.43 | 0.17 | P Rpoly | 1 | MCSS–Discrete |
| CNAM20D002127 | O | 1.08 | 0.70 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAM20D004143 | P | 0.86 | 0.50 | [no flag] | 2 | CompositeObjective–Member |
| CNAM20D010185 | O | 0.86 | 0.60 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D010187 | O | 0.80 | 0.62 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D010190 | O | 0.49 | 0.67 | [no flag] | 1 | MCSS–Member |
| CNAM20D010189 | O | 0.60 | 0.63 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D010191 | O | 1.10 | 0.76 | [no flag] | 2 | CompositeObjective–Member |
| CNAM19S004380 | O | 0.77 | 0.71 | [no flag] | 1 | MCSS–Member |
| CNAM19S004378 | O | 0.68 | 0.56 | [no flag] | 1 | MCSS–Discrete |
| CNAM19S004379 | O | 0.68 | 0.56 | [no flag] | 1 | MCSS–Member |
| CNAM19S004384 | O | 0.50 | 0.63 | [no flag] | 1 | MCSS–Member |
| CNAM19S004385 | O | 1.24 | 0.65 | [no flag] | 2 | MCMS–Discrete |
| CNAM20D013213 | O | 0.53 | 0.53 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D013216 | O | 0.60 | 0.50 | D | 2 | MatchMS–Discrete |
| CNAM21D003186 | P | 0.46 | 0.45 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D003189 | P | 1.02 | 0.32 | D | 2 | MatchMS–Discrete |
| CNAM20D002123 | O | 0.82 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D004138 | P | 0.64 | 0.52 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D004140 | P | 0.57 | 0.58 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D002128 | O | 1.30 | 0.72 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAM20D004144 | P | 0.92 | 0.55 | [no flag] | 2 | CompositeObjective–Member |
| CNAM20D010188 | O | 0.71 | 0.85 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D010192 | O | 1.24 | 0.66 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAM21D011370 | O | 0.61 | 0.34 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D011369 | O | 0.54 | 0.18 | Rpoly | 1 | MCSS–Discrete |
| CNAM21D011373 | O | 0.74 | 0.63 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D011374 | O | 0.61 | 0.62 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D011377 | O | 1.16 | 0.78 | [no flag] | 2 | CompositeObjective–Member |
| CNAM21D001112 | P | 0.81 | 0.65 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D001113 | P | 0.84 | 0.74 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D001115 | P | 0.41 | 0.33 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D001114 | P | 0.55 | 0.32 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D001119 | P | 1.02 | 0.37 | P | 2 | MCMS–Discrete |
| CNAM21D002173 | P | 0.72 | 0.56 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D004236 | O | 0.85 | 0.75 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D002175 | P | 0.62 | 0.37 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D004238 | O | 0.82 | 0.66 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D002177 | P | 0.64 | 0.54 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D004240 | O | 0.63 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D002180 | P | 0.72 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D004241 | O | 0.77 | 0.74 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D002181 | P | 0.86 | 0.50 | [no flag] | 2 | CompositeObjective–Member |
| CNAM21D004242 | O | 0.76 | 0.47 | [no flag] | 2 | CompositeObjective–Member |
| CNAM20D007161 | O | 0.73 | 0.60 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D007162 | O | 0.83 | 0.74 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D007164 | O | 0.69 | 0.73 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D007165 | O | 0.74 | 0.66 | [no flag] | 1 | MCSS–Member |
| CNAM20D007168 | O | 1.20 | 0.73 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAM21D011371 | O | 0.57 | 0.36 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D011372 | O | 0.49 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D011376 | O | 1.02 | 0.63 | [no flag] | 2 | CompositeObjective–Member |
| CNAM21D001116 | P | 0.36 | 0.22 | P | 1 | MCSS–Discrete |
| CNAM21D001118 | P | 1.04 | 0.43 | P | 2 | MCMS–Discrete |
| CNAM21D002174 | P | 0.82 | 0.70 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D004237 | O | 0.86 | 0.73 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D002178 | P | 0.65 | 0.41 | [no flag] | 1 | MCSS–Discrete |
| CNAM21D004244 | O | 0.74 | 0.54 | [no flag] | 2 | CompositeObjective–Member |
| CNAM20D007163 | O | 0.57 | 0.38 | [no flag] | 1 | MCSS–Discrete |
| CNAM20D007166 | O | 0.53 | 0.64 | [no flag] | 1 | MCSS–Discrete |

Table 8.B.3 AIS and Polyserial for High School

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Use** | **AIS** | **Polyserial** | **Flag** | **Maximum Score Points** | **Item Type** |
| CNAH19S008209 | O | 0.75 | 0.64 | [no flag] | 1 | MCSS–Member |
| CNAH20D012313 | P | 0.82 | 0.68 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S008215 | O | 0.69 | 0.55 | [no flag] | 1 | MCSS–Member |
| CNAH20D012315 | P | 0.84 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S008211 | O | 0.72 | 0.71 | [no flag] | 1 | MCSS–Member |
| CNAH20D012317 | P | 0.76 | 0.71 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S008212 | O | 0.37 | 0.43 | [no flag] | 1 | MCSS–Member |
| CNAH20D012318 | P | 0.69 | 0.52 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S008214 | O | 0.88 | 0.50 | [no flag] | 2 | MCMS–Member |
| CNAH20D012319 | P | 1.32 | 0.75 | [no flag] | 2 | CompositeObjective–Member |
| CNAH20D009289 | O | 0.68 | 0.54 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D014330 | P | 0.72 | 0.53 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D009291 | O | 0.75 | 0.56 | [no flag] | 1 | MatchSS–Discrete |
| CNAH20D014331 | P | 0.49 | 0.36 | A | 1 | MCSS–Discrete |
| CNAH20D009292 | O | 0.52 | 0.29 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D014332 | P | 0.59 | 0.43 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D009293 | O | 0.28 | 0.34 | A | 1 | MCSS–Discrete |
| CNAH20D014334 | P | 0.59 | 0.40 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D009295 | O | 0.88 | 0.31 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAH20D014335 | P | 1.22 | 0.62 | [no flag] | 2 | CompositeObjective–Member |
| CNAH19S001009 | O | 0.89 | 0.72 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S001010 | O | 0.83 | 0.70 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S001011 | O | 0.73 | 0.76 | [no flag] | 1 | MCSS–Member |
| CNAH19S001015 | O | 0.66 | 0.71 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S001014 | O | 1.36 | 0.76 | [no flag] | 2 | MatchMS–Member |
| CNAH20D001225 | O | 0.59 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D001227 | O | 0.72 | 0.66 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D001229 | O | 0.51 | 0.62 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D001228 | O | 0.67 | 0.65 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D001231 | O | 1.10 | 0.77 | [no flag] | 2 | MatchMS–Discrete |
| CNAH21D007084 | O | 0.64 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D007085 | O | 0.68 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D007087 | O | 0.34 | 0.60 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D007089 | O | 0.41 | 0.40 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D007090 | O | 0.62 | 0.39 | D | 2 | CompositeObjective–Member |
| CNAH19S005077 | O | 0.79 | 0.67 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S005074 | O | 0.72 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S005075 | O | 0.69 | 0.63 | [no flag] | 1 | MCSS–Discrete |
| CNAH19S005078 | O | 0.64 | 0.77 | [no flag] | 1 | MCSS–Member |
| CNAH19S005080 | O | 1.16 | 0.62 | [no flag] | 2 | MCMS–Discrete |
| CNAH20D012314 | P | 0.72 | 0.40 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D012316 | P | 0.56 | 0.52 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D012320 | P | 1.12 | 0.40 | [no flag] | 2 | CompositeObjective–Member |
| CNAH20D009290 | O | 0.56 | 0.33 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D009294 | O | 0.44 | 0.21 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D014333 | P | 0.49 | 0.51 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D001230 | O | 0.45 | 0.59 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D001232 | O | 0.88 | 0.62 | [no flag] | 2 | CompositeObjective–Discrete |
| CNAH21D007086 | O | 0.62 | 0.49 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D007092 | O | 0.52 | 0.24 | D | 2 | CompositeObjective–Member |
| CNAH20D013322 | P | 0.79 | 0.66 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D013321 | P | 0.77 | 0.65 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D013324 | P | 0.63 | 0.62 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D013326 | P | 0.48 | 0.36 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D013328 | P | 1.20 | 0.61 | [no flag] | 2 | CompositeObjective–Member |
| CNAH20D010297 | O | 0.84 | 0.57 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D013326 | P | 0.66 | 0.47 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D010298 | O | 0.80 | 0.76 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D013325 | P | 0.61 | 0.18 | Rpoly | 1 | MCSS–Discrete |
| CNAH20D010301 | O | 0.60 | 0.55 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D013328 | P | 0.44 | 0.39 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D010300 | O | 0.37 | 0.48 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D013330 | P | 0.69 | 0.55 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D010304 | O | 1.32 | 0.69 | [no flag] | 2 | MatchMS–Discrete |
| CNAH21D013332 | P | 1.08 | 0.50 | [no flag] | 2 | CompositeObjective–Member |
| CNAH21D005263 | O | 0.69 | 0.69 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D005264 | O | 0.66 | 0.68 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D003244 | O | 0.45 | 0.63 | [no flag] | 1 | MCSS–Member |
| CNAH21D005268 | O | 0.60 | 0.72 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D005269 | O | 1.10 | 0.63 | [no flag] | 2 | CompositeObjective–Member |
| CNAH20D007274 | O | 0.65 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D007273 | O | 0.70 | 0.52 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D007276 | O | 0.56 | 0.41 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D007278 | O | 0.41 | 0.43 | [no flag] | 1 | MCSS–Member |
| CNAH20D007279 | O | 0.84 | 0.32 | D | 2 | CompositeObjective–Member |
| CNAH20D013323 | P | 0.79 | 0.70 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D013327 | P | 0.75 | 0.61 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D010299 | O | 0.81 | 0.75 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D010302 | O | 0.58 | 0.56 | [no flag] | 1 | MatchSS–Discrete |
| CNAH21D013329 | P | 0.51 | 0.54 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D010303 | O | 1.24 | 0.66 | [no flag] | 2 | MCMS–Discrete |
| CNAH21D013333 | P | 0.86 | 0.45 | [no flag] | 2 | CompositeObjective–Member |
| CNAH21D005265 | O | 0.71 | 0.62 | [no flag] | 1 | MCSS–Discrete |
| CNAH21D005271 | O | 1.06 | 0.66 | [no flag] | 2 | CompositeObjective–Member |
| CNAH20D007275 | O | 0.63 | 0.37 | [no flag] | 1 | MCSS–Discrete |
| CNAH20D007277 | O | 0.70 | 0.65 | [no flag] | 1 | MCSS–Member |
| CNAH20D007280 | O | 0.88 | 0.56 | [no flag] | 2 | CompositeObjective–Member |

**Note:** In table 8.B.4 through table 8.B.6, the columns *Score 0, Score 1,* and *Score 2* indicate the possible scores for the item.

Table 8.B.4 Distribution of Item Scores for Grade Five

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Use** | **Max Points** | **Score 0** | **Score 1** | **Score 2** | **Omit** | **N Total** |
| CNAE19S008187 | O | 1 | 15% | 83% | N/A | 2% | 4,339 |
| CNAE21D011122 | P | 1 | 19% | 79% | N/A | 2% | 1,053 |
| CNAE19S008185 | O | 1 | 23% | 76% | N/A | 2% | 4,339 |
| CNAE21D011120 | P | 1 | 23% | 75% | N/A | 2% | 2,035 |
| CNAE19S008190 | O | 1 | 56% | 41% | N/A | 2% | 4,339 |
| CNAE21D011125 | P | 1 | 46% | 52% | N/A | 1% | 2,035 |
| CNAE19S008189 | O | 1 | 48% | 49% | N/A | 2% | 4,339 |
| CNAE21D011123 | P | 1 | 46% | 52% | N/A | 2% | 2,035 |
| CNAE19S008191 | O | 2 | 18% | 44% | 36% | 3% | 4,339 |
| CNAE21D011127 | P | 2 | 11% | 44% | 43% | 3% | 1,053 |
| CNAE21D009019 | P | 1 | 48% | 49% | N/A | 3% | 1,053 |
| CNAE21D010228 | O | 1 | 26% | 70% | N/A | 3% | 1,053 |
| CNAE21D009021 | P | 1 | 21% | 77% | N/A | 2% | 2,035 |
| CNAE21D010227 | O | 1 | 19% | 78% | N/A | 3% | 2,035 |
| CNAE21D009022 | P | 1 | 46% | 51% | N/A | 3% | 2,035 |
| CNAE21D010230 | O | 1 | 53% | 43% | N/A | 5% | 2,035 |
| CNAE21D009024 | P | 1 | 49% | 46% | N/A | 4% | 2,035 |
| CNAE21D010232 | O | 1 | 42% | 53% | N/A | 4% | 2,035 |
| CNAE21D009025 | P | 2 | 20% | 64% | 12% | 3% | 1,053 |
| CNAE21D010234 | O | 2 | 16% | 45% | 36% | 4% | 2,035 |
| CNAE19S004298 | O | 1 | 15% | 83% | N/A | 2% | 4,339 |
| CNAE19S004299 | O | 1 | 22% | 75% | N/A | 2% | 4,339 |
| CNAE19S004302 | O | 1 | 44% | 53% | N/A | 3% | 4,339 |
| CNAE19S004301 | O | 1 | 22% | 76% | N/A | 2% | 4,339 |
| CNAE19S004304 | O | 2 | 16% | 57% | 24% | 3% | 4,339 |
| CNAE20D005039 | O | 1 | 35% | 62% | N/A | 3% | 2,034 |
| CNAE20D005038 | O | 1 | 25% | 73% | N/A | 3% | 1,053 |
| CNAE20D005034 | O | 1 | 53% | 43% | N/A | 4% | 2,034 |
| CNAE20D005033 | O | 1 | 27% | 68% | N/A | 5% | 1,053 |
| CNAE20D005036 | O | 2 | 26% | 39% | 30% | 5% | 2,033 |
| CNAE20D007041 | O | 1 | 46% | 52% | N/A | 2% | 2,035 |
| CNAE20D007043 | O | 1 | 29% | 69% | N/A | 2% | 1,053 |
| CNAE20D007045 | O | 1 | 64% | 32% | N/A | 4% | 2,035 |
| CNAE20D007046 | O | 1 | 61% | 35% | N/A | 4% | 1,053 |
| CNAE20D007047 | O | 2 | 45% | 39% | 12% | 4% | 2,035 |
| CNAE19S007170 | O | 1 | 17% | 81% | N/A | 2% | 4,338 |
| CNAE19S007171 | O | 1 | 22% | 76% | N/A | 2% | 4,338 |
| CNAE19S007172 | O | 1 | 32% | 63% | N/A | 5% | 4,337 |
| CNAE19S007174 | O | 1 | 30% | 66% | N/A | 3% | 4,337 |
| CNAE19S007176 | O | 2 | 4% | 38% | 53% | 5% | 4,337 |
| CNAE21D011121 | P | 1 | 18% | 81% | N/A | 1% | 982 |
| CNAE21D011126 | P | 2 | 14% | 56% | 28% | 2% | 982 |
| CNAE21D009020 | P | 1 | 26% | 72% | N/A | 2% | 982 |
| CNAE21D010229 | O | 1 | 31% | 64% | N/A | 4% | 982 |
| CNAE21D009027 | P | 2 | 33% | 49% | 14% | 4% | 982 |
| CNAE20D005037 | O | 1 | 11% | 87% | N/A | 2% | 982 |
| CNAE20D005040 | O | 1 | 37% | 56% | N/A | 6% | 981 |
| CNAE20D007042 | O | 1 | 17% | 82% | N/A | 1% | 982 |
| CNAE20D007044 | O | 1 | 24% | 72% | N/A | 4% | 982 |
| CNAE20D014105 | P | 1 | 31% | 66% | N/A | 3% | 1,167 |
| CNAE20D014106 | P | 1 | 25% | 72% | N/A | 3% | 2,304 |
| CNAE20D014109 | P | 1 | 63% | 34% | N/A | 4% | 2,304 |
| CNAE20D014110 | P | 1 | 35% | 63% | N/A | 2% | 2,304 |
| CNAE20D014111 | P | 2 | 17% | 48% | 32% | 4% | 2,304 |
| CNAE21D012131 | P | 1 | 52% | 45% | N/A | 3% | 2,303 |
| CNAE21D013191 | O | 1 | 26% | 71% | N/A | 3% | 1,167 |
| CNAE21D012129 | P | 1 | 37% | 61% | N/A | 3% | 1,167 |
| CNAE21D013192 | O | 1 | 49% | 48% | N/A | 3% | 2,304 |
| CNAE21D012132 | P | 1 | 56% | 41% | N/A | 3% | 2,303 |
| CNAE21D013195 | O | 1 | 60% | 37% | N/A | 3% | 1,167 |
| CNAE21D012133 | P | 1 | 53% | 42% | N/A | 5% | 1,167 |
| CNAE21D013196 | O | 1 | 79% | 19% | N/A | 3% | 2,304 |
| CNAE21D012135 | P | 2 | 45% | 27% | 21% | 6% | 1,167 |
| CNAE21D013199 | O | 2 | 13% | 52% | 27% | 8% | 2,304 |
| CNAE21D002012 | O | 1 | 23% | 74% | N/A | 3% | 2,304 |
| CNAE21D002010 | O | 1 | 29% | 68% | N/A | 3% | 1,167 |
| CNAE21D002014 | O | 1 | 36% | 60% | N/A | 4% | 2,304 |
| CNAE21D002013 | O | 1 | 27% | 69% | N/A | 4% | 1,167 |
| CNAE21D002016 | O | 2 | 7% | 39% | 52% | 2% | 2,304 |
| CNAE20D009058 | O | 1 | 28% | 68% | N/A | 3% | 2,304 |
| CNAE20D009059 | O | 1 | 21% | 76% | N/A | 3% | 2,304 |
| CNAE20D009062 | O | 1 | 48% | 50% | N/A | 3% | 2,303 |
| CNAE20D009060 | O | 1 | 40% | 57% | N/A | 2% | 1,167 |
| CNAE20D009063 | O | 2 | 11% | 37% | 47% | 5% | 1,167 |
| CNAE20D014107 | P | 1 | 16% | 82% | N/A | 2% | 1,137 |
| CNAE21D012130 | P | 1 | 39% | 58% | N/A | 2% | 1,137 |
| CNAE21D013193 | O | 1 | 21% | 76% | N/A | 2% | 1,137 |
| CNAE21D013194 | O | 1 | 38% | 59% | N/A | 3% | 1,137 |
| CNAE21D012378 | P | 1 | 50% | 46% | N/A | 5% | 1,136 |
| CNAE21D012136 | P | 2 | 24% | 45% | 27% | 4% | 1,136 |
| CNAE21D002011 | O | 1 | 23% | 74% | N/A | 3% | 1,137 |
| CNAE21D002015 | O | 1 | 43% | 52% | N/A | 5% | 1,137 |
| CNAE20D009061 | O | 1 | 30% | 67% | N/A | 3% | 1,136 |
| CNAE20D009064 | O | 2 | 8% | 53% | 36% | 4% | 1,136 |

Table 8.B.5 Distribution of Item Scores for Grade Eight

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Use** | **Max Points** | **Score 0** | **Score 1** | **Score 2** | **Omit** | **N Total** |
| CNAM19S010488 | O | 1 | 26% | 72% | N/A | 2% | 4,205 |
| CNAM19S010485 | O | 1 | 40% | 58% | N/A | 2% | 4,205 |
| CNAM19S010483 | O | 1 | 36% | 63% | N/A | 1% | 4,205 |
| CNAM19S010487 | O | 1 | 36% | 62% | N/A | 1% | 4,205 |
| CNAM19S010489 | O | 2 | 10% | 51% | 37% | 2% | 4,205 |
| CNAM20D013209 | O | 1 | 21% | 77% | N/A | 1% | 2,148 |
| CNAM20D013210 | O | 1 | 22% | 77% | N/A | 1% | 2,148 |
| CNAM20D013212 | O | 1 | 46% | 50% | N/A | 3% | 2,148 |
| CNAM19S007452 | O | 1 | 30% | 66% | N/A | 3% | 1,105 |
| CNAM20D013215 | O | 2 | 31% | 34% | 30% | 4% | 1,105 |
| CNAM19S002354 | O | 1 | 11% | 88% | N/A | 1% | 4,205 |
| CNAM21D003182 | P | 1 | 15% | 84% | N/A | 1% | 2,148 |
| CNAM19S002356 | O | 1 | 8% | 90% | N/A | 1% | 4,205 |
| CNAM21D003184 | P | 1 | 11% | 88% | N/A | 1% | 2,148 |
| CNAM19S002357 | O | 1 | 33% | 65% | N/A | 1% | 4,204 |
| CNAM21D003187 | P | 1 | 51% | 47% | N/A | 2% | 2,148 |
| CNAM19S002358 | O | 1 | 51% | 48% | N/A | 1% | 4,204 |
| CNAM21D003185 | P | 1 | 53% | 45% | N/A | 2% | 1,104 |
| CNAM19S002360 | O | 2 | 16% | 50% | 32% | 2% | 4,204 |
| CNAM21D003188 | P | 2 | 40% | 38% | 17% | 4% | 1,104 |
| CNAM20D002121 | O | 1 | 18% | 81% | N/A | 1% | 1,105 |
| CNAM20D004137 | P | 1 | 19% | 79% | N/A | 2% | 1,103 |
| CNAM20D002122 | O | 1 | 21% | 78% | N/A | 1% | 2,148 |
| CNAM20D004139 | P | 1 | 30% | 67% | N/A | 3% | 2,146 |
| CNAM20D002124 | O | 1 | 18% | 79% | N/A | 3% | 2,148 |
| CNAM20D004142 | P | 1 | 41% | 56% | N/A | 3% | 2,146 |
| CNAM20D002125 | O | 1 | 31% | 66% | N/A | 2% | 2,148 |
| CNAM20D004141 | P | 1 | 54% | 43% | N/A | 4% | 1,103 |
| CNAM20D002127 | O | 2 | 25% | 36% | 36% | 3% | 1,105 |
| CNAM20D004143 | P | 2 | 33% | 40% | 24% | 4% | 1,103 |
| CNAM20D010185 | O | 1 | 14% | 86% | N/A | 1% | 2,148 |
| CNAM20D010187 | O | 1 | 18% | 80% | N/A | 2% | 2,148 |
| CNAM20D010190 | O | 1 | 48% | 49% | N/A | 3% | 1,105 |
| CNAM20D010189 | O | 1 | 36% | 60% | N/A | 3% | 2,148 |
| CNAM20D010191 | O | 2 | 28% | 29% | 40% | 3% | 1,104 |
| CNAM19S004380 | O | 1 | 21% | 77% | N/A | 2% | 4,201 |
| CNAM19S004378 | O | 1 | 29% | 68% | N/A | 3% | 4,201 |
| CNAM19S004379 | O | 1 | 29% | 68% | N/A | 2% | 4,201 |
| CNAM19S004384 | O | 1 | 47% | 50% | N/A | 3% | 4,201 |
| CNAM19S004385 | O | 2 | 12% | 48% | 38% | 3% | 4,201 |
| CNAM20D013213 | O | 1 | 45% | 53% | N/A | 2% | 1,043 |
| CNAM20D013216 | O | 2 | 48% | 38% | 11% | 3% | 1,043 |
| CNAM21D003186 | P | 1 | 53% | 46% | N/A | 1% | 1,043 |
| CNAM21D003189 | P | 2 | 14% | 64% | 19% | 3% | 1,043 |
| CNAM20D002123 | O | 1 | 16% | 82% | N/A | 1% | 1,043 |
| CNAM20D004138 | P | 1 | 34% | 64% | N/A | 2% | 1,043 |
| CNAM20D004140 | P | 1 | 40% | 57% | N/A | 3% | 1,043 |
| CNAM20D002128 | O | 2 | 14% | 36% | 47% | 3% | 1,043 |
| CNAM20D004144 | P | 2 | 31% | 39% | 26% | 4% | 1,043 |
| CNAM20D010188 | O | 1 | 27% | 71% | N/A | 2% | 1,043 |
| CNAM20D010192 | O | 2 | 17% | 36% | 44% | 3% | 1,042 |
| CNAM21D011370 | O | 1 | 37% | 61% | N/A | 1% | 1,070 |
| CNAM21D011369 | O | 1 | 45% | 54% | N/A | 1% | 2,056 |
| CNAM21D011373 | O | 1 | 24% | 74% | N/A | 2% | 1,069 |
| CNAM21D011374 | O | 1 | 37% | 61% | N/A | 2% | 2,056 |
| CNAM21D011377 | O | 2 | 25% | 30% | 43% | 2% | 1,069 |
| CNAM21D001112 | P | 1 | 19% | 81% | N/A | 1% | 2,057 |
| CNAM21D001113 | P | 1 | 15% | 84% | N/A | 1% | 2,057 |
| CNAM21D001115 | P | 1 | 56% | 41% | N/A | 3% | 1,070 |
| CNAM21D001114 | P | 1 | 43% | 55% | N/A | 2% | 2,057 |
| CNAM21D001119 | P | 2 | 16% | 60% | 21% | 2% | 1,070 |
| CNAM21D002173 | P | 1 | 26% | 72% | N/A | 2% | 1,070 |
| CNAM21D004236 | O | 1 | 13% | 85% | N/A | 1% | 1,069 |
| CNAM21D002175 | P | 1 | 36% | 62% | N/A | 2% | 2,056 |
| CNAM21D004238 | O | 1 | 17% | 82% | N/A | 1% | 2,056 |
| CNAM21D002177 | P | 1 | 34% | 64% | N/A | 2% | 1,069 |
| CNAM21D004240 | O | 1 | 35% | 63% | N/A | 2% | 2,056 |
| CNAM21D002180 | P | 1 | 27% | 72% | N/A | 2% | 2,056 |
| CNAM21D004241 | O | 1 | 22% | 77% | N/A | 1% | 2,056 |
| CNAM21D002181 | P | 2 | 33% | 47% | 19% | 1% | 2,056 |
| CNAM21D004242 | O | 2 | 40% | 39% | 18% | 3% | 1,069 |
| CNAM20D007161 | O | 1 | 25% | 73% | N/A | 2% | 2,057 |
| CNAM20D007162 | O | 1 | 15% | 83% | N/A | 3% | 1,070 |
| CNAM20D007164 | O | 1 | 29% | 69% | N/A | 2% | 2,057 |
| CNAM20D007165 | O | 1 | 25% | 74% | N/A | 1% | 1,070 |
| CNAM20D007168 | O | 2 | 22% | 35% | 42% | 1% | 2,057 |
| CNAM21D011371 | O | 1 | 41% | 57% | N/A | 2% | 987 |
| CNAM21D011372 | O | 1 | 47% | 49% | N/A | 3% | 987 |
| CNAM21D011376 | O | 2 | 23% | 46% | 28% | 3% | 987 |
| CNAM21D001116 | P | 1 | 61% | 36% | N/A | 3% | 987 |
| CNAM21D001118 | P | 2 | 19% | 52% | 26% | 3% | 987 |
| CNAM21D002174 | P | 1 | 16% | 82% | N/A | 2% | 987 |
| CNAM21D004237 | O | 1 | 13% | 86% | N/A | 1% | 987 |
| CNAM21D002178 | P | 1 | 34% | 65% | N/A | 2% | 987 |
| CNAM21D004244 | O | 2 | 42% | 37% | 18% | 3% | 987 |
| CNAM20D007163 | O | 1 | 41% | 57% | N/A | 2% | 987 |
| CNAM20D007166 | O | 1 | 46% | 53% | N/A | 1% | 987 |

Table 8.B.6 Distribution of Item Scores for High School

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Use** | **Max Points** | **Score 0** | **Score 1** | **Score 2** | **Omit** | **N Total** |
| CNAH19S008209 | O | 1 | 24% | 75% | N/A | 1% | 4,413 |
| CNAH20D012313 | P | 1 | 16% | 82% | N/A | 1% | 1,146 |
| CNAH19S008215 | O | 1 | 30% | 69% | N/A | 1% | 4,413 |
| CNAH20D012315 | P | 1 | 14% | 84% | N/A | 1% | 2,270 |
| CNAH19S008211 | O | 1 | 26% | 72% | N/A | 2% | 4,413 |
| CNAH20D012317 | P | 1 | 23% | 76% | N/A | 1% | 1,146 |
| CNAH19S008212 | O | 1 | 60% | 37% | N/A | 2% | 4,413 |
| CNAH20D012318 | P | 1 | 29% | 69% | N/A | 1% | 2,270 |
| CNAH19S008214 | O | 2 | 27% | 52% | 18% | 2% | 4,413 |
| CNAH20D012319 | P | 2 | 16% | 29% | 52% | 3% | 1,146 |
| CNAH20D009289 | O | 1 | 30% | 68% | N/A | 2% | 1,146 |
| CNAH20D014330 | P | 1 | 26% | 72% | N/A | 2% | 2,270 |
| CNAH20D009291 | O | 1 | 21% | 75% | N/A | 4% | 2,269 |
| CNAH20D014331 | P | 1 | 49% | 49% | N/A | 2% | 2,270 |
| CNAH20D009292 | O | 1 | 47% | 52% | N/A | 1% | 1,146 |
| CNAH20D014332 | P | 1 | 39% | 59% | N/A | 2% | 1,146 |
| CNAH20D009293 | O | 1 | 70% | 28% | N/A | 2% | 2,269 |
| CNAH20D014334 | P | 1 | 38% | 59% | N/A | 3% | 2,270 |
| CNAH20D009295 | O | 2 | 30% | 45% | 22% | 3% | 2,269 |
| CNAH20D014335 | P | 2 | 17% | 37% | 43% | 3% | 2,270 |
| CNAH19S001009 | O | 1 | 10% | 89% | N/A | 1% | 4,413 |
| CNAH19S001010 | O | 1 | 16% | 83% | N/A | 1% | 4,413 |
| CNAH19S001011 | O | 1 | 25% | 73% | N/A | 2% | 4,413 |
| CNAH19S001015 | O | 1 | 32% | 66% | N/A | 3% | 4,413 |
| CNAH19S001014 | O | 2 | 11% | 34% | 51% | 4% | 4,413 |
| CNAH20D001225 | O | 1 | 39% | 59% | N/A | 2% | 2,270 |
| CNAH20D001227 | O | 1 | 26% | 72% | N/A | 2% | 2,270 |
| CNAH20D001229 | O | 1 | 47% | 51% | N/A | 2% | 1,146 |
| CNAH20D001228 | O | 1 | 30% | 67% | N/A | 3% | 2,270 |
| CNAH20D001231 | O | 2 | 30% | 22% | 44% | 5% | 1,146 |
| CNAH21D007084 | O | 1 | 34% | 64% | N/A | 2% | 1,146 |
| CNAH21D007085 | O | 1 | 31% | 68% | N/A | 2% | 2,270 |
| CNAH21D007087 | O | 1 | 64% | 34% | N/A | 2% | 2,269 |
| CNAH21D007089 | O | 1 | 57% | 41% | N/A | 2% | 2,268 |
| CNAH21D007090 | O | 2 | 46% | 43% | 9% | 2% | 1,144 |
| CNAH19S005077 | O | 1 | 20% | 79% | N/A | 2% | 4,410 |
| CNAH19S005074 | O | 1 | 25% | 72% | N/A | 2% | 4,410 |
| CNAH19S005075 | O | 1 | 29% | 69% | N/A | 3% | 4,410 |
| CNAH19S005078 | O | 1 | 34% | 64% | N/A | 2% | 4,410 |
| CNAH19S005080 | O | 2 | 21% | 40% | 38% | 2% | 4,410 |
| CNAH20D012314 | P | 1 | 27% | 72% | N/A | 1% | 1,124 |
| CNAH20D012316 | P | 1 | 42% | 56% | N/A | 2% | 1,124 |
| CNAH20D012320 | P | 2 | 21% | 43% | 35% | 2% | 1,124 |
| CNAH20D009290 | O | 1 | 41% | 56% | N/A | 3% | 1,123 |
| CNAH20D009294 | O | 1 | 54% | 44% | N/A | 2% | 1,123 |
| CNAH20D014333 | P | 1 | 48% | 49% | N/A | 3% | 1,124 |
| CNAH20D001230 | O | 1 | 52% | 45% | N/A | 3% | 1,124 |
| CNAH20D001232 | O | 2 | 34% | 39% | 25% | 2% | 1,124 |
| CNAH21D007086 | O | 1 | 36% | 62% | N/A | 2% | 1,124 |
| CNAH21D007092 | O | 2 | 54% | 37% | 8% | 2% | 1,123 |
| CNAH20D013322 | P | 1 | 20% | 79% | N/A | 1% | 2,143 |
| CNAH20D013321 | P | 1 | 22% | 77% | N/A | 0% | 973 |
| CNAH20D013324 | P | 1 | 36% | 63% | N/A | 1% | 2,143 |
| CNAH20D013326 | P | 1 | 50% | 48% | N/A | 2% | 2,143 |
| CNAH20D013328 | P | 2 | 17% | 41% | 39% | 2% | 2,143 |
| CNAH20D010297 | O | 1 | 15% | 84% | N/A | 1% | 973 |
| CNAH21D013326 | P | 1 | 33% | 66% | N/A | 1% | 2,143 |
| CNAH20D010298 | O | 1 | 19% | 80% | N/A | 1% | 2,143 |
| CNAH21D013325 | P | 1 | 37% | 61% | N/A | 2% | 973 |
| CNAH20D010301 | O | 1 | 37% | 60% | N/A | 2% | 2,143 |
| CNAH21D013328 | P | 1 | 53% | 44% | N/A | 2% | 2,142 |
| CNAH20D010300 | O | 1 | 62% | 37% | N/A | 1% | 973 |
| CNAH21D013330 | P | 1 | 29% | 69% | N/A | 1% | 973 |
| CNAH20D010304 | O | 2 | 10% | 42% | 45% | 3% | 973 |
| CNAH21D013332 | P | 2 | 24% | 40% | 34% | 2% | 973 |
| CNAH21D005263 | O | 1 | 30% | 69% | N/A | 2% | 2,143 |
| CNAH21D005264 | O | 1 | 32% | 66% | N/A | 2% | 973 |
| CNAH20D003244 | O | 1 | 53% | 45% | N/A | 1% | 2,143 |
| CNAH21D005268 | O | 1 | 38% | 60% | N/A | 2% | 2,143 |
| CNAH21D005269 | O | 2 | 24% | 37% | 37% | 2% | 973 |
| CNAH20D007274 | O | 1 | 34% | 65% | N/A | 1% | 973 |
| CNAH20D007273 | O | 1 | 29% | 70% | N/A | 1% | 2,143 |
| CNAH20D007276 | O | 1 | 43% | 56% | N/A | 1% | 973 |
| CNAH20D007278 | O | 1 | 56% | 41% | N/A | 2% | 2,143 |
| CNAH20D007279 | O | 2 | 28% | 56% | 14% | 2% | 973 |
| CNAH20D013323 | P | 1 | 20% | 79% | N/A | 1% | 1,170 |
| CNAH21D013327 | P | 1 | 23% | 75% | N/A | 2% | 1,170 |
| CNAH20D010299 | O | 1 | 17% | 81% | N/A | 2% | 1,170 |
| CNAH20D010302 | O | 1 | 39% | 58% | N/A | 3% | 1,170 |
| CNAH21D013329 | P | 1 | 46% | 51% | N/A | 3% | 1,169 |
| CNAH20D010303 | O | 2 | 12% | 48% | 38% | 1% | 1,170 |
| CNAH21D013333 | P | 2 | 31% | 45% | 20% | 4% | 1,169 |
| CNAH21D005265 | O | 1 | 27% | 71% | N/A | 2% | 1,170 |
| CNAH21D005271 | O | 2 | 26% | 36% | 35% | 3% | 1,170 |
| CNAH20D007275 | O | 1 | 35% | 63% | N/A | 2% | 1,170 |
| CNAH20D007277 | O | 1 | 28% | 70% | N/A | 2% | 1,170 |
| CNAH20D007280 | O | 2 | 30% | 48% | 20% | 3% | 1,170 |

**Note:**

Item types in table 8.B.7 are as follows:

* MC = multiple-choice item.
* TEI = technology-enhanced item.
* Composite = composite item (an item type that includes multiple parts).

Table 8.B.7 Item Difficulty Distributions by Item Type

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Item Type** | **0 ≤ p < 0.2** | **0.2 ≤ p < 0.4** | **0.4 ≤ p < 0.6** | **0.6 ≤ p < 0.8** | **0.8 ≤ p ≤ 1.0** | **Total Number of Items** |
| Grade 5 | MC | 1 | 3 | 13 | 25 | 5 | 47 |
| Grade 5 | TEI | 0 | 0 | 3 | 3 | 0 | 6 |
| Grade 5 | Composite | 0 | 1 | 2 | 0 | 0 | 3 |
| Grade 8 | MC | 0 | 0 | 11 | 25 | 10 | 46 |
| Grade 8 | TEI | 0 | 1 | 0 | 0 | 0 | 1 |
| Grade 8 | Composite | 0 | 2 | 7 | 2 | 0 | 11 |
| High school | MC | 0 | 4 | 12 | 26 | 4 | 46 |
| High school | TEI | 0 | 0 | 2 | 3 | 0 | 5 |
| High school | Composite | 0 | 2 | 6 | 0 | 0 | 8 |

PTs in table 8.B.8 are as follows:

* “ESS” = Earth and Space Sciences
* “LS” = Life Sciences
* “PS” = Physical Sciences

Table 8.B.8 Item Difficulty Distributions by PT

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **PT** | **0 ≤ p < 0.2** | **0.2 ≤ p < 0.4** | **0.4 ≤ p < 0.6** | **0.6 ≤ p < 0.8** | **0.8 ≤ p ≤ 1.0** | **Total Number of Items** |
| Grade 5 | ESS | 1 | 1 | 9 | 6 | 1 | 18 |
| Grade 5 | LS | 0 | 0 | 6 | 11 | 2 | 19 |
| Grade 5 | PS | 0 | 3 | 3 | 11 | 2 | 19 |
| Grade 8 | ESS | 0 | 1 | 9 | 10 | 0 | 20 |
| Grade 8 | LS | 0 | 2 | 3 | 7 | 7 | 19 |
| Grade 8 | PS | 0 | 0 | 6 | 10 | 3 | 19 |
| High school | ESS | 0 | 3 | 6 | 9 | 2 | 20 |
| High school | LS | 0 | 0 | 8 | 9 | 2 | 19 |
| High school | PS | 0 | 3 | 6 | 11 | 0 | 20 |

**Note:**

Item types in table 8.B.9 are as follows:

* MC = multiple-choice item.
* TEI = technology-enhanced item.
* Composite = composite item (an item type that includes multiple parts).

Table 8.B.9 Item-Total Correlation Distributions by Item Type

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Item Type** | **r < 0** | **0 ≤ r < 0.2** | **0.2 ≤ r < 0.3** | **0.3 ≤ r < 0.4** | **0.4 ≤ r < 0.5** | **r ≥ 0.5** | **Total Number of Items** |
| Grade 5 | MC | 1 | 1 | 0 | 4 | 6 | 35 | 47 |
| Grade 5 | TEI | 0 | 0 | 0 | 0 | 1 | 5 | 6 |
| Grade 5 | Composite | 0 | 0 | 0 | 0 | 1 | 2 | 3 |
| Grade 8 | MC | 0 | 1 | 0 | 3 | 0 | 42 | 46 |
| Grade 8 | TEI | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Grade 8 | Composite | 0 | 0 | 0 | 0 | 1 | 10 | 11 |
| High school | MC | 0 | 0 | 2 | 3 | 7 | 34 | 46 |
| High school | TEI | 0 | 0 | 0 | 0 | 0 | 5 | 5 |
| High school | Composite | 0 | 0 | 1 | 3 | 0 | 4 | 8 |

PTs in table 8.B.10 are as follows:

* “ESS” = Earth and Space Sciences
* “LS” = Life Sciences
* “PS” = Physical Sciences

Table 8.B.10 Item-Total Correlation Distributions by PT

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **PT** | **r < 0** | **0 ≤ r < 0.2** | **0.2 ≤ r < 0.3** | **0.3 ≤ r < 0.4** | **0.4 ≤ r < 0.5** | **r ≥ 0.5** | **Total Number of Items** |
| Grade 5 | ESS | 1 | 0 | 0 | 3 | 3 | 11 | 18 |
| Grade 5 | LS | 0 | 0 | 0 | 0 | 3 | 16 | 19 |
| Grade 5 | PS | 0 | 1 | 0 | 1 | 2 | 15 | 19 |
| Grade 8 | ESS | 0 | 1 | 0 | 2 | 0 | 17 | 20 |
| Grade 8 | LS | 0 | 0 | 0 | 0 | 1 | 18 | 19 |
| Grade 8 | PS | 0 | 0 | 0 | 1 | 0 | 18 | 19 |
| High school | ESS | 0 | 0 | 2 | 3 | 2 | 13 | 20 |
| High school | LS | 0 | 0 | 0 | 0 | 0 | 19 | 19 |
| High school | PS | 0 | 0 | 1 | 3 | 5 | 11 | 20 |

### Appendix 8.C: Omission and Completion Rates

Table 8.C.1 Item Difficulties, Omit Rates, and No-Response Rates, Grade Five

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Type** | ***p*-value** | **IRT *b*-‍value** | **Omit Rate** | **No-Response Rate** |
| CNAE19S004298 | MCSS–Member | 0.83 | −1.99 | 2% | 0% |
| CNAE19S004299 | MCSS–Member | 0.75 | −1.39 | 2% | 0% |
| CNAE19S004301 | MCSS–Member | 0.76 | −1.45 | 2% | 0% |
| CNAE19S004302 | MatchSS–Discrete | 0.53 | −0.20 | 3% | 0% |
| CNAE19S004304 | MCMS–Member | 0.53 | −0.24 | 3% | 1% |
| CNAE19S007170 | MCSS–Member | 0.81 | −1.79 | 2% | 0% |
| CNAE19S007171 | MCSS–Member | 0.76 | −1.42 | 2% | 0% |
| CNAE19S007172 | GridSS–Discrete | 0.63 | −0.71 | 5% | 1% |
| CNAE19S007174 | MCSS–Discrete | 0.66 | −0.85 | 3% | 1% |
| CNAE19S007176 | GridMS–Discrete | 0.72 | −1.30 | 5% | 1% |
| CNAE19S008185 | MCSS–Member | 0.76 | −1.41 | 2% | 0% |
| CNAE19S008187 | MCSS–Member | 0.83 | −1.99 | 2% | 0% |
| CNAE19S008189 | MCSS–Member | 0.49 | −0.05 | 2% | 0% |
| CNAE19S008190 | MCSS–Member | 0.41 | 0.37 | 2% | 0% |
| CNAE19S008191 | CompositeObjective–Member | 0.58 | −0.45 | 3% | 0% |
| CNAE20D005033 | MatchSS–Member | 0.68 | −1.07 | 5% | 1% |
| CNAE20D005034 | MCSS–Discrete | 0.43 | 0.24 | 4% | 1% |
| CNAE20D005036 | CompositeObjective–Member | 0.49 | −0.08 | 5% | 1% |
| CNAE20D005037 | MCSS–Discrete | 0.87 | −2.32 | 2% | 0% |
| CNAE20D005038 | MCSS–Discrete | 0.73 | −1.35 | 3% | 0% |
| CNAE20D005039 | MCSS–Member | 0.62 | −0.72 | 3% | 0% |
| CNAE20D005040 | MatchSS–Member | 0.56 | −0.35 | 6% | 1% |
| CNAE20D007041 | MCSS–Member | 0.52 | −0.17 | 2% | 1% |
| CNAE20D007042 | MCSS–Member | 0.82 | −1.84 | 1% | 0% |
| CNAE20D007043 | MCSS–Member | 0.69 | −1.06 | 2% | 0% |
| CNAE20D007044 | MCSS–Member | 0.72 | −1.19 | 4% | 1% |
| CNAE20D007045 | MCSS–Member | 0.32 | 0.74 | 4% | 1% |
| CNAE20D007046 | MCSS–Member | 0.35 | 0.67 | 4% | 1% |
| CNAE20D007047 | CompositeObjective–Member | 0.31 | 0.85 | 4% | 1% |
| CNAE20D009058 | MCSS–Member | 0.68 | −0.95 | 3% | 1% |
| CNAE20D009059 | MCSS–Member | 0.76 | −1.45 | 3% | 1% |
| CNAE20D009060 | MCSS–Member | 0.57 | −0.44 | 2% | 0% |
| CNAE20D009061 | MCSS–Member | 0.67 | −0.83 | 3% | 0% |
| CNAE20D009062 | MCSS–Member | 0.50 | 0.01 | 3% | 0% |
| CNAE20D009063 | MCMS–Member | 0.65 | −0.78 | 5% | 1% |
| CNAE20D009064 | MCMS–Discrete | 0.62 | −0.71 | 4% | 1% |
| CNAE20D014105 | MCSS–Member | 0.66 | −0.85 | 3% | 1% |
| CNAE20D014106 | MCSS–Member | 0.72 | −1.15 | 3% | 1% |
| CNAE20D014107 | MCSS–Discrete | 0.82 | −1.81 | 2% | 0% |
| CNAE20D014109 | MCSS–Member | 0.34 | 0.79 | 4% | 1% |
| CNAE20D014110 | MCSS–Discrete | 0.63 | −0.67 | 2% | 0% |
| CNAE20D014111 | CompositeObjective–Member | 0.56 | −0.34 | 4% | 1% |
| CNAE21D002010 | MCSS–Discrete | 0.68 | −1.03 | 3% | 0% |
| CNAE21D002011 | MCSS–Discrete | 0.74 | −1.22 | 3% | 0% |
| CNAE21D002012 | MCSS–Discrete | 0.74 | −1.31 | 3% | 0% |
| CNAE21D002013 | MCSS–Discrete | 0.69 | −1.03 | 4% | 1% |
| CNAE21D002014 | MCSS–Discrete | 0.60 | −0.49 | 4% | 1% |
| CNAE21D002015 | MCSS–Discrete | 0.52 | −0.04 | 5% | 1% |
| CNAE21D002016 | MCMS–Discrete | 0.71 | −1.22 | 2% | 0% |
| CNAE21D009019 | MCSS–Discrete | 0.49 | −0.08 | 3% | 1% |
| CNAE21D009020 | MCSS–Discrete | 0.72 | −1.17 | 2% | 0% |
| CNAE21D009021 | MCSS–Discrete | 0.77 | −1.59 | 2% | 0% |
| CNAE21D009022 | MCSS–Discrete | 0.51 | −0.19 | 3% | 1% |
| CNAE21D009024 | MCSS–Member | 0.46 | 0.06 | 4% | 1% |
| CNAE21D009027 | CompositeObjective–Member | 0.38 | 0.49 | 4% | 1% |
| CNAE21D010227 | MCSS–Discrete | 0.78 | −1.60 | 3% | 1% |
| CNAE21D010228 | MCSS–Discrete | 0.70 | −1.21 | 3% | 1% |
| CNAE21D010229 | MCSS–Discrete | 0.64 | −0.80 | 4% | 1% |
| CNAE21D010230 | MCSS–Discrete | 0.43 | 0.24 | 5% | 1% |
| CNAE21D010232 | MCSS–Discrete | 0.53 | −0.23 | 4% | 1% |
| CNAE21D010234 | MCMS–Member | 0.58 | −0.54 | 4% | 1% |
| CNAE21D011120 | MCSS–Discrete | 0.75 | −1.39 | 2% | 0% |
| CNAE21D011121 | MCSS–Discrete | 0.81 | −1.78 | 1% | 0% |
| CNAE21D011122 | MCSS–Discrete | 0.79 | −1.78 | 2% | 0% |
| CNAE21D011123 | MCSS–Discrete | 0.52 | −0.20 | 2% | 1% |
| CNAE21D011125 | MCSS–Discrete | 0.52 | −0.22 | 1% | 0% |
| CNAE21D011126 | MCMS–Discrete | 0.56 | −0.45 | 2% | 1% |
| CNAE21D011127 | MCMS–Member | 0.64 | −0.88 | 3% | 1% |
| CNAE21D012129 | MCSS–Discrete | 0.61 | −0.61 | 3% | 0% |
| CNAE21D012130 | MCSS–Discrete | 0.58 | −0.37 | 2% | 0% |
| CNAE21D012131 | MCSS–Discrete | 0.45 | 0.22 | 3% | 0% |
| CNAE21D012132 | MCSS–Discrete | 0.41 | 0.41 | 3% | 0% |
| CNAE21D012133 | MCSS–Discrete | 0.42 | 0.27 | 5% | 1% |
| CNAE21D012135 | MatchMS–Discrete | 0.35 | 0.57 | 6% | 1% |
| CNAE21D012136 | CompositeObjective–Member | 0.50 | 0.05 | 4% | 0% |
| CNAE21D012378 | MCSS–Discrete | 0.46 | 0.24 | 5% | 1% |
| CNAE21D013191 | MCSS–Discrete | 0.71 | −1.18 | 3% | 0% |
| CNAE21D013192 | MCSS–Discrete | 0.48 | 0.09 | 3% | 0% |
| CNAE21D013193 | MCSS–Discrete | 0.76 | −1.34 | 2% | 0% |
| CNAE21D013194 | MCSS–Discrete | 0.59 | −0.42 | 3% | 0% |
| CNAE21D013195 | MCSS–Discrete | 0.37 | 0.54 | 3% | 0% |
| CNAE21D013196 | MCSS–Discrete | 0.19 | 1.77 | 3% | 0% |
| CNAE21D013199 | MatchMS–Discrete | 0.53 | −0.21 | 8% | 1% |

Table 8.C.2 Item Difficulties, Omit Rates, and No-Response Rates, Grade Eight

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Type** | ***p*-value** | **IRT *b*-‍value** | **Omit Rate** | **No-Response Rate** |
| CNAM19S002354 | MCSS–Member | 0.88 | −2.40 | 1% | 0% |
| CNAM19S002356 | MCSS–Member | 0.90 | −2.75 | 1% | 0% |
| CNAM19S002357 | MCSS–Discrete | 0.65 | −0.84 | 1% | 0% |
| CNAM19S002358 | MCSS–Discrete | 0.48 | 0.06 | 1% | 0% |
| CNAM19S002360 | CompositeObjective–Member | 0.57 | −0.46 | 2% | 0% |
| CNAM19S004378 | MCSS–Discrete | 0.68 | −0.98 | 3% | 0% |
| CNAM19S004379 | MCSS–Member | 0.68 | −0.99 | 2% | 0% |
| CNAM19S004380 | MCSS–Member | 0.77 | −1.55 | 2% | 0% |
| CNAM19S004384 | MCSS–Member | 0.50 | −0.03 | 3% | 0% |
| CNAM19S004385 | MCMS–Discrete | 0.62 | −0.75 | 3% | 0% |
| CNAM19S007452 | MCSS–Discrete | 0.66 | −0.99 | 3% | 1% |
| CNAM19S010483 | MCSS–Discrete | 0.63 | −0.73 | 1% | 0% |
| CNAM19S010485 | MCSS–Member | 0.58 | −0.47 | 2% | 1% |
| CNAM19S010487 | MCSS–Discrete | 0.62 | −0.68 | 1% | 0% |
| CNAM19S010488 | MCSS–Discrete | 0.72 | −1.26 | 2% | 1% |
| CNAM19S010489 | MCMS–Discrete | 0.62 | −0.78 | 2% | 1% |
| CNAM20D002121 | MCSS–Discrete | 0.81 | −1.83 | 1% | 0% |
| CNAM20D002122 | MCSS–Discrete | 0.78 | −1.67 | 1% | 0% |
| CNAM20D002123 | MCSS–Discrete | 0.82 | −1.99 | 1% | 0% |
| CNAM20D002124 | MCSS–Discrete | 0.79 | −1.82 | 3% | 1% |
| CNAM20D002125 | MCSS–Discrete | 0.66 | −0.96 | 2% | 0% |
| CNAM20D002127 | CompositeObjective–Discrete | 0.54 | −0.27 | 3% | 1% |
| CNAM20D002128 | CompositeObjective–Discrete | 0.65 | −0.81 | 3% | 0% |
| CNAM20D004137 | MCSS–Discrete | 0.79 | −1.74 | 2% | 0% |
| CNAM20D004138 | MCSS–Discrete | 0.64 | −0.78 | 2% | 0% |
| CNAM20D004139 | MCSS–Discrete | 0.67 | −0.96 | 3% | 1% |
| CNAM20D004140 | MCSS–Discrete | 0.57 | −0.40 | 3% | 0% |
| CNAM20D004141 | MCSS–Discrete | 0.43 | 0.32 | 4% | 1% |
| CNAM20D004142 | MCSS–Discrete | 0.56 | −0.40 | 3% | 0% |
| CNAM20D004143 | CompositeObjective–Member | 0.43 | 0.25 | 4% | 1% |
| CNAM20D004144 | CompositeObjective–Member | 0.46 | 0.19 | 4% | 1% |
| CNAM20D007161 | MCSS–Discrete | 0.73 | −1.21 | 2% | 0% |
| CNAM20D007162 | MCSS–Discrete | 0.83 | −1.89 | 3% | 0% |
| CNAM20D007163 | MCSS–Discrete | 0.57 | −0.41 | 2% | 0% |
| CNAM20D007164 | MCSS–Discrete | 0.69 | −1.02 | 2% | 0% |
| CNAM20D007165 | MCSS–Member | 0.74 | −1.29 | 1% | 0% |
| CNAM20D007166 | MCSS–Discrete | 0.53 | −0.20 | 1% | 0% |
| CNAM20D007168 | CompositeObjective–Discrete | 0.60 | −0.50 | 1% | 0% |
| CNAM20D010185 | MCSS–Discrete | 0.86 | −2.30 | 1% | 0% |
| CNAM20D010187 | MCSS–Discrete | 0.80 | −1.85 | 2% | 0% |
| CNAM20D010188 | MCSS–Discrete | 0.71 | −1.22 | 2% | 0% |
| CNAM20D010189 | MCSS–Discrete | 0.60 | −0.64 | 3% | 0% |
| CNAM20D010190 | MCSS–Member | 0.49 | 0.00 | 3% | 1% |
| CNAM20D010191 | CompositeObjective–Member | 0.55 | −0.31 | 3% | 1% |
| CNAM20D010192 | CompositeObjective–Discrete | 0.62 | −0.68 | 3% | 0% |
| CNAM20D013209 | MCSS–Discrete | 0.77 | −1.60 | 1% | 0% |
| CNAM20D013210 | MCSS–Discrete | 0.77 | −1.60 | 1% | 0% |
| CNAM20D013212 | MCSS–Discrete | 0.50 | −0.08 | 3% | 1% |
| CNAM20D013213 | MCSS–Discrete | 0.53 | −0.23 | 2% | 0% |
| CNAM20D013215 | CompositeObjective–Discrete | 0.48 | 0.03 | 4% | 1% |
| CNAM20D013216 | MatchMS–Discrete | 0.30 | 1.11 | 3% | 0% |
| CNAM21D001112 | MCSS–Discrete | 0.81 | −1.76 | 1% | 0% |
| CNAM21D001113 | MCSS–Discrete | 0.84 | −1.99 | 1% | 0% |
| CNAM21D001114 | MCSS–Discrete | 0.55 | −0.26 | 2% | 0% |
| CNAM21D001115 | MCSS–Discrete | 0.41 | 0.52 | 3% | 1% |
| CNAM21D001116 | MCSS–Discrete | 0.36 | 0.63 | 3% | 0% |
| CNAM21D001118 | MCMS–Discrete | 0.52 | −0.16 | 3% | 0% |
| CNAM21D001119 | MCMS–Discrete | 0.51 | −0.08 | 2% | 1% |
| CNAM21D002173 | MCSS–Discrete | 0.72 | −1.14 | 2% | 0% |
| CNAM21D002174 | MCSS–Discrete | 0.82 | −1.82 | 2% | 0% |
| CNAM21D002175 | MCSS–Discrete | 0.62 | −0.61 | 2% | 0% |
| CNAM21D002177 | MCSS–Discrete | 0.64 | −0.67 | 2% | 1% |
| CNAM21D002178 | MCSS–Discrete | 0.65 | −0.83 | 2% | 0% |
| CNAM21D002180 | MCSS–Discrete | 0.72 | −1.17 | 2% | 0% |
| CNAM21D002181 | CompositeObjective–Member | 0.43 | 0.39 | 1% | 0% |
| CNAM21D003182 | MCSS–Discrete | 0.84 | −2.09 | 1% | 0% |
| CNAM21D003184 | MCSS–Discrete | 0.88 | −2.49 | 1% | 0% |
| CNAM21D003185 | MCSS–Discrete | 0.45 | 0.19 | 2% | 0% |
| CNAM21D003186 | MCSS–Discrete | 0.46 | 0.22 | 1% | 0% |
| CNAM21D003187 | MCSS–Discrete | 0.47 | 0.08 | 2% | 0% |
| CNAM21D003188 | MatchMS–Discrete | 0.36 | 0.62 | 4% | 1% |
| CNAM21D003189 | MatchMS–Discrete | 0.51 | −0.13 | 3% | 0% |
| CNAM21D004236 | MCSS–Discrete | 0.85 | −2.10 | 1% | 0% |
| CNAM21D004237 | MCSS–Discrete | 0.86 | −2.14 | 1% | 0% |
| CNAM21D004238 | MCSS–Discrete | 0.82 | −1.81 | 1% | 0% |
| CNAM21D004240 | MCSS–Discrete | 0.63 | −0.68 | 2% | 0% |
| CNAM21D004241 | MCSS–Discrete | 0.77 | −1.46 | 1% | 0% |
| CNAM21D004242 | CompositeObjective–Member | 0.38 | 0.64 | 3% | 1% |
| CNAM21D004244 | CompositeObjective–Member | 0.37 | 0.64 | 3% | 0% |
| CNAM21D011369 | MCSS–Discrete | 0.54 | −0.20 | 1% | 0% |
| CNAM21D011370 | MCSS–Discrete | 0.61 | −0.52 | 1% | 0% |
| CNAM21D011371 | MCSS–Discrete | 0.57 | −0.35 | 2% | 0% |
| CNAM21D011372 | MCSS–Discrete | 0.49 | 0.01 | 3% | 1% |
| CNAM21D011373 | MCSS–Discrete | 0.74 | −1.24 | 2% | 1% |
| CNAM21D011374 | MCSS–Discrete | 0.61 | −0.54 | 2% | 0% |
| CNAM21D011376 | CompositeObjective–Member | 0.51 | −0.14 | 3% | 0% |
| CNAM21D011377 | CompositeObjective–Member | 0.58 | −0.34 | 2% | 0% |

Table 8.C.3 Item Difficulties, Omit Rates, and No-Response Rates, High School

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Type** | ***p*-value** | **IRT *b*-‍value** | **Omit Rate** | **No-Response Rate** |
| CNAH19S001009 | MCSS–Discrete | 0.89 | −2.51 | 1% | 0% |
| CNAH19S001010 | MCSS–Discrete | 0.83 | −1.95 | 1% | 0% |
| CNAH19S001011 | MCSS–Member | 0.73 | −1.26 | 2% | 1% |
| CNAH19S001014 | MatchMS–Member | 0.68 | −0.93 | 4% | 1% |
| CNAH19S001015 | MCSS–Discrete | 0.66 | −0.86 | 3% | 1% |
| CNAH19S005074 | MCSS–Discrete | 0.72 | −1.21 | 2% | 1% |
| CNAH19S005075 | MCSS–Discrete | 0.69 | −0.98 | 3% | 1% |
| CNAH19S005077 | MCSS–Discrete | 0.79 | −1.57 | 2% | 0% |
| CNAH19S005078 | MCSS–Member | 0.64 | −0.76 | 2% | 1% |
| CNAH19S005080 | MCMS–Discrete | 0.58 | −0.42 | 2% | 0% |
| CNAH19S008209 | MCSS–Member | 0.75 | −1.38 | 1% | 0% |
| CNAH19S008211 | MCSS–Member | 0.72 | −1.20 | 2% | 0% |
| CNAH19S008212 | MCSS–Member | 0.37 | 0.57 | 2% | 1% |
| CNAH19S008214 | MCMS–Member | 0.44 | 0.30 | 2% | 1% |
| CNAH19S008215 | MCSS–Member | 0.69 | −1.02 | 1% | 0% |
| CNAH20D001225 | MCSS–Discrete | 0.59 | −0.62 | 2% | 0% |
| CNAH20D001227 | MCSS–Discrete | 0.72 | −1.30 | 2% | 1% |
| CNAH20D001228 | MCSS–Discrete | 0.67 | −0.95 | 3% | 1% |
| CNAH20D001229 | MCSS–Discrete | 0.51 | −0.08 | 2% | 0% |
| CNAH20D001230 | MCSS–Discrete | 0.45 | 0.07 | 3% | 1% |
| CNAH20D001231 | MatchMS–Discrete | 0.55 | −0.27 | 5% | 1% |
| CNAH20D001232 | CompositeObjective–Discrete | 0.44 | 0.07 | 2% | 1% |
| CNAH20D003244 | MCSS–Member | 0.45 | 0.21 | 1% | 0% |
| CNAH20D007273 | MCSS–Discrete | 0.70 | −0.97 | 1% | 1% |
| CNAH20D007274 | MCSS–Discrete | 0.65 | −0.81 | 1% | 0% |
| CNAH20D007275 | MCSS–Discrete | 0.63 | −0.57 | 2% | 1% |
| CNAH20D007276 | MCSS–Discrete | 0.56 | −0.32 | 1% | 0% |
| CNAH20D007277 | MCSS–Member | 0.70 | −1.02 | 2% | 1% |
| CNAH20D007278 | MCSS–Member | 0.41 | 0.48 | 2% | 1% |
| CNAH20D007279 | CompositeObjective–Member | 0.42 | 0.52 | 2% | 0% |
| CNAH20D007280 | CompositeObjective–Member | 0.44 | 0.39 | 3% | 1% |
| CNAH20D009289 | MCSS–Discrete | 0.68 | −0.99 | 2% | 0% |
| CNAH20D009290 | MCSS–Discrete | 0.56 | −0.41 | 3% | 0% |
| CNAH20D009291 | MatchSS–Discrete | 0.75 | −1.37 | 4% | 1% |
| CNAH20D009292 | MCSS–Discrete | 0.52 | −0.18 | 1% | 0% |
| CNAH20D009293 | MCSS–Discrete | 0.28 | 1.01 | 2% | 0% |
| CNAH20D009294 | MCSS–Discrete | 0.44 | 0.20 | 2% | 0% |
| CNAH20D009295 | CompositeObjective–Discrete | 0.44 | 0.17 | 3% | 0% |
| CNAH20D010297 | MCSS–Discrete | 0.84 | −2.00 | 1% | 0% |
| CNAH20D010298 | MCSS–Discrete | 0.80 | −1.67 | 1% | 0% |
| CNAH20D010299 | MCSS–Discrete | 0.81 | −1.73 | 2% | 0% |
| CNAH20D010300 | MCSS–Discrete | 0.37 | 0.66 | 1% | 0% |
| CNAH20D010301 | MCSS–Discrete | 0.60 | −0.49 | 2% | 1% |
| CNAH20D010302 | MatchSS–Discrete | 0.58 | −0.31 | 3% | 1% |
| CNAH20D010303 | MCMS–Discrete | 0.62 | −0.63 | 1% | 0% |
| CNAH20D010304 | MatchMS–Discrete | 0.66 | −0.85 | 3% | 1% |
| CNAH20D012313 | MCSS–Discrete | 0.82 | −1.90 | 1% | 0% |
| CNAH20D012314 | MCSS–Discrete | 0.72 | −1.27 | 1% | 0% |
| CNAH20D012315 | MCSS–Discrete | 0.84 | −2.07 | 1% | 0% |
| CNAH20D012316 | MCSS–Discrete | 0.56 | −0.43 | 2% | 1% |
| CNAH20D012317 | MCSS–Discrete | 0.76 | −1.44 | 1% | 0% |
| CNAH20D012318 | MCSS–Discrete | 0.69 | −1.06 | 1% | 0% |
| CNAH20D012319 | CompositeObjective–Member | 0.66 | −0.82 | 3% | 1% |
| CNAH20D012320 | CompositeObjective–Member | 0.56 | −0.46 | 2% | 1% |
| CNAH20D013321 | MCSS–Discrete | 0.77 | −1.49 | 0% | 0% |
| CNAH20D013322 | MCSS–Discrete | 0.79 | −1.59 | 1% | 0% |
| CNAH20D013323 | MCSS–Discrete | 0.79 | −1.54 | 1% | 0% |
| CNAH20D013324 | MCSS–Discrete | 0.63 | −0.64 | 1% | 0% |
| CNAH20D013326 | MCSS–Discrete | 0.48 | 0.11 | 2% | 1% |
| CNAH20D013328 | CompositeObjective–Member | 0.60 | −0.49 | 2% | 1% |
| CNAH20D014330 | MCSS–Discrete | 0.72 | −1.22 | 2% | 1% |
| CNAH20D014331 | MCSS–Discrete | 0.49 | −0.10 | 2% | 0% |
| CNAH20D014332 | MCSS–Discrete | 0.59 | −0.54 | 2% | 1% |
| CNAH20D014333 | MCSS–Discrete | 0.49 | −0.20 | 3% | 1% |
| CNAH20D014334 | MCSS–Discrete | 0.59 | −0.55 | 3% | 1% |
| CNAH20D014335 | CompositeObjective–Member | 0.61 | −0.64 | 3% | 1% |
| CNAH21D005263 | MCSS–Discrete | 0.69 | −0.96 | 2% | 0% |
| CNAH21D005264 | MCSS–Discrete | 0.66 | −0.84 | 2% | 0% |
| CNAH21D005265 | MCSS–Discrete | 0.71 | −0.97 | 2% | 0% |
| CNAH21D005268 | MCSS–Discrete | 0.60 | −0.52 | 2% | 0% |
| CNAH21D005269 | CompositeObjective–Member | 0.55 | −0.27 | 2% | 0% |
| CNAH21D005271 | CompositeObjective–Member | 0.53 | −0.06 | 3% | 1% |
| CNAH21D007084 | MCSS–Discrete | 0.64 | −0.76 | 2% | 0% |
| CNAH21D007085 | MCSS–Discrete | 0.68 | −1.02 | 2% | 0% |
| CNAH21D007086 | MCSS–Discrete | 0.62 | −0.73 | 2% | 0% |
| CNAH21D007087 | MCSS–Discrete | 0.34 | 0.61 | 2% | 0% |
| CNAH21D007089 | MCSS–Discrete | 0.41 | 0.32 | 2% | 1% |
| CNAH21D007090 | CompositeObjective–Member | 0.31 | 1.00 | 2% | 1% |
| CNAH21D007092 | CompositeObjective–Member | 0.26 | 1.14 | 2% | 1% |
| CNAH21D013325 | MCSS–Discrete | 0.61 | −0.59 | 2% | 0% |
| CNAH21D013326 | MCSS–Discrete | 0.66 | −0.74 | 1% | 0% |
| CNAH21D013327 | MCSS–Discrete | 0.75 | −1.33 | 2% | 0% |
| CNAH21D013328 | MCSS–Discrete | 0.44 | 0.33 | 2% | 1% |
| CNAH21D013329 | MCSS–Discrete | 0.51 | 0.05 | 3% | 1% |
| CNAH21D013330 | MCSS–Discrete | 0.69 | −1.05 | 1% | 0% |
| CNAH21D013332 | CompositeObjective–Member | 0.54 | −0.17 | 2% | 0% |
| CNAH21D013333 | CompositeObjective–Member | 0.43 | 0.49 | 4% | 1% |

Table 8.C.4 Average Number of Item Omits by Grade Level and PT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **ESS** | **LS** | **PS** | **FT** |
| Grade 5 | 0.21 | 0.21 | 0.25 | 0.21 |
| Grade 8 | 0.14 | 0.12 | 0.17 | 0.16 |
| High school—Grade 10 | 0.27 | 0.31 | 0.24 | 0.28 |
| High school—Grade 11 | 0.15 | 0.15 | 0.14 | 0.13 |
| High school—Grade 12 | 0.13 | 0.14 | 0.09 | 0.09 |
| High school—All grades | 0.15 | 0.15 | 0.13 | 0.13 |

Table 8.C.5 Average Number of No Response Selections by Grade Level and PT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **ESS** | **LS** | **PS** | **FT** |
| Grade 5 | 0.05 | 0.04 | 0.06 | 0.06 |
| Grade 8 | 0.04 | 0.03 | 0.04 | 0.04 |
| High school—Grade 10 | 0.09 | 0.12 | 0.09 | 0.14 |
| High school—Grade 11 | 0.03 | 0.03 | 0.03 | 0.03 |
| High school—Grade 12 | 0.04 | 0.06 | 0.06 | 0.06 |
| High school—All grades | 0.04 | 0.05 | 0.05 | 0.05 |

**Note:** In table 8.C.6, “Level 1” refers to Level 1—Limited Understanding, “Level 2” refers to Level 2—Foundational Understanding, and “Level 3” refers to Level 3—Understanding.

Table 8.C.6 Total Number of Items Answered by Student Achievement Level

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total Number Answered** | **Grade Five Level 1** | **Grade Five Level 2** | **Grade Five Level 3** | **Grade Eight Level 1** | **Grade Eight Level 2** | **Grade Eight Level 3** | **High School Level 1** | **High School Level 2** | **High School Level 3** |
| 40 | 954 | 1,645 | 1,016 | 889 | 1,629 | 1,231 | 1,007 | 1,649 | 1,144 |
| 39 | 133 | 100 | 31 | 84 | 68 | 28 | 136 | 126 | 31 |
| 38 | 51 | 31 | 4 | 37 | 11 | 3 | 50 | 27 | 0 |
| 37 | 47 | 7 | 1 | 16 | 4 | 0 | 36 | 6 | 1 |
| 36 | 32 | 6 | 0 | 14 | 6 | 0 | 11 | 3 | 0 |
| 35 | 29 | 5 | 0 | 15 | 2 | 0 | 13 | 3 | 0 |
| 34 | 19 | 6 | 0 | 10 | 2 | 0 | 10 | 1 | 0 |
| 33 | 16 | 1 | 0 | 12 | 0 | 0 | 10 | 1 | 0 |
| 32 | 18 | 1 | 0 | 12 | 2 | 0 | 10 | 1 | 0 |
| 31 | 17 | 2 | 0 | 10 | 0 | 0 | 8 | 0 | 0 |
| 30 | 17 | 2 | 0 | 9 | 3 | 0 | 5 | 1 | 1 |
| 29 | 7 | 0 | 0 | 7 | 0 | 0 | 15 | 1 | 0 |
| 28 | 7 | 1 | 0 | 10 | 0 | 0 | 11 | 0 | 0 |
| 27 | 12 | 0 | 0 | 2 | 0 | 0 | 7 | 0 | 0 |
| 26 | 12 | 1 | 0 | 5 | 0 | 0 | 8 | 0 | 0 |
| 25 | 8 | 0 | 0 | 11 | 0 | 0 | 10 | 0 | 0 |
| 24 | 6 | 0 | 0 | 5 | 0 | 0 | 7 | 0 | 0 |
| 23 | 7 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 22 | 12 | 0 | 0 | 3 | 0 | 0 | 4 | 0 | 0 |
| 21 | 7 | 0 | 0 | 5 | 0 | 0 | 11 | 0 | 0 |
| 20 | 10 | 0 | 0 | 12 | 0 | 0 | 3 | 0 | 0 |
| 19 | 9 | 0 | 0 | 7 | 0 | 0 | 6 | 0 | 0 |
| 18 | 6 | 0 | 0 | 6 | 0 | 0 | 3 | 0 | 0 |
| 17 | 9 | 0 | 0 | 2 | 0 | 0 | 5 | 0 | 0 |
| 16 | 9 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 |
| 15 | 4 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 |
| 14 | 6 | 0 | 0 | 7 | 0 | 0 | 4 | 0 | 0 |
| 13 | 3 | 0 | 0 | 4 | 0 | 0 | 7 | 0 | 0 |
| 12 | 5 | 0 | 0 | 7 | 0 | 0 | 5 | 0 | 0 |
| 11 | 9 | 0 | 0 | 4 | 0 | 0 | 5 | 0 | 0 |
| 10 | 8 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 |
| 9 | 4 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 0 |
| 8 | 3 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 |
| 7 | 5 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 |
| 6 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 5 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 4 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table 8.C.7 Percentage of Students in Each Grade Level or Grade Band Completing Embedded PTs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Students Registered** | **No PTs Completed** | **1 PT Completed** | **2 PTs Completed** | **3 PTs Completed** | **4 PTs Completed** |
| Grade 5 | 5,785 | 11% | 1% | 1% | 2% | 85% |
| Grade 8 | 5,626 | 14% | 1% | 1% | 1% | 83% |
| High school—Grade 10 | 434 | 23% | 2% | 0% | 1% | 74% |
| High school—Grade 11 | 4,183 | 23% | 2% | 1% | 1% | 73% |
| High school—Grade 12 | 2,267 | 28% | 2% | 1% | 1% | 68% |
| High school—All grades | 6,884 | 25% | 2% | 1% | 1% | 72% |

Table 8.C.8 Completion Rates by Grade Level or Grade Band for Each Embedded PT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Embedded PT** | **Number of Students Registered** | **Number of Students Completing the PT** | **Percent Completing the PT** |
| Grade 5 | Earth and Space Sciences | 5,785 | 5,065 | 88% |
| Grade 5 | Life Sciences | 5,785 | 5,136 | 89% |
| Grade 5 | Physical Sciences | 5,785 | 5,037 | 87% |
| Grade 8 | Earth and Space Sciences | 5,626 | 4,748 | 84% |
| Grade 8 | Life Sciences | 5,626 | 4,797 | 85% |
| Grade 8 | Physical Sciences | 5,626 | 4,719 | 84% |
| High school—Grade 10 | Earth and Space Sciences | 434 | 326 | 75% |
| High school—Grade 10 | Life Sciences | 434 | 334 | 77% |
| High school—Grade 10 | Physical Sciences | 434 | 323 | 74% |
| High school—Grade 11 | Earth and Space Sciences | 4,183 | 3,141 | 75% |
| High school—Grade 11 | Life Sciences | 4,183 | 3,172 | 76% |
| High school—Grade 11 | Physical Sciences | 4,183 | 3,103 | 74% |
| High school—Grade 12 | Earth and Space Sciences | 2,267 | 1,590 | 70% |
| High school—Grade 12 | Life Sciences | 2,267 | 1,612 | 71% |
| High school—Grade 12 | Physical Sciences | 2,267 | 1,573 | 69% |
| High school—All grades | Earth and Space Sciences | 6,884 | 5,057 | 73% |
| High school—All grades | Life Sciences | 6,884 | 5,118 | 74% |
| High school—All grades | Physical Sciences | 6,884 | 4,999 | 73% |

### Appendix 8.D: Differential Item Functioning Analyses

**Note:** The sample size requirements for the DIF analyses were 100 in the smaller of either the focal group or the reference group and 400 in the combined focal and reference groups. The following focal groups did not meet the required sample size for inclusion in the DIF analyses for grade five, grade eight, and high school:

* American Indian or Alaska Native
* Native Hawaiian or Other Pacific Islander
* Deaf-blindness
* Emotional disturbance
* Hearing impairment
* Orthopedic impairment
* Speech or language impairment
* Traumatic brain injury
* Visual impairment

Table 8.D.1 Number of Items by DIF Category for Grade Five

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Focal Group–Reference Group** | **DIF Category A−** | **DIF Category A+** | **DIF Category B−** | **DIF Category B+** | **DIF Category C−** | **DIF Category C+** | **Insufficient Counts** |
| Female–Male | 52 | 30 | 0 | 2 | 0 | 0 | 0 |
| Asian–White | 21 | 24 | 0 | 1 | 0 | 0 | 38 |
| Black–White | 24 | 21 | 0 | 1 | 0 | 0 | 38 |
| Hispanic–White | 45 | 39 | 0 | 0 | 0 | 0 | 0 |
| Filipino–White | 9 | 6 | 0 | 0 | 0 | 0 | 69 |
| Two or more races–White | 8 | 6 | 0 | 1 | 0 | 0 | 69 |
| Autism–Intellectual disability | 28 | 50 | 5 | 1 | 0 | 0 | 0 |
| Multiple disabilities–Intellectual disability | 7 | 8 | 0 | 0 | 0 | 0 | 69 |
| Other health impairment–Intellectual disability | 20 | 24 | 1 | 1 | 0 | 0 | 38 |
| Specific learning disability–Intellectual disability | 6 | 8 | 1 | 0 | 0 | 0 | 69 |
| Autism–Intellectual disability group | 28 | 52 | 3 | 1 | 0 | 0 | 0 |
| Other learning disability group–Intellectual disability group | 40 | 37 | 3 | 4 | 0 | 0 | 0 |

Table 8.D.2 Number of Items by DIF Category for Grade Eight

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Focal Group–Reference Group** | **DIF Category A−** | **DIF Category A+** | **DIF Category B−** | **DIF Category B+** | **DIF Category C−** | **DIF Category C+** | **Insufficient Counts** |
| Female–Male | 47 | 40 | 0 | 0 | 0 | 0 | 0 |
| Asian–White | 26 | 17 | 0 | 0 | 0 | 0 | 44 |
| Black–White | 20 | 22 | 1 | 0 | 0 | 0 | 44 |
| Hispanic–White | 42 | 38 | 3 | 4 | 0 | 0 | 0 |
| Filipino–White | 7 | 7 | 1 | 0 | 0 | 0 | 72 |
| Two or more races–White | 7 | 7 | 0 | 1 | 0 | 0 | 72 |
| Autism–Intellectual disability | 36 | 41 | 3 | 6 | 0 | 1 | 0 |
| Multiple disabilities–Intellectual disability | 11 | 13 | 3 | 2 | 0 | 0 | 58 |
| Other health impairment–Intellectual disability | 14 | 28 | 0 | 1 | 0 | 0 | 44 |
| Specific learning disability–Intellectual disability | 9 | 18 | 1 | 0 | 0 | 0 | 59 |
| Autism–Intellectual disability group | 34 | 44 | 3 | 6 | 0 | 0 | 0 |
| Other learning disability group–Intellectual disability group | 31 | 53 | 2 | 1 | 0 | 0 | 0 |

Table 8.D.3 Number of Items by DIF Category for High School

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Focal Group–Reference Group** | **DIF Category A−** | **DIF Category A+** | **DIF Category B−** | **DIF Category B+** | **DIF Category C−** | **DIF Category C+** | **Insufficient Counts** |
| Female–Male | 49 | 38 | 0 | 0 | 0 | 0 | 0 |
| Asian–White | 19 | 20 | 3 | 1 | 0 | 0 | 44 |
| Black–White | 21 | 22 | 0 | 0 | 0 | 0 | 44 |
| Hispanic–White | 50 | 30 | 5 | 2 | 0 | 0 | 0 |
| Filipino–White | 8 | 5 | 1 | 1 | 0 | 0 | 72 |
| Two or more races–White | 5 | 9 | 1 | 0 | 0 | 0 | 72 |
| Autism–Intellectual disability | 41 | 41 | 1 | 3 | 0 | 1 | 0 |
| Multiple disabilities–Intellectual disability | 24 | 17 | 2 | 0 | 0 | 0 | 44 |
| Other health impairment–Intellectual disability | 3 | 11 | 0 | 1 | 0 | 0 | 72 |
| Specific learning disability–Intellectual disability | 12 | 14 | 0 | 2 | 0 | 0 | 59 |
| Autism–Intellectual disability group | 42 | 41 | 1 | 2 | 0 | 1 | 0 |
| Other learning disability group–Intellectual disability group | 34 | 48 | 2 | 3 | 0 | 0 | 0 |
| Grade ten–Grade eleven | 31 | 30 | 1 | 3 | 0 | 0 | 22 |
| Grade twelve–Grade eleven | 38 | 49 | 0 | 0 | 0 | 0 | 0 |

### Appendix 8.E: Item Response Theory Analyses Results

For figure 8.E.1 through figure 8.E.3, the x-axis presents IRT *b*-parameters from the 2021–‍22 base scale of the item bank. The item bank *b*-parameters were either calibrated in 2021–22 or calibrated in 2018–19 but linked to the 2021–22 base scale. The y-axis presents the IRT *b*-parameters from the 2022–23 calibration that were linked back to the base scale. A black square indicates that an item was dropped from the anchor set by robust-z statistics.

Data for these graphs is presented in table 8.E.1 through table 8.E.3. Each table follows its associated graph.

#### Grade Five Graph and Table

Figure 8.E.1 indicates, in the grade five assessment, the relationship between the item bank *b*-parameters (calibrated in 2018–19 or 2021–22) and the equated *b*-parameters from 2022–23, the third iteration of the robust-z evaluation for the anchor items. The x-axis is the item bank *b*-parameter, and the y-axis is the 2022–23 spring equated *b*-parameters. Points shaped as circles represent IRT *b*-parameters of items remaining in the final linking set, and points shaped as squares represents IRT *b*-parameters of items removed from the linking set. Each polytomous item has two IRT *b*-parameters and therefore is depicted twice in the graph. Data used to create this graph is found in table 8.E.1, which immediately follows the graph.

Figure 8.E.1 *b*-parameters from item bank and 2022–23 for the equating set of grade five

Table 8.E.1 *b*-parameters from Item Bank and 2022–23 for the Equating Set of Grade Five

|  |  |  |
| --- | --- | --- |
| **Item ID** | ***b*-parameter from Item Bank** | ***b*-parameter from 2022–23** |
| CNAE19S004298 | −1.890 | −1.9884 |
| CNAE19S004299 | −1.414 | −1.3886 |
| CNAE19S004301 | −1.558 | −1.4466 |
| CNAE19S004302\* | 0.136 | −0.1950 |
| CNAE19S004304\* | 1.571 | 1.1215 |
| CNAE19S004304\* | −1.009 | −1.5923 |
| CNAE19S007170 | −1.931 | −1.7916 |
| CNAE19S007171 | −1.303 | −1.4183 |
| CNAE19S007172 | −0.548 | −0.7139 |
| CNAE19S007174 | −0.892 | −0.8546 |
| CNAE19S007176 | −0.454 | −0.3577 |
| CNAE19S007176 | −2.192 | −2.2323 |
| CNAE19S008185 | −1.394 | −1.4095 |
| CNAE19S008187 | −2.062 | −1.9861 |
| CNAE19S008189 | −0.040 | −0.0457 |
| CNAE19S008190 | 0.498 | 0.3729 |
| CNAE19S008191 | 0.433 | 0.3932 |
| CNAE19S008191 | −1.423 | −1.3024 |

**Note:** An asterisk (\*) indicates that the item was dropped from the anchor set by robust-z statistics.

#### Grade Eight Graph and Table

Figure 8.E.2 indicates, in the grade eight assessment, the relationship between the item bank *b*-parameters (calibrated in 2018–19 or 2021–22) and the equated *b*-parameters from 2022–23, the second iteration of the robust-z evaluation for the anchor items. The x-axis is the item bank *b*-parameter, and the y-axis is the 2022–23 spring equated *b*-parameter. Points shaped as circles represent IRT *b*-parameters of items remaining in the final linking set, and points shaped as squares represents IRT *b*-parameters of items removed from the linking set. Each polytomous item has two IRT *b*-parameters and therefore is depicted twice in the graph. Data used to create this graph is found in table 8.E.2, which immediately follows the graph.

Figure 8.E.2 *b*-parameters from item bank and 2022–23 for the equating set of grade eight

Table 8.E.2 *b*-parameters from Item Bank and 2022–23 for the Equating Set of Grade Eight

|  |  |  |
| --- | --- | --- |
| **Item ID** | ***b*-parameter from Item Bank** | ***b*-parameter from 2022–23** |
| CNAM19S002354 | −2.242 | −2.4012 |
| CNAM19S002356 | −2.934 | −2.7484 |
| CNAM19S002357 | −0.996 | −0.8387 |
| CNAM19S002358 | 0.297\* | 0.0602 |
| CNAM19S002360 | 0.806 | 0.6995 |
| CNAM19S002360 | −1.410 | −1.6151 |
| CNAM19S004378 | −0.983 | −0.9797 |
| CNAM19S004379 | −1.043 | −0.9920 |
| CNAM19S004380 | −1.582 | −1.5476 |
| CNAM19S004384 | −0.015 | −0.0342 |
| CNAM19S004385 | 0.293 | 0.4109 |
| CNAM19S004385 | −1.769 | −1.9031 |
| CNAM19S010483 | −0.733 | −0.7334 |
| CNAM19S010485 | −0.406 | −0.4711 |
| CNAM19S010487 | −0.746 | −0.6773 |
| CNAM19S010488 | −1.279 | −1.2554 |
| CNAM19S010489 | 0.439 | 0.4964 |
| CNAM19S010489 | −2.049 | −2.0592 |

**Note:** An asterisk (\*) indicates that the item was dropped from the anchor set by robust-z statistics.

#### High School Graph and Table

Figure 8.E.3 indicates, in the high school assessment, the relationship between the item bank parameters (calibrated in 2018–19 or 2021–22) and the equated *b*-parameters from 2022–23, the first iteration of the robust-z evaluation for the anchor items. The x-axis is the item bank *b*-parameter, and the y-axis is the 2022–23 spring equated *b*-parameter. Points shaped as circles represent IRT *b*-parameters of items remaining in the final linking set, and points shaped as squares represents IRT *b*-parameters of items removed from the linking set. Each polytomous item has two IRT *b*-parameters and therefore is depicted twice in the graph. Data used to create this graph is found in table 8.E.3, which immediately follows the graph.

Figure 8.E.3 *b*-parameters from item bank and 2022–23 for the equating set of high school

Table 8.E.3 *b*-parameters from Item Bank and 2022–23 for the Equating Set of High School

|  |  |  |
| --- | --- | --- |
| **Item ID** | ***b*-parameter from Item Bank** | ***b*-parameter from 2022–23** |
| CNAH19S001009 | −2.621 | −2.5129 |
| CNAH19S001010 | −1.957 | −1.9529 |
| CNAH19S001011 | −1.224 | −1.2621 |
| CNAH19S001014 | −0.378 | −0.4210 |
| CNAH19S001014 | −1.356 | −1.4428 |
| CNAH19S001015 | −0.911 | −0.8634 |
| CNAH19S005074 | −1.067 | −1.2056 |
| CNAH19S005075 | −0.954 | −0.9836 |
| CNAH19S005077 | −1.578 | −1.5742 |
| CNAH19S005078 | −0.870 | −0.7566 |
| CNAH19S005080 | 0.320 | 0.2343 |
| CNAH19S005080 | −1.232 | −1.0735 |
| CNAH19S008209 | −1.471 | −1.3762 |
| CNAH19S008211 | −1.177 | −1.2045 |
| CNAH19S008212 | 0.657 | 0.5715 |
| CNAH19S008214 | 1.495 | 1.4958 |
| CNAH19S008214 | −0.895 | −0.8936 |
| CNAH19S008215 | −1.021 | −1.0188 |

**Note:** An asterisk (\*) indicates that the item was dropped from the anchor set by robust-z statistics.

Table 8.E.4 IRT Item Difficulty for Grade Five

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Sample Size** | ***b-*value** | ***b-*value Standard Error** | ***d-*values** | ***d-*values Standard Error** |
| CNAE19S008185 | 3,604 | −1.4095 | 0.05 | N/A | N/A |
| CNAE19S008187 | 3,604 | −1.9861 | 0.05 | N/A | N/A |
| CNAE19S008189 | 3,604 | −0.0457 | 0.04 | N/A | N/A |
| CNAE19S008190 | 3,604 | 0.3729 | 0.04 | N/A | N/A |
| CNAE19S007170 | 3,604 | −1.7916 | 0.05 | N/A | N/A |
| CNAE19S007171 | 3,604 | −1.4183 | 0.05 | N/A | N/A |
| CNAE19S007174 | 3,603 | −0.8546 | 0.04 | N/A | N/A |
| CNAE19S007176 | 3,603 | −1.2950 | 0.04 | 0.9373 : −0.9373 | 0.0450 : 0.0450 |
| CNAE19S007172 | 3,603 | −0.7139 | 0.05 | N/A | N/A |
| CNAE19S004298 | 3,604 | −1.9884 | 0.06 | N/A | N/A |
| CNAE19S004299 | 3,604 | −1.3886 | 0.05 | N/A | N/A |
| CNAE19S004301 | 3,604 | −1.4466 | 0.05 | N/A | N/A |
| CNAE19S004302 | 3,604 | −0.1950 | 0.04 | N/A | N/A |
| CNAE19S004304 | 3,604 | −0.2354 | 0.04 | 1.3569 : −1.3569 | 0.0349 : 0.0349 |
| CNAE19S008191 | 3,604 | −0.4546 | 0.03 | 0.8478 : −0.8478 | 0.0362 : 0.0362 |
| CNAE20D005033 | 852 | −1.0733 | 0.08 | N/A | N/A |
| CNAE20D005034 | 1,671 | 0.2429 | 0.06 | N/A | N/A |
| CNAE20D005036 | 1,671 | −0.0829 | 0.05 | 0.6196 : −0.6196 | 0.0521 : 0.0521 |
| CNAE20D005039 | 1,671 | −0.7235 | 0.06 | N/A | N/A |
| CNAE20D005040 | 819 | −0.3545 | 0.08 | N/A | N/A |
| CNAE20D007041 | 1,671 | −0.1722 | 0.06 | N/A | N/A |
| CNAE20D007042 | 819 | −1.8445 | 0.11 | N/A | N/A |
| CNAE20D007043 | 852 | −1.0604 | 0.08 | N/A | N/A |
| CNAE20D007044 | 819 | −1.1944 | 0.10 | N/A | N/A |
| CNAE20D007045 | 1,671 | 0.7409 | 0.06 | N/A | N/A |
| CNAE20D007046 | 852 | 0.6721 | 0.08 | N/A | N/A |
| CNAE20D007047 | 1,671 | 0.8517 | 0.05 | 0.8605 : −0.8605 | 0.0572 : 0.0572 |
| CNAE20D014105 | 1,002 | −0.8523 | 0.08 | N/A | N/A |
| CNAE20D014106 | 1,923 | −1.1460 | 0.06 | N/A | N/A |
| CNAE20D014107 | 921 | −1.8117 | 0.10 | N/A | N/A |
| CNAE20D009058 | 1,933 | −0.9452 | 0.06 | N/A | N/A |
| CNAE20D009059 | 1,933 | −1.4472 | 0.07 | N/A | N/A |
| CNAE20D009063 | 1,007 | −0.7791 | 0.06 | 0.6092 : −0.6092 | 0.0722 : 0.0722 |
| CNAE20D009064 | 926 | −0.7126 | 0.07 | 1.3126 : −1.3126 | 0.0763 : 0.0763 |
| CNAE20D014109 | 1,923 | 0.7936 | 0.06 | N/A | N/A |
| CNAE20D014111 | 1,923 | −0.3437 | 0.04 | 0.9903 : −0.9903 | 0.0498 : 0.0498 |
| CNAE20D014110 | 1,923 | −0.6694 | 0.06 | N/A | N/A |
| CNAE20D009062 | 1,933 | 0.0070 | 0.05 | N/A | N/A |
| CNAE20D009061 | 926 | −0.8343 | 0.09 | N/A | N/A |
| CNAE20D009060 | 1,007 | −0.4438 | 0.08 | N/A | N/A |
| CNAE20D005037 | 819 | −2.3180 | 0.12 | N/A | N/A |
| CNAE20D005038 | 852 | −1.3501 | 0.10 | N/A | N/A |
| CNAE21D002010 | 1,007 | −1.0287 | 0.08 | N/A | N/A |
| CNAE21D002012 | 1,933 | −1.3115 | 0.06 | N/A | N/A |
| CNAE21D002013 | 1,007 | −1.0287 | 0.09 | N/A | N/A |
| CNAE21D002014 | 1,933 | −0.4866 | 0.06 | N/A | N/A |
| CNAE21D002015 | 926 | −0.0367 | 0.08 | N/A | N/A |
| CNAE21D002011 | 926 | −1.2175 | 0.09 | N/A | N/A |
| CNAE21D002016 | 1,932 | −1.2215 | 0.05 | 0.9934 : −0.9934 | 0.0591 : 0.0591 |
| CNAE21D012129 | 1,002 | −0.6094 | 0.07 | N/A | N/A |
| CNAE21D012130 | 921 | −0.3702 | 0.07 | N/A | N/A |
| CNAE21D012131 | 1,922 | 0.2210 | 0.05 | N/A | N/A |
| CNAE21D012132 | 1,922 | 0.4122 | 0.06 | N/A | N/A |
| CNAE21D012133 | 1,002 | 0.2717 | 0.07 | N/A | N/A |
| CNAE21D012135 | 1,002 | 0.5708 | 0.06 | 0.1114 : −0.1114 | 0.0754 : 0.0754 |
| CNAE21D012136 | 920 | 0.0517 | 0.06 | 0.8100 : −0.8100 | 0.0696 : 0.0696 |
| CNAE21D011120 | 1,664 | −1.3933 | 0.07 | N/A | N/A |
| CNAE21D011121 | 813 | −1.7806 | 0.10 | N/A | N/A |
| CNAE21D011122 | 851 | −1.7831 | 0.10 | N/A | N/A |
| CNAE21D011123 | 1,664 | −0.2049 | 0.06 | N/A | N/A |
| CNAE21D009019 | 851 | −0.0770 | 0.08 | N/A | N/A |
| CNAE21D009020 | 813 | −1.1688 | 0.09 | N/A | N/A |
| CNAE21D009021 | 1,664 | −1.5912 | 0.07 | N/A | N/A |
| CNAE21D009022 | 1,664 | −0.1934 | 0.06 | N/A | N/A |
| CNAE21D011125 | 1,664 | −0.2164 | 0.06 | N/A | N/A |
| CNAE21D011126 | 813 | −0.4467 | 0.07 | 1.3520 : −1.3520 | 0.0763 : 0.0763 |
| CNAE21D011127 | 851 | −0.8796 | 0.07 | 0.9197 : −0.9197 | 0.0794 : 0.0794 |
| CNAE21D009024 | 1,664 | 0.0633 | 0.06 | N/A | N/A |
| CNAE21D009027 | 813 | 0.4933 | 0.07 | 1.1443 : −1.1443 | 0.0757 : 0.0757 |
| CNAE21D010227 | 1,671 | −1.5999 | 0.07 | N/A | N/A |
| CNAE21D010228 | 852 | −1.2051 | 0.09 | N/A | N/A |
| CNAE21D013191 | 1,009 | −1.1833 | 0.08 | N/A | N/A |
| CNAE21D013192 | 1,933 | 0.0900 | 0.05 | N/A | N/A |
| CNAE21D013193 | 924 | −1.3376 | 0.09 | N/A | N/A |
| CNAE21D013194 | 924 | −0.4201 | 0.08 | N/A | N/A |
| CNAE21D013195 | 1,009 | 0.5439 | 0.07 | N/A | N/A |
| CNAE21D013196 | 1,933 | 1.7730 | 0.07 | N/A | N/A |
| CNAE21D013199 | 1,933 | −0.2114 | 0.04 | 1.1012 : −1.1012 | 0.0474 : 0.0474 |
| CNAE21D010229 | 819 | −0.8013 | 0.09 | N/A | N/A |
| CNAE21D010230 | 1,671 | 0.2399 | 0.06 | N/A | N/A |
| CNAE21D010232 | 1,671 | −0.2328 | 0.06 | N/A | N/A |
| CNAE21D010234 | 1,671 | −0.5371 | 0.05 | 0.8976 : −0.8976 | 0.0532 : 0.0532 |
| CNAE21D012378 | 920 | 0.2396 | 0.08 | N/A | N/A |

Table 8.E.5 IRT Item Difficulty for Grade Eight

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Sample Size** | ***b-*value** | ***b-*value Standard Error** | ***d-*values** | ***d-*values Standard Error** |
| CNAM19S002354 | 3,683 | −2.4012 | 0.06 | N/A | N/A |
| CNAM19S002356 | 3,683 | −2.7484 | 0.07 | N/A | N/A |
| CNAM19S002357 | 3,683 | −0.8387 | 0.05 | N/A | N/A |
| CNAM19S002358 | 3,683 | 0.0602 | 0.04 | N/A | N/A |
| CNAM19S004378 | 3,683 | −0.9797 | 0.05 | N/A | N/A |
| CNAM19S004379 | 3,683 | −0.9920 | 0.05 | N/A | N/A |
| CNAM19S004380 | 3,683 | −1.5476 | 0.05 | N/A | N/A |
| CNAM19S004384 | 3,683 | −0.0342 | 0.04 | N/A | N/A |
| CNAM19S004385 | 3,683 | −0.7461 | 0.04 | 1.1570 : −1.1570 | 0.0370 : 0.0370 |
| CNAM19S010483 | 3,683 | −0.7334 | 0.05 | N/A | N/A |
| CNAM19S010485 | 3,683 | −0.4711 | 0.04 | N/A | N/A |
| CNAM19S010487 | 3,683 | −0.6773 | 0.05 | N/A | N/A |
| CNAM19S010488 | 3,683 | −1.2554 | 0.05 | N/A | N/A |
| CNAM19S010489 | 3,683 | −0.7814 | 0.04 | 1.2778 : −1.2778 | 0.0381 : 0.0381 |
| CNAM19S007452 | 962 | −0.9873 | 0.09 | N/A | N/A |
| CNAM19S002360 | 3,683 | −0.4578 | 0.04 | 1.1573 : −1.1573 | 0.0346 : 0.0346 |
| CNAM20D002121 | 962 | −1.8294 | 0.10 | N/A | N/A |
| CNAM20D002122 | 1,857 | −1.6708 | 0.07 | N/A | N/A |
| CNAM20D002123 | 895 | −1.9858 | 0.10 | N/A | N/A |
| CNAM20D002124 | 1,857 | −1.8158 | 0.07 | N/A | N/A |
| CNAM20D002125 | 1,857 | −0.9559 | 0.06 | N/A | N/A |
| CNAM20D002128 | 895 | −0.8129 | 0.06 | 0.6852 : −0.6852 | 0.0763 : 0.0763 |
| CNAM20D002127 | 962 | −0.2741 | 0.06 | 0.5256 : −0.5256 | 0.0707 : 0.0707 |
| CNAM20D004137 | 959 | −1.7383 | 0.10 | N/A | N/A |
| CNAM20D004138 | 895 | −0.7794 | 0.08 | N/A | N/A |
| CNAM20D004139 | 1,854 | −0.9642 | 0.06 | N/A | N/A |
| CNAM20D004140 | 895 | −0.4011 | 0.08 | N/A | N/A |
| CNAM20D004141 | 959 | 0.3190 | 0.07 | N/A | N/A |
| CNAM20D004142 | 1,854 | −0.4023 | 0.06 | N/A | N/A |
| CNAM20D004143 | 959 | 0.2489 | 0.06 | 0.7166 : −0.7166 | 0.0695 : 0.0695 |
| CNAM20D010185 | 1,857 | −2.2979 | 0.08 | N/A | N/A |
| CNAM20D010189 | 1,857 | −0.6369 | 0.06 | N/A | N/A |
| CNAM20D007161 | 1,826 | −1.2142 | 0.06 | N/A | N/A |
| CNAM20D010190 | 962 | −0.0008 | 0.08 | N/A | N/A |
| CNAM20D007162 | 956 | −1.8942 | 0.10 | N/A | N/A |
| CNAM20D010192 | 895 | −0.6830 | 0.06 | 0.5844 : −0.5844 | 0.0753 : 0.0753 |
| CNAM20D007163 | 870 | −0.4051 | 0.08 | N/A | N/A |
| CNAM20D004144 | 895 | 0.1890 | 0.06 | 0.7263 : −0.7263 | 0.0719 : 0.0719 |
| CNAM20D010187 | 1,857 | −1.8484 | 0.07 | N/A | N/A |
| CNAM20D010188 | 895 | −1.2196 | 0.10 | N/A | N/A |
| CNAM20D010191 | 962 | −0.3127 | 0.06 | 0.2005 : −0.2005 | 0.0762 : 0.0762 |
| CNAM20D007164 | 1,826 | −1.0224 | 0.06 | N/A | N/A |
| CNAM20D007165 | 956 | −1.2880 | 0.09 | N/A | N/A |
| CNAM20D007166 | 870 | −0.2003 | 0.08 | N/A | N/A |
| CNAM20D007168 | 1,826 | −0.4957 | 0.05 | 0.4884 : −0.4884 | 0.0521 : 0.0521 |
| CNAM20D013209 | 1,857 | −1.5960 | 0.07 | N/A | N/A |
| CNAM20D013210 | 1,857 | −1.5960 | 0.07 | N/A | N/A |
| CNAM20D013212 | 1,857 | −0.0777 | 0.06 | N/A | N/A |
| CNAM20D013213 | 895 | −0.2275 | 0.08 | N/A | N/A |
| CNAM20D013216 | 895 | 1.1101 | 0.07 | 0.9404 : −0.9404 | 0.0792 : 0.0792 |
| CNAM20D013215 | 962 | 0.0346 | 0.06 | 0.4781 : −0.4781 | 0.0709 : 0.0709 |
| CNAM21D002173 | 950 | −1.1366 | 0.09 | N/A | N/A |
| CNAM21D002174 | 867 | −1.8195 | 0.11 | N/A | N/A |
| CNAM21D002175 | 1,817 | −0.6064 | 0.06 | N/A | N/A |
| CNAM21D002177 | 950 | −0.6687 | 0.08 | N/A | N/A |
| CNAM21D002178 | 867 | −0.8253 | 0.08 | N/A | N/A |
| CNAM21D002180 | 1,817 | −1.1654 | 0.07 | N/A | N/A |
| CNAM21D002181 | 1,817 | 0.3916 | 0.05 | 1.0164 : −1.0164 | 0.0497 : 0.0497 |
| CNAM21D001112 | 1,817 | −1.7611 | 0.07 | N/A | N/A |
| CNAM21D001113 | 1,817 | −1.9902 | 0.08 | N/A | N/A |
| CNAM21D001114 | 1,817 | −0.2605 | 0.06 | N/A | N/A |
| CNAM21D001115 | 950 | 0.5172 | 0.08 | N/A | N/A |
| CNAM21D001116 | 867 | 0.6320 | 0.08 | N/A | N/A |
| CNAM21D001118 | 867 | −0.1642 | 0.06 | 1.1861 : −1.1861 | 0.0709 : 0.0709 |
| CNAM21D001119 | 950 | −0.0820 | 0.06 | 1.5295 : −1.5295 | 0.0689 : 0.0689 |
| CNAM21D003182 | 1,855 | −2.0933 | 0.08 | N/A | N/A |
| CNAM21D003184 | 1,855 | −2.4874 | 0.09 | N/A | N/A |
| CNAM21D003185 | 960 | 0.1856 | 0.07 | N/A | N/A |
| CNAM21D003186 | 895 | 0.2206 | 0.08 | N/A | N/A |
| CNAM21D003187 | 1,855 | 0.0819 | 0.06 | N/A | N/A |
| CNAM21D003188 | 960 | 0.6241 | 0.06 | 0.7274 : −0.7274 | 0.0727 : 0.0727 |
| CNAM21D003189 | 895 | −0.1302 | 0.07 | 1.8051 : −1.8051 | 0.0755 : 0.0755 |
| CNAM21D004236 | 955 | −2.0951 | 0.11 | N/A | N/A |
| CNAM21D004237 | 871 | −2.1363 | 0.11 | N/A | N/A |
| CNAM21D004238 | 1,826 | −1.8085 | 0.07 | N/A | N/A |
| CNAM21D004240 | 1,826 | −0.6775 | 0.06 | N/A | N/A |
| CNAM21D004241 | 1,826 | −1.4585 | 0.07 | N/A | N/A |
| CNAM21D004242 | 955 | 0.6436 | 0.06 | 0.7348 : −0.7348 | 0.0704 : 0.0704 |
| CNAM21D004244 | 871 | 0.6425 | 0.06 | 0.7068 : −0.7068 | 0.0756 : 0.0756 |
| CNAM21D011369 | 1,826 | −0.1974 | 0.06 | N/A | N/A |
| CNAM21D011370 | 956 | −0.5180 | 0.07 | N/A | N/A |
| CNAM21D011371 | 870 | −0.3536 | 0.08 | N/A | N/A |
| CNAM21D011372 | 870 | 0.0149 | 0.08 | N/A | N/A |
| CNAM21D011373 | 956 | −1.2357 | 0.09 | N/A | N/A |
| CNAM21D011374 | 1,826 | −0.5387 | 0.06 | N/A | N/A |
| CNAM21D011377 | 956 | −0.3383 | 0.06 | 0.2598 : −0.2598 | 0.0743 : 0.0743 |
| CNAM21D011376 | 870 | −0.1402 | 0.06 | 0.9497 : −0.9497 | 0.0712 : 0.0712 |

Table 8.E.6 IRT Item Difficulty for High School

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Sample Size** | ***b-*value** | ***b-*value Standard Error** | ***d-*values** | ***d-*values Standard Error** |
| CNAH19S001010 | 3,802 | −1.9529 | 0.05 | N/A | N/A |
| CNAH19S001011 | 3,802 | −1.2621 | 0.05 | N/A | N/A |
| CNAH19S001014 | 3,802 | −0.9319 | 0.03 | 0.5109 : −0.5109 | 0.0394 : 0.0394 |
| CNAH19S001015 | 3,802 | −0.8634 | 0.04 | N/A | N/A |
| CNAH19S005074 | 3,801 | −1.2056 | 0.05 | N/A | N/A |
| CNAH19S005075 | 3,801 | −0.9836 | 0.04 | N/A | N/A |
| CNAH19S005077 | 3,801 | −1.5742 | 0.05 | N/A | N/A |
| CNAH19S005078 | 3,801 | −0.7566 | 0.04 | N/A | N/A |
| CNAH19S005080 | 3,801 | −0.4196 | 0.03 | 0.6539 : −0.6539 | 0.0360 : 0.0360 |
| CNAH19S008211 | 3,802 | −1.2045 | 0.05 | N/A | N/A |
| CNAH19S008212 | 3,802 | 0.5715 | 0.04 | N/A | N/A |
| CNAH19S008214 | 3,802 | 0.3011 | 0.03 | 1.1947 : −1.1947 | 0.0345 : 0.0345 |
| CNAH19S008215 | 3,802 | −1.0188 | 0.04 | N/A | N/A |
| CNAH19S001009 | 3,802 | −2.5129 | 0.06 | N/A | N/A |
| CNAH19S008209 | 3,802 | −1.3762 | 0.05 | N/A | N/A |
| CNAH20D013321 | 858 | −1.4866 | 0.10 | N/A | N/A |
| CNAH20D001225 | 1,939 | −0.6243 | 0.06 | N/A | N/A |
| CNAH20D001227 | 1,939 | −1.2997 | 0.06 | N/A | N/A |
| CNAH20D001228 | 1,939 | −0.9490 | 0.06 | N/A | N/A |
| CNAH20D013322 | 1,860 | −1.5901 | 0.07 | N/A | N/A |
| CNAH20D001229 | 983 | −0.0840 | 0.08 | N/A | N/A |
| CNAH20D001231 | 983 | −0.2747 | 0.05 | −0.2532 : 0.2532 | 0.0800 : 0.0800 |
| CNAH20D001232 | 956 | 0.0738 | 0.06 | 0.5281 : −0.5281 | 0.0694 : 0.0694 |
| CNAH20D013323 | 1,002 | −1.5417 | 0.10 | N/A | N/A |
| CNAH20D013324 | 1,860 | −0.6397 | 0.06 | N/A | N/A |
| CNAH20D013326 | 1,860 | 0.1145 | 0.06 | N/A | N/A |
| CNAH20D013328 | 1,860 | −0.4931 | 0.05 | 0.8197 : −0.8197 | 0.0514 : 0.0514 |
| CNAH20D012313 | 973 | −1.8977 | 0.10 | N/A | N/A |
| CNAH20D012315 | 1,925 | −2.0734 | 0.08 | N/A | N/A |
| CNAH20D012316 | 952 | −0.4328 | 0.08 | N/A | N/A |
| CNAH20D012317 | 973 | −1.4412 | 0.10 | N/A | N/A |
| CNAH20D012318 | 1,925 | −1.0571 | 0.06 | N/A | N/A |
| CNAH20D012319 | 973 | −0.8237 | 0.07 | 0.3225 : −0.3225 | 0.0774 : 0.0774 |
| CNAH20D012320 | 952 | −0.4592 | 0.06 | 0.7620 : −0.7620 | 0.0684 : 0.0684 |
| CNAH20D009289 | 982 | −0.9888 | 0.08 | N/A | N/A |
| CNAH20D009290 | 957 | −0.4089 | 0.07 | N/A | N/A |
| CNAH20D003244 | 1,863 | 0.2138 | 0.06 | N/A | N/A |
| CNAH20D009291 | 1,939 | −1.3670 | 0.06 | N/A | N/A |
| CNAH20D009292 | 982 | −0.1755 | 0.07 | N/A | N/A |
| CNAH20D009293 | 1,939 | 1.0050 | 0.06 | N/A | N/A |
| CNAH20D009294 | 957 | 0.1968 | 0.07 | N/A | N/A |
| CNAH20D009295 | 1,939 | 0.1740 | 0.04 | 0.8587 : −0.8587 | 0.0467 : 0.0467 |
| CNAH20D010297 | 858 | −2.0034 | 0.10 | N/A | N/A |
| CNAH20D010298 | 1,863 | −1.6686 | 0.07 | N/A | N/A |
| CNAH20D010299 | 1,005 | −1.7291 | 0.10 | N/A | N/A |
| CNAH20D010301 | 1,863 | −0.4873 | 0.06 | N/A | N/A |
| CNAH20D010302 | 1,005 | −0.3125 | 0.08 | N/A | N/A |
| CNAH20D010303 | 1,005 | −0.6259 | 0.06 | 1.1735 : −1.1735 | 0.0715 : 0.0715 |
| CNAH20D010304 | 858 | −0.8510 | 0.07 | 0.9178 : −0.9178 | 0.0793 : 0.0793 |
| CNAH20D007273 | 1,863 | −0.9655 | 0.06 | N/A | N/A |
| CNAH20D007274 | 859 | −0.8127 | 0.08 | N/A | N/A |
| CNAH20D007275 | 1,004 | −0.5697 | 0.07 | N/A | N/A |
| CNAH20D007276 | 859 | −0.3247 | 0.08 | N/A | N/A |
| CNAH20D007278 | 1,863 | 0.4798 | 0.06 | N/A | N/A |
| CNAH20D007277 | 1,004 | −1.0185 | 0.09 | N/A | N/A |
| CNAH20D007279 | 859 | 0.5234 | 0.06 | 1.3969 : −1.3969 | 0.0723 : 0.0723 |
| CNAH20D007280 | 1,004 | 0.3925 | 0.06 | 1.0456 : −1.0456 | 0.0669 : 0.0669 |
| CNAH20D014330 | 1,925 | −1.2162 | 0.06 | N/A | N/A |
| CNAH20D014331 | 1,925 | −0.1030 | 0.06 | N/A | N/A |
| CNAH20D014332 | 973 | −0.5388 | 0.08 | N/A | N/A |
| CNAH20D014333 | 952 | −0.1953 | 0.08 | N/A | N/A |
| CNAH20D014334 | 1,925 | −0.5537 | 0.06 | N/A | N/A |
| CNAH20D014335 | 1,925 | −0.6373 | 0.05 | 0.5201 : −0.5201 | 0.0515 : 0.0515 |
| CNAH20D010300 | 858 | 0.6586 | 0.08 | N/A | N/A |
| CNAH20D012314 | 952 | −1.2682 | 0.08 | N/A | N/A |
| CNAH20D001230 | 956 | 0.0748 | 0.08 | N/A | N/A |
| CNAH21D007084 | 983 | −0.7551 | 0.08 | N/A | N/A |
| CNAH21D007085 | 1,939 | −1.0174 | 0.06 | N/A | N/A |
| CNAH21D007086 | 956 | −0.7347 | 0.08 | N/A | N/A |
| CNAH21D007087 | 1,938 | 0.6093 | 0.06 | N/A | N/A |
| CNAH21D007089 | 1,938 | 0.3216 | 0.06 | N/A | N/A |
| CNAH21D007090 | 983 | 1.0018 | 0.07 | 1.1346 : −1.1346 | 0.0758 : 0.0758 |
| CNAH21D007092 | 955 | 1.1443 | 0.07 | 0.8372 : −0.8372 | 0.0823 : 0.0823 |
| CNAH21D005263 | 1,863 | −0.9564 | 0.06 | N/A | N/A |
| CNAH21D005264 | 859 | −0.8376 | 0.09 | N/A | N/A |
| CNAH21D005265 | 1,004 | −0.9722 | 0.08 | N/A | N/A |
| CNAH21D013325 | 858 | −0.5945 | 0.08 | N/A | N/A |
| CNAH21D005268 | 1,863 | −0.5203 | 0.06 | N/A | N/A |
| CNAH21D005269 | 859 | −0.2670 | 0.06 | 0.5369 : −0.5369 | 0.0750 : 0.0750 |
| CNAH21D005271 | 1,004 | −0.0553 | 0.05 | 0.4966 : −0.4966 | 0.0692 : 0.0692 |
| CNAH21D013326 | 1,860 | −0.7446 | 0.06 | N/A | N/A |
| CNAH21D013327 | 1,002 | −1.3299 | 0.09 | N/A | N/A |
| CNAH21D013328 | 1,859 | 0.3297 | 0.06 | N/A | N/A |
| CNAH21D013329 | 1,001 | 0.0495 | 0.08 | N/A | N/A |
| CNAH21D013330 | 858 | −1.0451 | 0.09 | N/A | N/A |
| CNAH21D013332 | 858 | −0.1695 | 0.06 | 0.6740 : −0.6740 | 0.0730 : 0.0730 |
| CNAH21D013333 | 1,001 | 0.4897 | 0.06 | 0.9576 : −0.9576 | 0.0669 : 0.0669 |

Table 8.E.7 IRT Item Difficulty Summary for Operational Items by Content Complexity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Tier Set** | **Number of Items** | **Mean *b-*value** | **SD *b-*value** | **Minimum *b-*value** | **Maximum *b-*value** | **Median *b-*value** |
| Grade 5 | Low Complexity | 23 | −1.2799 | 0.5531 | −2.3180 | 0.0900 | −1.3376 |
| Grade 5 | Medium Complexity | 23 | −0.2073 | 0.7448 | −1.4466 | 1.7730 | −0.2328 |
| Grade 5 | High Complexity | 10 | −0.4678 | 1.1736 | −2.2323 | 1.7122 | −0.2929 |
| Grade 5 | All Operational Items | 56 | −0.6600 | 0.9559 | −2.3180 | 1.7730 | −0.8178 |
| Grade 8 | Low Complexity | 22 | −1.4932 | 0.7295 | −2.7484 | −0.1974 | −1.6334 |
| Grade 8 | Medium Complexity | 22 | −0.7065 | 0.5342 | −1.8158 | 0.0602 | −0.7055 |
| Grade 8 | High Complexity | 14 | −0.1865 | 0.9974 | −2.0592 | 2.0505 | −0.0949 |
| Grade 8 | All Operational Items | 58 | −0.7447 | 0.9576 | −2.7484 | 2.0505 | −0.7055 |
| High school | Low Complexity | 23 | −1.1892 | 0.5209 | −2.5129 | −0.4089 | −1.0174 |
| High school | Medium Complexity | 22 | −0.2187 | 0.6736 | −1.2621 | 1.0050 | −0.2440 |
| High school | High Complexity | 14 | 0.0133 | 1.0940 | −1.7994 | 2.1364 | −0.0772 |
| High school | All Operational Items | 59 | −0.4355 | 0.9686 | −2.5129 | 2.1364 | −0.6243 |

Table 8.E.8 IRT Item Difficulty Summary for Field Test Items by Content Complexity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Tier Set** | **Number of Items** | **Mean *b-*value** | **SD *b-*value** | **Minimum *b-*value** | **Maximum *b-*value** | **Median *b-*value** |
| Grade 5 | Low Complexity | 12 | −1.0302 | 0.6966 | −1.8117 | 0.2210 | −1.1574 |
| Grade 5 | Medium Complexity | 9 | 0.0551 | 0.4304 | −0.6694 | 0.7936 | 0.0633 |
| Grade 5 | High Complexity | 6 | −0.0924 | 1.1477 | −1.7993 | 1.6376 | 0.2498 |
| Grade 5 | All Field Test Items | 27 | −0.3932 | 0.9532 | −1.8117 | 1.6376 | −0.2164 |
| Grade 8 | Low Complexity | 10 | −1.5376 | 0.6251 | −2.4874 | −0.6064 | −1.7497 |
| Grade 8 | Medium Complexity | 12 | −0.1473 | 0.5621 | −1.1654 | 0.6320 | −0.0893 |
| Grade 8 | High Complexity | 7 | 0.1539 | 1.2486 | −1.9353 | 1.6749 | 0.4060 |
| Grade 8 | All Field Test Items | 29 | −0.4164 | 1.1371 | −2.4874 | 1.6749 | −0.5025 |
| High school | Low Complexity | 11 | −1.2587 | 0.5798 | −2.0734 | −0.1030 | −1.3299 |
| High school | Medium Complexity | 11 | −0.4918 | 0.5461 | −1.4412 | 0.3297 | −0.5388 |
| High school | High Complexity | 6 | −0.3489 | 0.8608 | −1.3128 | 1.4473 | −0.4846 |
| High school | All Field Test Items | 28 | −0.6895 | 0.7762 | −2.0734 | 1.4473 | −0.6922 |

Table 8.E.9 Distribution of IRT Item Difficulty by Content Complexity, Grade Five

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***b*-value** | **Low Complexity** | **Medium Complexity** | **High Complexity** | **All Operational Items** |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 0 | 0 | 0 | 0 |
| −2.5 ≤ b < −2.0 | 1 | 0 | 3 | 4 |
| −2.0 ≤ b < −1.5 | 5 | 0 | 1 | 6 |
| −1.5 ≤ b < −1.0 | 12 | 4 | 4 | 20 |
| −1.0 ≤ b < −0.5 | 3 | 3 | 1 | 7 |
| −0.5 ≤ b < 0 | 1 | 8 | 4 | 13 |
| 0 ≤ b < 0.5 | 1 | 4 | 2 | 7 |
| 0.5 ≤ b < 1.0 | 0 | 3 | 3 | 6 |
| 1.0 ≤ b < 1.5 | 0 | 0 | 1 | 1 |
| 1.5 ≤ b < 2.0 | 0 | 1 | 1 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 0 | 0 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.32 | −1.45 | −2.23 | −2.32 |
| Maximum | 0.09 | 1.77 | 1.71 | 1.77 |
| Mean | −1.28 | −0.21 | −0.47 | −0.66 |
| SD | 0.55 | 0.74 | 1.17 | 0.96 |
| **Number of Items:** | **23** | **23** | **10** | **56** |

Table 8.E.10 Distribution of IRT Item Difficulty by Content Complexity, Grade Eight

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***b*-value** | **Low Complexity** | **Medium Complexity** | **High Complexity** | **All Operational Items** |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 1 | 0 | 0 | 1 |
| −2.5 ≤ b < −2.0 | 4 | 0 | 1 | 5 |
| −2.0 ≤ b < −1.5 | 9 | 1 | 2 | 12 |
| −1.5 ≤ b < −1.0 | 2 | 5 | 3 | 10 |
| −1.0 ≤ b < −0.5 | 2 | 9 | 4 | 15 |
| −0.5 ≤ b < 0 | 4 | 5 | 8 | 17 |
| 0 ≤ b < 0.5 | 0 | 2 | 4 | 6 |
| 0.5 ≤ b < 1.0 | 0 | 0 | 3 | 3 |
| 1.0 ≤ b < 1.5 | 0 | 0 | 2 | 2 |
| 1.5 ≤ b < 2.0 | 0 | 0 | 0 | 0 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 1 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.75 | −1.82 | −2.06 | −2.75 |
| Maximum | −0.20 | 0.06 | 2.05 | 2.05 |
| Mean | −1.49 | −0.71 | −0.19 | −0.74 |
| SD | 0.73 | 0.53 | 1.00 | 0.96 |
| **Number of Items:** | **22** | **22** | **14** | **58** |

Table 8.E.11 Distribution of IRT Item Difficulty by Content Complexity, High School

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***b*-value** | **Low Complexity** | **Medium Complexity** | **High Complexity** | **All Operational Items** |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 1 | 0 | 0 | 1 |
| −2.5 ≤ b < −2.0 | 1 | 0 | 0 | 1 |
| −2.0 ≤ b < −1.5 | 4 | 0 | 2 | 6 |
| −1.5 ≤ b < −1.0 | 6 | 3 | 2 | 11 |
| −1.0 ≤ b < −0.5 | 10 | 5 | 7 | 22 |
| −0.5 ≤ b < 0 | 1 | 5 | 4 | 10 |
| 0 ≤ b < 0.5 | 0 | 5 | 5 | 10 |
| 0.5 ≤ b < 1.0 | 0 | 3 | 2 | 5 |
| 1.0 ≤ b < 1.5 | 0 | 1 | 3 | 4 |
| 1.5 ≤ b < 2.0 | 0 | 0 | 2 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 1 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.51 | −1.26 | −1.80 | −2.51 |
| Maximum | −0.41 | 1.01 | 2.14 | 2.14 |
| Mean | −1.19 | −0.22 | 0.01 | −0.44 |
| SD | 0.52 | 0.67 | 1.09 | 0.97 |
| **Number of Items:** | **23** | **22** | **14** | **59** |

**Note:**

Item types are as follows:

* MC = multiple-choice item.
* TEI = technology-enhanced item.
* Composite = composite item (an item type that includes multiple parts).

Table 8.E.12 Item Difficulty Parameter Distribution by Item Type for Grade Five

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IRT-*b* Range** | **MC** | **TEI** | **Composite** | **All Operational Items** |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 0 | 0 | 0 | 0 |
| −2.5 ≤ b < −2.0 | 3 | 1 | 0 | 4 |
| −2.0 ≤ b < −1.5 | 6 | 0 | 0 | 6 |
| −1.5 ≤ b < −1.0 | 17 | 2 | 1 | 20 |
| −1.0 ≤ b < −0.5 | 5 | 1 | 1 | 7 |
| −0.5 ≤ b < 0 | 9 | 3 | 1 | 13 |
| 0 ≤ b < 0.5 | 6 | 0 | 1 | 7 |
| 0.5 ≤ b < 1.0 | 4 | 1 | 1 | 6 |
| 1.0 ≤ b < 1.5 | 1 | 0 | 0 | 1 |
| 1.5 ≤ b < 2.0 | 1 | 0 | 1 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 0 | 0 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.32 | −2.23 | −1.30 | −2.32 |
| Maximum | 1.77 | 0.89 | 1.71 | 1.77 |
| Mean | −0.75 | −0.67 | 0.10 | −0.66 |
| SD | 0.93 | 0.92 | 1.05 | 0.96 |
| **Number of Items:** | **47** | **6** | **3** | **56** |

Table 8.E.13 Item Difficulty Parameter Distribution by Item Type for Grade Eight

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IRT-*b* Range** | **MC** | **TEI** | **Composite** | **All Operational Items** |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 1 | 0 | 0 | 1 |
| −2.5 ≤ b < −2.0 | 5 | 0 | 0 | 5 |
| −2.0 ≤ b < −1.5 | 11 | 0 | 1 | 12 |
| −1.5 ≤ b < −1.0 | 7 | 0 | 3 | 10 |
| −1.0 ≤ b < −0.5 | 11 | 0 | 4 | 15 |
| −0.5 ≤ b < 0 | 9 | 0 | 8 | 17 |
| 0 ≤ b < 0.5 | 4 | 1 | 1 | 6 |
| 0.5 ≤ b < 1.0 | 0 | 0 | 3 | 3 |
| 1.0 ≤ b < 1.5 | 0 | 0 | 2 | 2 |
| 1.5 ≤ b < 2.0 | 0 | 0 | 0 | 0 |
| 2.0 ≤ b < 2.5 | 0 | 1 | 0 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.75 | 0.17 | −1.62 | −2.75 |
| Maximum | 0.50 | 2.05 | 1.38 | 2.05 |
| Mean | −1.07 | 1.11 | −0.20 | −0.74 |
| SD | 0.80 | 1.33 | 0.83 | 0.96 |
| **Number of Items:** | **46** | **1** | **11** | **58** |

Table 8.E.14 Item Difficulty Parameter Distribution by Item Type for High School

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IRT-*b* Range** | **MC** | **TEI** | **Composite** | **All Operational Items** |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 1 | 0 | 0 | 1 |
| −2.5 ≤ b < −2.0 | 1 | 0 | 0 | 1 |
| −2.0 ≤ b < −1.5 | 5 | 1 | 0 | 6 |
| −1.5 ≤ b < −1.0 | 9 | 2 | 0 | 11 |
| −1.0 ≤ b < −0.5 | 16 | 1 | 5 | 22 |
| −0.5 ≤ b < 0 | 5 | 3 | 2 | 10 |
| 0 ≤ b < 0.5 | 6 | 1 | 3 | 10 |
| 0.5 ≤ b < 1.0 | 4 | 0 | 1 | 5 |
| 1.0 ≤ b < 1.5 | 2 | 0 | 2 | 4 |
| 1.5 ≤ b < 2.0 | 0 | 0 | 2 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 1 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.51 | −1.77 | −0.87 | −2.51 |
| Maximum | 1.50 | 0.07 | 2.14 | 2.14 |
| Mean | −0.65 | −0.72 | 0.37 | −0.44 |
| SD | 0.84 | 0.70 | 1.05 | 0.97 |
| **Number of Items:** | **46** | **5** | **8** | **59** |

Table 8.E.15 Item Difficulty Parameter Distribution by Content Domain for Grade Five

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IRT-*b* Range | Earth and Space Sciences | Life Sciences | Physical Sciences | All Operational Items |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 0 | 0 | 0 | 0 |
| −2.5 ≤ b < −2.0 | 0 | 2 | 2 | 4 |
| −2.0 ≤ b < −1.5 | 2 | 2 | 2 | 6 |
| −1.5 ≤ b < −1.0 | 7 | 8 | 5 | 20 |
| −1.0 ≤ b < −0.5 | 1 | 2 | 4 | 7 |
| −0.5 ≤ b < 0 | 3 | 5 | 5 | 13 |
| 0 ≤ b < 0.5 | 5 | 1 | 1 | 7 |
| 0.5 ≤ b < 1.0 | 2 | 1 | 3 | 6 |
| 1.0 ≤ b < 1.5 | 0 | 1 | 0 | 1 |
| 1.5 ≤ b < 2.0 | 1 | 0 | 1 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 0 | 0 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −1.99 | −2.32 | −2.23 | −2.32 |
| Maximum | 1.77 | 1.12 | 1.71 | 1.77 |
| Mean | −0.46 | −0.85 | −0.66 | −0.66 |
| SD | 1.00 | 0.88 | 0.99 | 0.96 |
| **Number of Items:** | **18** | **19** | **19** | **56** |

Table 8.E.16 Item Difficulty Parameter Distribution by Content Domain for Grade Eight

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IRT-*b* Range | Earth and Space Sciences | Life Sciences | Physical Sciences | All Operational Items |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 0 | 1 | 0 | 1 |
| −2.5 ≤ b < −2.0 | 1 | 3 | 1 | 5 |
| −2.0 ≤ b < −1.5 | 2 | 6 | 4 | 12 |
| −1.5 ≤ b < −1.0 | 3 | 2 | 5 | 10 |
| −1.0 ≤ b < −0.5 | 6 | 4 | 5 | 15 |
| −0.5 ≤ b < 0 | 7 | 3 | 7 | 17 |
| 0 ≤ b < 0.5 | 3 | 2 | 1 | 6 |
| 0.5 ≤ b < 1.0 | 2 | 1 | 0 | 3 |
| 1.0 ≤ b < 1.5 | 0 | 2 | 0 | 2 |
| 1.5 ≤ b < 2.0 | 0 | 0 | 0 | 0 |
| 2.0 ≤ b < 2.5 | 1 | 0 | 0 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.06 | −2.75 | −2.30 | −2.75 |
| Maximum | 2.05 | 1.38 | 0.41 | 2.05 |
| Mean | −0.43 | −0.95 | −0.87 | −0.74 |
| SD | 0.87 | 1.16 | 0.74 | 0.96 |
| **Number of Items:** | **20** | **19** | **19** | **58** |

Table 8.E.17 Item Difficulty Parameter Distribution by Content Domain for High School

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IRT-*b* Range | Earth and Space Sciences | Life Sciences | Physical Sciences | All Operational Items |
| b < −3.5 | 0 | 0 | 0 | 0 |
| −3.5 ≤ b < −3.0 | 0 | 0 | 0 | 0 |
| −3.0 ≤ b < −2.5 | 0 | 1 | 0 | 1 |
| −2.5 ≤ b < −2.0 | 1 | 0 | 0 | 1 |
| −2.0 ≤ b < −1.5 | 4 | 1 | 1 | 6 |
| −1.5 ≤ b < −1.0 | 4 | 3 | 4 | 11 |
| −1.0 ≤ b < −0.5 | 3 | 10 | 9 | 22 |
| −0.5 ≤ b < 0 | 4 | 4 | 2 | 10 |
| 0 ≤ b < 0.5 | 2 | 4 | 4 | 10 |
| 0.5 ≤ b < 1.0 | 3 | 1 | 1 | 5 |
| 1.0 ≤ b < 1.5 | 3 | 0 | 1 | 4 |
| 1.5 ≤ b < 2.0 | 0 | 0 | 2 | 2 |
| 2.0 ≤ b < 2.5 | 0 | 0 | 1 | 1 |
| 2.5 ≤ b < 3.0 | 0 | 0 | 0 | 0 |
| 3.0 ≤ b < 3.5 | 0 | 0 | 0 | 0 |
| b ≥ 3.5 | 0 | 0 | 0 | 0 |
| Minimum | −2.00 | −2.51 | −1.57 | −2.51 |
| Maximum | 1.50 | 0.60 | 2.14 | 2.14 |
| Mean | −0.51 | −0.64 | −0.16 | −0.44 |
| SD | 1.03 | 0.74 | 1.07 | 0.97 |
| **Number of Items:** | **20** | **19** | **20** | **59** |

### Appendix 8.F: Response Time Analyses

* Response time analyses were based on students who logged on to the assessment and whose total testing time at the test level did not equal zero.
* Because response time was recorded at the page level, items that were on a page with multiple items were excluded in the analysis in table 8.F.2.
* The following abbreviations apply in table 8.F.2:
* MCSS = multiple-choice single-select item.
* TE = technology-enhanced item.
* Composite = composite item (an item type that includes multiple parts).

Table 8.F.1 Testing Time (in Minutes) by PT

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **PT** | **N** | **Mean** | **SD** | **Min** | **Max** | **1st Percentile** | **10th Percentile** | **25th Percentile** | **50th Percentile** | **75th Percentile** | **90th Percentile** | **99th Percentile** |
| Grade 5 | ESS | 4,341 | 4.64 | 3.70 | 0.17 | 74.05 | 0.70 | 1.87 | 2.64 | 3.83 | 5.57 | 7.97 | 18.99 |
| Grade 5 | LS | 4,341 | 4.95 | 3.93 | 0.30 | 59.45 | 0.89 | 2.09 | 2.84 | 3.96 | 5.76 | 8.57 | 21.90 |
| Grade 5 | PS | 4,341 | 4.34 | 3.16 | 0.15 | 56.19 | 0.75 | 2.02 | 2.76 | 3.65 | 5.01 | 6.90 | 16.29 |
| Grade 5 | Field Test | 4,341 | 4.23 | 3.03 | 0.21 | 68.75 | 0.64 | 1.79 | 2.61 | 3.64 | 5.04 | 6.93 | 15.56 |
| Grade 8 | ESS | 4,204 | 4.13 | 2.84 | 0.26 | 64.61 | 0.68 | 1.76 | 2.56 | 3.61 | 4.95 | 6.78 | 14.82 |
| Grade 8 | LS | 4,204 | 4.95 | 3.85 | 0.17 | 56.37 | 0.82 | 2.03 | 2.75 | 3.95 | 5.89 | 8.76 | 21.07 |
| Grade 8 | PS | 4,204 | 4.44 | 2.87 | 0.25 | 48.88 | 0.82 | 2.08 | 2.81 | 3.82 | 5.23 | 7.33 | 15.04 |
| Grade 8 | Field Test | 4,204 | 3.99 | 2.59 | 0.18 | 29.97 | 0.67 | 1.77 | 2.47 | 3.45 | 4.77 | 6.56 | 14.59 |
| High school—Grade 10 | ESS | 285 | 4.06 | 2.80 | 0.45 | 20.86 | 0.61 | 1.57 | 2.45 | 3.55 | 4.86 | 6.95 | 20.12 |
| High school—Grade 10 | LS | 285 | 3.87 | 2.20 | 0.45 | 15.84 | 0.68 | 1.68 | 2.62 | 3.40 | 4.66 | 6.28 | 13.27 |
| High school—Grade 10 | PS | 285 | 5.23 | 2.98 | 0.39 | 27.97 | 0.53 | 2.61 | 3.49 | 4.70 | 6.02 | 7.91 | 16.05 |
| High school—Grade 10 | Field Test | 285 | 3.78 | 2.30 | 0.45 | 20.16 | 0.49 | 1.35 | 2.34 | 3.42 | 4.83 | 6.26 | 11.95 |
| High school—Grade 11 | ESS | 2,728 | 4.25 | 2.87 | 0.25 | 39.57 | 0.61 | 1.74 | 2.62 | 3.71 | 5.14 | 6.92 | 15.13 |
| High school—Grade 11 | LS | 2,728 | 4.11 | 2.84 | 0.07 | 55.82 | 0.65 | 1.77 | 2.59 | 3.53 | 4.90 | 6.72 | 14.24 |
| High school—Grade 11 | PS | 2,728 | 5.29 | 2.86 | 0.22 | 50.95 | 0.59 | 2.74 | 3.75 | 4.93 | 6.22 | 7.84 | 14.97 |
| High school—Grade 11 | Field Test | 2,728 | 4.15 | 2.58 | 0.00 | 39.91 | 0.51 | 1.65 | 2.60 | 3.73 | 5.05 | 6.86 | 13.89 |
| High school—Grade 12 | ESS | 1,395 | 4.55 | 3.71 | 0.22 | 65.06 | 0.61 | 1.85 | 2.62 | 3.78 | 5.58 | 7.61 | 17.65 |
| High school—Grade 12 | LS | 1,395 | 4.48 | 2.95 | 0.31 | 39.44 | 0.80 | 1.95 | 2.75 | 3.77 | 5.48 | 7.47 | 15.51 |
| High school—Grade 12 | PS | 1,395 | 5.52 | 3.24 | 0.26 | 60.37 | 0.60 | 2.73 | 3.84 | 5.02 | 6.60 | 8.42 | 17.19 |
| High school—Grade 12 | Field Test | 1,395 | 4.47 | 3.24 | 0.23 | 38.95 | 0.60 | 1.82 | 2.74 | 3.84 | 5.44 | 7.38 | 16.94 |
| High school—All grades | ESS | 4,408 | 4.33 | 3.16 | 0.22 | 65.06 | 0.61 | 1.78 | 2.61 | 3.72 | 5.24 | 7.14 | 15.76 |
| High school—All grades | LS | 4,408 | 4.21 | 2.84 | 0.07 | 55.82 | 0.68 | 1.81 | 2.63 | 3.59 | 5.06 | 6.93 | 14.49 |
| High school—All grades | PS | 4,408 | 5.36 | 3.00 | 0.22 | 60.37 | 0.60 | 2.73 | 3.76 | 4.93 | 6.34 | 8.10 | 15.84 |
| High school—All grades | Field Test | 4,408 | 4.23 | 2.79 | 0.00 | 39.91 | 0.55 | 1.68 | 2.62 | 3.74 | 5.11 | 7.03 | 15.01 |

Table 8.F.2 Testing Time (in Minutes) by Item Type

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Item Type** | **N** | **Mean** | **SD** | **Min** | **Max** | **1st Percentile** | **10th Percentile** | **25th Percentile** | **50th Percentile** | **75th Percentile** | **90th Percentile** | **99th Percentile** |
| Grade 5 | MCSS | 128,184 | 0.40 | 0.79 | 0.00 | 55.18 | 0.04 | 0.12 | 0.17 | 0.26 | 0.42 | 0.68 | 2.51 |
| Grade 5 | TE | 32,602 | 0.58 | 0.71 | 0.00 | 41.23 | 0.04 | 0.19 | 0.29 | 0.45 | 0.70 | 1.04 | 2.49 |
| Grade 5 | Composite | 12,834 | 0.70 | 0.81 | 0.00 | 44.68 | 0.03 | 0.24 | 0.38 | 0.57 | 0.83 | 1.21 | 2.67 |
| Grade 8 | MCSS | 134,491 | 0.38 | 0.63 | 0.00 | 53.11 | 0.04 | 0.12 | 0.17 | 0.27 | 0.43 | 0.67 | 2.08 |
| Grade 8 | TE | 13,649 | 0.52 | 0.58 | 0.00 | 28.16 | 0.04 | 0.17 | 0.28 | 0.42 | 0.62 | 0.91 | 2.11 |
| Grade 8 | Composite | 19,970 | 0.77 | 0.81 | 0.00 | 29.45 | 0.05 | 0.24 | 0.41 | 0.63 | 0.94 | 1.36 | 3.19 |
| High school—Grade 10 | MCSS | 8,864 | 0.38 | 0.52 | 0.00 | 22.66 | 0.03 | 0.10 | 0.17 | 0.28 | 0.45 | 0.71 | 1.70 |
| High school—Grade 10 | TE | 1,387 | 0.53 | 0.58 | 0.00 | 11.61 | 0.03 | 0.13 | 0.24 | 0.40 | 0.65 | 1.01 | 2.70 |
| High school—Grade 10 | Composite | 1,149 | 0.66 | 0.51 | 0.00 | 4.48 | 0.03 | 0.14 | 0.36 | 0.58 | 0.82 | 1.23 | 2.72 |
| High school—Grade 11 | MCSS | 85,142 | 0.39 | 0.57 | 0.00 | 52.55 | 0.04 | 0.12 | 0.18 | 0.29 | 0.47 | 0.73 | 1.68 |
| High school—Grade 11 | TE | 12,301 | 0.58 | 0.71 | 0.00 | 31.17 | 0.04 | 0.16 | 0.27 | 0.46 | 0.72 | 1.08 | 2.65 |
| High school—Grade 11 | Composite | 11,654 | 0.71 | 0.61 | 0.00 | 15.05 | 0.04 | 0.21 | 0.39 | 0.61 | 0.88 | 1.26 | 2.73 |
| High school—Grade 12 | MCSS | 43,591 | 0.42 | 0.65 | 0.00 | 48.33 | 0.04 | 0.12 | 0.19 | 0.30 | 0.49 | 0.77 | 1.91 |
| High school—Grade 12 | TE | 6,255 | 0.63 | 0.73 | 0.00 | 21.12 | 0.04 | 0.17 | 0.28 | 0.47 | 0.78 | 1.19 | 2.76 |
| High school—Grade 12 | Composite | 5,948 | 0.76 | 0.73 | 0.00 | 24.58 | 0.04 | 0.23 | 0.40 | 0.62 | 0.93 | 1.35 | 3.04 |
| High school—All grades | MCSS | 137,597 | 0.40 | 0.59 | 0.00 | 52.55 | 0.04 | 0.12 | 0.18 | 0.29 | 0.47 | 0.74 | 1.75 |
| High school—All grades | TE | 19,943 | 0.60 | 0.71 | 0.00 | 31.17 | 0.04 | 0.16 | 0.27 | 0.46 | 0.73 | 1.11 | 2.70 |
| High school—All grades | Composite | 18,751 | 0.72 | 0.64 | 0.00 | 24.58 | 0.04 | 0.21 | 0.39 | 0.61 | 0.89 | 1.29 | 2.81 |

Table 8.F.3 Total Testing Time (in Minutes) at Each Quartile Group

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Scale Score Range** | **Number** | **Mean** | **SD** | **Minimum** | **Maximum** | **Percentile Points 1** | **Percentile Points 10** | **Percentile Points 25** | **Percentile Points 50** | **Percentile Points 75** | **Percentile Points 90** | **Percentile Points 99** |
| Grade 5 Q 1 | 502–541 | 1,040 | 17.62 | 10.88 | 1.59 | 101.50 | 2.69 | 7.17 | 10.41 | 14.97 | 22.23 | 32.55 | 54.89 |
| Grade 5 Q 2 | 542–549 | 1,087 | 18.31 | 13.09 | 1.31 | 178.82 | 3.87 | 8.28 | 11.20 | 15.41 | 21.85 | 30.51 | 66.66 |
| Grade 5 Q 3 | 550–558 | 1,050 | 18.62 | 10.65 | 2.09 | 143.60 | 5.88 | 9.60 | 12.22 | 16.41 | 22.32 | 29.97 | 55.05 |
| Grade 5 Q 4 | 559–599 | 1,164 | 18.12 | 8.75 | 3.67 | 132.82 | 6.93 | 10.24 | 12.94 | 16.33 | 21.13 | 27.30 | 48.44 |
| Grade 8 Q 1 | 802–843 | 1,015 | 16.81 | 11.48 | 1.13 | 95.65 | 2.79 | 6.34 | 9.69 | 14.16 | 20.47 | 30.09 | 64.32 |
| Grade 8 Q 2 | 844–851 | 1,057 | 17.54 | 10.66 | 2.55 | 123.77 | 4.73 | 8.25 | 10.77 | 15.36 | 20.91 | 29.36 | 59.79 |
| Grade 8 Q 3 | 852–862 | 1,051 | 17.76 | 8.51 | 2.71 | 64.85 | 5.69 | 9.47 | 12.01 | 16.16 | 21.24 | 28.78 | 52.09 |
| Grade 8 Q 4 | 863–899 | 1,081 | 17.90 | 7.67 | 3.29 | 64.24 | 6.99 | 9.81 | 12.45 | 16.48 | 21.16 | 27.68 | 42.78 |
| High school—Grade 10 Q 1 | 902–940 | 66 | 14.41 | 7.67 | 2.29 | 38.99 | 2.29 | 5.62 | 8.30 | 12.77 | 19.73 | 24.50 | 38.99 |
| High school—Grade 10 Q 2 | 941–947 | 67 | 17.35 | 8.46 | 2.47 | 53.21 | 2.47 | 8.70 | 12.35 | 16.03 | 20.91 | 29.27 | 53.21 |
| High school—Grade 10 Q 3 | 948–961 | 77 | 17.62 | 8.25 | 4.28 | 69.19 | 4.28 | 9.21 | 14.00 | 16.75 | 20.34 | 24.35 | 69.19 |
| High school—Grade 10 Q 4 | 962–999 | 75 | 18.11 | 8.65 | 6.61 | 40.06 | 6.61 | 9.51 | 12.05 | 14.65 | 22.58 | 33.40 | 40.06 |
| High school—Grade 11 Q 1 | 902–942 | 659 | 16.02 | 9.73 | 1.05 | 95.91 | 2.56 | 5.76 | 9.23 | 14.78 | 20.35 | 26.73 | 50.50 |
| High school—Grade 11 Q 2 | 943–949 | 628 | 17.44 | 8.87 | 1.91 | 76.46 | 2.75 | 8.18 | 11.95 | 16.26 | 21.12 | 27.15 | 46.79 |
| High school—Grade 11 Q 3 | 950–959 | 732 | 18.77 | 8.31 | 2.94 | 70.34 | 4.43 | 10.31 | 13.52 | 17.15 | 22.46 | 28.45 | 48.11 |
| High school—Grade 11 Q 4 | 960–999 | 709 | 18.79 | 8.17 | 4.62 | 71.43 | 7.26 | 11.00 | 13.61 | 17.06 | 22.07 | 27.68 | 48.68 |
| High school—Grade 12 Q 1 | 902–941 | 310 | 17.77 | 12.48 | 1.03 | 89.19 | 1.92 | 6.79 | 9.95 | 14.41 | 21.76 | 31.89 | 66.60 |
| High school—Grade 12 Q 2 | 942–950 | 379 | 19.21 | 12.19 | 2.80 | 165.01 | 3.12 | 9.65 | 12.51 | 16.79 | 23.04 | 30.57 | 60.16 |
| High school—Grade 12 Q 3 | 951–959 | 326 | 19.01 | 8.54 | 2.74 | 56.05 | 3.69 | 10.29 | 12.97 | 17.65 | 23.41 | 29.26 | 51.28 |
| High school—Grade 12 Q 4 | 960–999 | 380 | 19.87 | 8.76 | 3.56 | 69.70 | 8.05 | 11.54 | 13.63 | 17.75 | 24.43 | 30.55 | 53.08 |
| High school—All grades Q 1 | 902–941 | 938 | 16.38 | 10.56 | 1.03 | 95.91 | 2.39 | 5.76 | 9.16 | 14.63 | 21.01 | 27.68 | 55.75 |
| High school—All grades Q 2 | 942–949 | 1,146 | 17.87 | 10.32 | 1.77 | 165.01 | 2.82 | 8.52 | 12.02 | 16.22 | 21.31 | 28.03 | 58.37 |
| High school—All grades Q 3 | 950–959 | 1,148 | 18.84 | 8.29 | 2.74 | 70.34 | 4.22 | 10.31 | 13.49 | 17.36 | 22.65 | 28.73 | 50.66 |
| High school—All grades Q 4 | 960–999 | 1,176 | 19.10 | 8.37 | 3.56 | 71.43 | 6.81 | 11.01 | 13.55 | 17.19 | 22.62 | 29.21 | 51.79 |

### Appendix 8.G: Reliability Analyses

Table 8.G.1 Reliabilities and SEMs by Demographic Student Group for Grade Five

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **N** | **Reliability** | **Scale Score SEM** |
| All students | 4,363 | 0.85 | 5.07 |
| Male | 3,004 | 0.85 | 5.10 |
| Female | 1,359 | 0.83 | 4.98 |
| Nonbinary | 0 | N/A | N/A |
| EL | 1,160 | 0.85 | 4.93 |
| English only | 2,659 | 0.85 | 5.12 |
| RFEP | 504 | 0.83 | 5.15 |
| IFEP | 39 | 0.85 | 4.52 |
| ADEL | 0 | N/A | N/A |
| To be determined | 0 | N/A | N/A |
| American Indian or Alaska Native (All) | 24 | 0.89 | 5.21 |
| Asian (All) | 397 | 0.84 | 5.10 |
| Native Hawaiian or Other Pacific Islander (All) | 13 | 0.85 | 4.73 |
| Filipino (All) | 138 | 0.87 | 4.75 |
| Hispanic or Latino (All) | 2,561 | 0.84 | 5.03 |
| Black or African American (All) | 331 | 0.85 | 4.79 |
| White (All) | 679 | 0.86 | 5.25 |
| Two or more races (All) | 220 | 0.83 | 5.44 |
| Intellectual disability | 1,491 | 0.82 | 5.11 |
| Hearing impairment | 26 | 0.87 | 5.24 |
| Speech or language impairment | 68 | 0.76 | 5.55 |
| Visual impairment | 9 | N/A | N/A |
| Emotional disturbance | 18 | 0.79 | 5.88 |
| Orthopedic impairment | 54 | 0.87 | 4.93 |
| Other health impairment | 243 | 0.83 | 5.33 |
| Specific learning disability | 161 | 0.60 | 6.42 |
| Deaf-blindness | 1 | N/A | N/A |
| Multiple disabilities | 157 | 0.87 | 4.65 |
| Autism | 2,123 | 0.85 | 4.86 |
| Traumatic brain injury | 12 | 0.88 | 4.93 |
| Economically disadvantaged | 2,913 | 0.84 | 5.04 |
| Not economically disadvantaged | 1,450 | 0.85 | 5.11 |
| Migrant education | 30 | 0.80 | 4.58 |
| Not migrant education | 4,333 | 0.85 | 5.07 |
| Foster youth | 46 | 0.85 | 4.65 |
| Not foster youth | 4,317 | 0.85 | 5.07 |
| American Indian or Alaska Native (Primary ethnicity—Not economically disadvantaged) | 5 | N/A | N/A |
| American Indian or Alaska Native (Primary ethnicity—Economically disadvantaged) | 19 | 0.90 | 5.11 |
| Asian (Primary ethnicity—Not economically disadvantaged) | 214 | 0.80 | 5.15 |
| Asian (Primary ethnicity—Economically disadvantaged) | 183 | 0.87 | 5.03 |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Not economically disadvantaged) | 3 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Economically disadvantaged) | 10 | N/A | N/A |
| Filipino (Primary ethnicity—Not economically disadvantaged) | 85 | 0.87 | 4.77 |
| Filipino (Primary ethnicity—Economically disadvantaged) | 53 | 0.85 | 4.72 |
| Hispanic or Latino (Primary ethnicity—Not economically disadvantaged) | 605 | 0.83 | 5.29 |
| Hispanic or Latino (Primary ethnicity—Economically disadvantaged) | 1,956 | 0.84 | 4.94 |
| Black or African American (Primary ethnicity—Not economically disadvantaged) | 82 | 0.88 | 4.73 |
| Black or African American (Primary ethnicity—Economically disadvantaged) | 249 | 0.84 | 4.81 |
| White (Primary ethnicity—Not economically disadvantaged) | 332 | 0.87 | 4.96 |
| White (Primary ethnicity—Economically disadvantaged) | 347 | 0.84 | 5.51 |
| Two or more races (Primary ethnicity—Not economically disadvantaged) | 124 | 0.87 | 4.80 |
| Two or more races (Primary ethnicity—Economically disadvantaged) | 96 | 0.78 | 6.08 |
| Using accommodations | 1,048 | 0.85 | 4.76 |
| Not using accommodations | 3,315 | 0.84 | 5.16 |
| Using designated supports | 1,860 | 0.85 | 4.91 |
| Not using designated supports | 2,503 | 0.85 | 5.18 |

Table 8.G.2 Reliabilities and SEMs by Demographic Student Group for Grade Eight

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **N** | **Reliability** | **Scale Score SEM** |
| All students | 4,216 | 0.79 | 6.47 |
| Male | 2,893 | 0.79 | 6.67 |
| Female | 1,323 | 0.79 | 5.99 |
| Nonbinary | 0 | N/A | N/A |
| EL | 919 | 0.83 | 5.43 |
| English only | 2,386 | 0.78 | 6.65 |
| RFEP | 878 | 0.76 | 6.96 |
| IFEP | 32 | 0.89 | 4.95 |
| ADEL | 0 | N/A | N/A |
| To be determined | 0 | N/A | N/A |
| American Indian or Alaska Native (All) | 24 | 0.82 | 4.83 |
| Asian (All) | 317 | 0.86 | 4.76 |
| Native Hawaiian or Other Pacific Islander (All) | 19 | 0.81 | 4.34 |
| Filipino (All) | 112 | 0.72 | 5.91 |
| Hispanic or Latino (All) | 2,551 | 0.79 | 6.35 |
| Black or African American (All) | 329 | 0.76 | 6.91 |
| White (All) | 692 | 0.76 | 7.38 |
| Two or more races (All) | 172 | 0.78 | 6.57 |
| Intellectual disability | 1,620 | 0.78 | 6.00 |
| Hearing impairment | 37 | 0.74 | 4.72 |
| Speech or language impairment | 26 | 0.71 | 5.56 |
| Visual impairment | 8 | N/A | N/A |
| Emotional disturbance | 15 | 0.59 | 10.94 |
| Orthopedic impairment | 62 | 0.86 | 4.95 |
| Other health impairment | 235 | 0.71 | 7.16 |
| Specific learning disability | 203 | 0.43 | 9.10 |
| Deaf-blindness | 2 | N/A | N/A |
| Multiple disabilities | 192 | 0.85 | 5.60 |
| Autism | 1,796 | 0.79 | 6.33 |
| Traumatic brain injury | 20 | 0.59 | 10.68 |
| Economically disadvantaged | 2,898 | 0.79 | 6.32 |
| Not economically disadvantaged | 1,318 | 0.78 | 6.76 |
| Migrant education | 21 | 0.83 | 4.47 |
| Not migrant education | 4,195 | 0.79 | 6.48 |
| Foster youth | 41 | 0.87 | 4.69 |
| Not foster youth | 4,175 | 0.79 | 6.48 |
| American Indian or Alaska Native (Primary ethnicity—Not economically disadvantaged) | 6 | N/A | N/A |
| American Indian or Alaska Native (Primary ethnicity—Economically disadvantaged) | 18 | 0.83 | 4.95 |
| Asian (Primary ethnicity—Not economically disadvantaged) | 144 | 0.86 | 4.65 |
| Asian (Primary ethnicity—Economically disadvantaged) | 173 | 0.86 | 4.84 |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Not economically disadvantaged) | 4 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Economically disadvantaged) | 15 | 0.75 | 4.29 |
| Filipino (Primary ethnicity—Not economically disadvantaged) | 72 | 0.84 | 4.33 |
| Filipino (Primary ethnicity—Economically disadvantaged) | 40 | 0.59 | 7.54 |
| Hispanic or Latino (Primary ethnicity—Not economically disadvantaged) | 550 | 0.76 | 6.89 |
| Hispanic or Latino (Primary ethnicity—Economically disadvantaged) | 2,001 | 0.80 | 6.18 |
| Black or African American (Primary ethnicity—Not economically disadvantaged) | 83 | 0.87 | 5.08 |
| Black or African American (Primary ethnicity—Economically disadvantaged) | 246 | 0.72 | 7.40 |
| White (Primary ethnicity—Not economically disadvantaged) | 368 | 0.75 | 7.62 |
| White (Primary ethnicity—Economically disadvantaged) | 324 | 0.78 | 7.09 |
| Two or more races (Primary ethnicity—Not economically disadvantaged) | 91 | 0.75 | 7.70 |
| Two or more races (Primary ethnicity—Economically disadvantaged) | 81 | 0.84 | 4.83 |
| Using accommodations | 873 | 0.80 | 5.86 |
| Not using accommodations | 3,343 | 0.78 | 6.61 |
| Using designated supports | 1,690 | 0.78 | 6.60 |
| Not using designated supports | 2,526 | 0.79 | 6.37 |

Table 8.G.3 Reliabilities and SEMs by Demographic Student Group for Grade Ten

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **N** | **Reliability** | **Scale Score SEM** |
| All students | 285 | 0.86 | 5.66 |
| Male | 200 | 0.87 | 6.02 |
| Female | 85 | 0.83 | 4.73 |
| Nonbinary | 0 | N/A | N/A |
| EL | 37 | 0.88 | 4.75 |
| English only | 176 | 0.85 | 5.97 |
| RFEP | 69 | 0.88 | 5.26 |
| IFEP | 3 | N/A | N/A |
| ADEL | 0 | N/A | N/A |
| To be determined | 0 | N/A | N/A |
| American Indian or Alaska Native (All) | 1 | N/A | N/A |
| Asian (All) | 12 | 0.80 | 4.30 |
| Native Hawaiian or Other Pacific Islander (All) | 1 | N/A | N/A |
| Filipino (All) | 3 | N/A | N/A |
| Hispanic or Latino (All) | 180 | 0.89 | 5.13 |
| Black or African American (All) | 29 | 0.84 | 4.94 |
| White (All) | 52 | 0.78 | 7.55 |
| Two or more races (All) | 7 | N/A | N/A |
| Intellectual disability | 127 | 0.82 | 5.97 |
| Hearing impairment | 12 | 0.59 | 5.91 |
| Speech or language impairment | 2 | N/A | N/A |
| Visual impairment | 1 | N/A | N/A |
| Emotional disturbance | 3 | N/A | N/A |
| Orthopedic impairment | 4 | N/A | N/A |
| Other health impairment | 9 | N/A | N/A |
| Specific learning disability | 11 | 0.67 | 6.76 |
| Deaf-blindness | 0 | N/A | N/A |
| Multiple disabilities | 14 | 0.90 | 5.05 |
| Autism | 101 | 0.89 | 5.14 |
| Traumatic brain injury | 1 | N/A | N/A |
| Economically disadvantaged | 193 | 0.85 | 5.95 |
| Not economically disadvantaged | 92 | 0.88 | 4.99 |
| Migrant education | 0 | N/A | N/A |
| Not migrant education | 285 | 0.86 | 5.66 |
| Foster youth | 8 | N/A | N/A |
| Not foster youth | 277 | 0.86 | 5.67 |
| American Indian or Alaska Native (Primary ethnicity—Not economically disadvantaged) | 0 | N/A | N/A |
| American Indian or Alaska Native (Primary ethnicity—Economically disadvantaged) | 1 | N/A | N/A |
| Asian (Primary ethnicity—Not economically disadvantaged) | 4 | N/A | N/A |
| Asian (Primary ethnicity—Economically disadvantaged) | 8 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Not economically disadvantaged) | 1 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Economically disadvantaged) | 0 | N/A | N/A |
| Filipino (Primary ethnicity—Not economically disadvantaged) | 1 | N/A | N/A |
| Filipino (Primary ethnicity—Economically disadvantaged) | 2 | N/A | N/A |
| Hispanic or Latino (Primary ethnicity—Not economically disadvantaged) | 43 | 0.89 | 4.88 |
| Hispanic or Latino (Primary ethnicity—Economically disadvantaged) | 137 | 0.89 | 5.20 |
| Black or African American (Primary ethnicity—Not economically disadvantaged) | 8 | N/A | N/A |
| Black or African American (Primary ethnicity—Economically disadvantaged) | 21 | 0.80 | 4.77 |
| White (Primary ethnicity—Not economically disadvantaged) | 30 | 0.89 | 5.15 |
| White (Primary ethnicity—Economically disadvantaged) | 22 | 0.70 | 9.51 |
| Two or more races (Primary ethnicity—Not economically disadvantaged) | 5 | N/A | N/A |
| Two or more races (Primary ethnicity—Economically disadvantaged) | 2 | N/A | N/A |
| Using accommodations | 36 | 0.80 | 4.51 |
| Not using accommodations | 249 | 0.86 | 5.81 |
| Using designated supports | 101 | 0.85 | 5.05 |
| Not using designated supports | 184 | 0.86 | 5.97 |

Table 8.G.4 Reliabilities and SEMs by Demographic Student Group for Grade Eleven

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **N** | **Reliability** | **Scale Score SEM** |
| All students | 2,733 | 0.83 | 5.24 |
| Male | 1,827 | 0.83 | 5.44 |
| Female | 905 | 0.84 | 4.79 |
| Nonbinary | 1 | N/A | N/A |
| EL | 475 | 0.85 | 4.93 |
| English only | 1,486 | 0.83 | 5.35 |
| RFEP | 743 | 0.80 | 5.22 |
| IFEP | 29 | 0.84 | 4.62 |
| ADEL | 0 | N/A | N/A |
| To be determined | 0 | N/A | N/A |
| American Indian or Alaska Native (All) | 11 | 0.89 | 5.13 |
| Asian (All) | 212 | 0.83 | 4.61 |
| Native Hawaiian or Other Pacific Islander (All) | 8 | N/A | N/A |
| Filipino (All) | 77 | 0.81 | 4.67 |
| Hispanic or Latino (All) | 1,664 | 0.82 | 5.29 |
| Black or African American (All) | 205 | 0.84 | 4.97 |
| White (All) | 469 | 0.85 | 5.54 |
| Two or more races (All) | 87 | 0.87 | 5.12 |
| Intellectual disability | 1,212 | 0.82 | 4.92 |
| Hearing impairment | 32 | 0.64 | 7.59 |
| Speech or language impairment | 13 | 0.74 | 5.23 |
| Visual impairment | 3 | N/A | N/A |
| Emotional disturbance | 12 | 0.83 | 6.32 |
| Orthopedic impairment | 55 | 0.86 | 5.16 |
| Other health impairment | 92 | 0.81 | 5.21 |
| Specific learning disability | 125 | 0.71 | 6.28 |
| Deaf-blindness | 1 | N/A | N/A |
| Multiple disabilities | 155 | 0.87 | 4.77 |
| Autism | 1,016 | 0.82 | 5.39 |
| Traumatic brain injury | 17 | 0.83 | 4.79 |
| Economically disadvantaged | 1,906 | 0.83 | 5.31 |
| Not economically disadvantaged | 827 | 0.84 | 5.06 |
| Migrant education | 14 | 0.85 | 4.82 |
| Not migrant education | 2,719 | 0.83 | 5.24 |
| Foster youth | 24 | 0.84 | 5.12 |
| Not foster youth | 2,709 | 0.83 | 5.24 |
| American Indian or Alaska Native (Primary ethnicity—Not economically disadvantaged) | 4 | N/A | N/A |
| American Indian or Alaska Native (Primary ethnicity—Economically disadvantaged) | 7 | N/A | N/A |
| Asian (Primary ethnicity—Not economically disadvantaged) | 117 | 0.83 | 4.56 |
| Asian (Primary ethnicity—Economically disadvantaged) | 95 | 0.84 | 4.68 |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Not economically disadvantaged) | 5 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Economically disadvantaged) | 3 | N/A | N/A |
| Filipino (Primary ethnicity—Not economically disadvantaged) | 43 | 0.81 | 4.65 |
| Filipino (Primary ethnicity—Economically disadvantaged) | 34 | 0.82 | 4.70 |
| Hispanic or Latino (Primary ethnicity—Not economically disadvantaged) | 312 | 0.84 | 4.79 |
| Hispanic or Latino (Primary ethnicity—Economically disadvantaged) | 1,352 | 0.81 | 5.39 |
| Black or African American (Primary ethnicity—Not economically disadvantaged) | 56 | 0.85 | 4.67 |
| Black or African American (Primary ethnicity—Economically disadvantaged) | 149 | 0.84 | 5.08 |
| White (Primary ethnicity—Not economically disadvantaged) | 240 | 0.84 | 5.81 |
| White (Primary ethnicity—Economically disadvantaged) | 229 | 0.86 | 5.24 |
| Two or more races (Primary ethnicity—Not economically disadvantaged) | 50 | 0.85 | 4.79 |
| Two or more races (Primary ethnicity—Economically disadvantaged) | 37 | 0.88 | 5.53 |
| Using accommodations | 305 | 0.85 | 4.88 |
| Not using accommodations | 2,428 | 0.83 | 5.28 |
| Using designated supports | 657 | 0.84 | 4.98 |
| Not using designated supports | 2,076 | 0.83 | 5.31 |

Table 8.G.5 Reliabilities and SEMs by Demographic Student Group for Grade Twelve

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **N** | **Reliability** | **Scale Score SEM** |
| All students | 1,409 | 0.82 | 5.91 |
| Male | 936 | 0.82 | 5.95 |
| Female | 473 | 0.81 | 5.84 |
| Nonbinary | 0 | N/A | N/A |
| EL | 294 | 0.83 | 5.66 |
| English only | 723 | 0.83 | 5.71 |
| RFEP | 379 | 0.79 | 6.45 |
| IFEP | 13 | 0.87 | 4.67 |
| ADEL | 0 | N/A | N/A |
| To be determined | 0 | N/A | N/A |
| American Indian or Alaska Native (All) | 6 | N/A | N/A |
| Asian (All) | 123 | 0.80 | 5.97 |
| Native Hawaiian or Other Pacific Islander (All) | 7 | N/A | N/A |
| Filipino (All) | 47 | 0.86 | 4.66 |
| Hispanic or Latino (All) | 848 | 0.81 | 6.07 |
| Black or African American (All) | 110 | 0.80 | 6.20 |
| White (All) | 220 | 0.87 | 5.30 |
| Two or more races (All) | 48 | 0.87 | 5.32 |
| Intellectual disability | 642 | 0.82 | 5.37 |
| Hearing impairment | 8 | N/A | N/A |
| Speech or language impairment | 4 | N/A | N/A |
| Visual impairment | 5 | N/A | N/A |
| Emotional disturbance | 9 | N/A | N/A |
| Orthopedic impairment | 23 | 0.87 | 4.95 |
| Other health impairment | 65 | 0.69 | 7.81 |
| Specific learning disability | 71 | 0.61 | 6.94 |
| Deaf-blindness | 0 | N/A | N/A |
| Multiple disabilities | 59 | 0.81 | 6.26 |
| Autism | 510 | 0.81 | 6.01 |
| Traumatic brain injury | 13 | 0.80 | 5.79 |
| Economically disadvantaged | 935 | 0.81 | 5.96 |
| Not economically disadvantaged | 474 | 0.83 | 5.81 |
| Migrant education | 12 | 0.74 | 4.66 |
| Not migrant education | 1,397 | 0.82 | 5.92 |
| Foster youth | 10 | N/A | N/A |
| Not foster youth | 1,399 | 0.82 | 5.92 |
| American Indian or Alaska Native (Primary ethnicity—Not economically disadvantaged) | 2 | N/A | N/A |
| American Indian or Alaska Native (Primary ethnicity—Economically disadvantaged) | 4 | N/A | N/A |
| Asian (Primary ethnicity—Not economically disadvantaged) | 64 | 0.77 | 6.78 |
| Asian (Primary ethnicity—Economically disadvantaged) | 59 | 0.85 | 4.79 |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Not economically disadvantaged) | 2 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Economically disadvantaged) | 5 | N/A | N/A |
| Filipino (Primary ethnicity—Not economically disadvantaged) | 27 | 0.84 | 4.59 |
| Filipino (Primary ethnicity—Economically disadvantaged) | 20 | 0.88 | 4.76 |
| Hispanic or Latino (Primary ethnicity—Not economically disadvantaged) | 185 | 0.81 | 6.02 |
| Hispanic or Latino (Primary ethnicity—Economically disadvantaged) | 663 | 0.81 | 6.09 |
| Black or African American (Primary ethnicity—Not economically disadvantaged) | 38 | 0.87 | 4.92 |
| Black or African American (Primary ethnicity—Economically disadvantaged) | 72 | 0.77 | 6.71 |
| White (Primary ethnicity—Not economically disadvantaged) | 127 | 0.87 | 5.35 |
| White (Primary ethnicity—Economically disadvantaged) | 93 | 0.87 | 5.23 |
| Two or more races (Primary ethnicity—Not economically disadvantaged) | 29 | 0.88 | 5.47 |
| Two or more races (Primary ethnicity—Economically disadvantaged) | 19 | 0.84 | 5.07 |
| Using accommodations | 133 | 0.75 | 6.48 |
| Not using accommodations | 1,276 | 0.83 | 5.83 |
| Using designated supports | 337 | 0.84 | 5.38 |
| Not using designated supports | 1,072 | 0.81 | 6.07 |

Table 8.G.6 Reliabilities and SEMs by Demographic Student Group for High School

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Group** | **N** | **Reliability** | **Scale Score SEM** |
| All students | 4,427 | 0.83 | 5.49 |
| Male | 2,963 | 0.83 | 5.65 |
| Female | 1,463 | 0.83 | 5.15 |
| Nonbinary | 1 | N/A | N/A |
| EL | 806 | 0.85 | 5.21 |
| English only | 2,385 | 0.83 | 5.51 |
| RFEP | 1,191 | 0.80 | 5.65 |
| IFEP | 45 | 0.85 | 4.67 |
| ADEL | 0 | N/A | N/A |
| To be determined | 0 | N/A | N/A |
| American Indian or Alaska Native (All) | 18 | 0.86 | 5.10 |
| Asian (All) | 347 | 0.82 | 5.13 |
| Native Hawaiian or Other Pacific Islander (All) | 16 | 0.78 | 4.97 |
| Filipino (All) | 127 | 0.85 | 4.73 |
| Hispanic or Latino (All) | 2,692 | 0.82 | 5.55 |
| Black or African American (All) | 344 | 0.82 | 5.41 |
| White (All) | 741 | 0.85 | 5.66 |
| Two or more races (All) | 142 | 0.87 | 5.15 |
| Intellectual disability | 1,981 | 0.82 | 5.14 |
| Hearing impairment | 52 | 0.69 | 7.05 |
| Speech or language impairment | 19 | 0.77 | 4.99 |
| Visual impairment | 9 | N/A | N/A |
| Emotional disturbance | 24 | 0.79 | 5.90 |
| Orthopedic impairment | 82 | 0.87 | 5.07 |
| Other health impairment | 166 | 0.75 | 6.47 |
| Specific learning disability | 207 | 0.67 | 6.58 |
| Deaf-blindness | 1 | N/A | N/A |
| Multiple disabilities | 228 | 0.85 | 5.26 |
| Autism | 1,627 | 0.82 | 5.58 |
| Traumatic brain injury | 31 | 0.82 | 5.26 |
| Economically disadvantaged | 3,034 | 0.82 | 5.56 |
| Not economically disadvantaged | 1,393 | 0.84 | 5.33 |
| Migrant education | 26 | 0.81 | 4.74 |
| Not migrant education | 4,401 | 0.83 | 5.50 |
| Foster youth | 42 | 0.86 | 5.11 |
| Not foster youth | 4,385 | 0.83 | 5.49 |
| American Indian or Alaska Native (Primary ethnicity—Not economically disadvantaged) | 6 | N/A | N/A |
| American Indian or Alaska Native (Primary ethnicity—Economically disadvantaged) | 12 | 0.87 | 5.36 |
| Asian (Primary ethnicity—Not economically disadvantaged) | 185 | 0.80 | 5.45 |
| Asian (Primary ethnicity—Economically disadvantaged) | 162 | 0.85 | 4.71 |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Not economically disadvantaged) | 8 | N/A | N/A |
| Native Hawaiian or Other Pacific Islander (Primary ethnicity—Economically disadvantaged) | 8 | N/A | N/A |
| Filipino (Primary ethnicity—Not economically disadvantaged) | 71 | 0.84 | 4.66 |
| Filipino (Primary ethnicity—Economically disadvantaged) | 56 | 0.86 | 4.82 |
| Hispanic or Latino (Primary ethnicity—Not economically disadvantaged) | 540 | 0.83 | 5.27 |
| Hispanic or Latino (Primary ethnicity—Economically disadvantaged) | 2,152 | 0.82 | 5.61 |
| Black or African American (Primary ethnicity—Not economically disadvantaged) | 102 | 0.86 | 4.82 |
| Black or African American (Primary ethnicity—Economically disadvantaged) | 242 | 0.81 | 5.63 |
| White (Primary ethnicity—Not economically disadvantaged) | 397 | 0.85 | 5.63 |
| White (Primary ethnicity—Economically disadvantaged) | 344 | 0.84 | 5.69 |
| Two or more races (Primary ethnicity—Not economically disadvantaged) | 84 | 0.86 | 5.01 |
| Two or more races (Primary ethnicity—Economically disadvantaged) | 58 | 0.87 | 5.36 |
| Using accommodations | 474 | 0.82 | 5.43 |
| Not using accommodations | 3,953 | 0.83 | 5.50 |
| Using designated supports | 1,095 | 0.84 | 5.11 |
| Not using designated supports | 3,332 | 0.83 | 5.61 |

Table 8.G.7 Scale Score Conversion Tables with CSEMs, Grade Five Form One

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 2.0890 | 502 | 24 |
| 1 | −4.5015 | 1.0220 | 502 | 12 |
| 2 | −3.7623 | 0.7391 | 508 | 8 |
| 3 | −3.3095 | 0.6173 | 513 | 7 |
| 4 | −2.9732 | 0.5468 | 517 | 6 |
| 5 | −2.7003 | 0.5003 | 520 | 6 |
| 6 | −2.4669 | 0.4672 | 523 | 5 |
| 7 | −2.2602 | 0.4426 | 525 | 5 |
| 8 | −2.0728 | 0.4237 | 527 | 5 |
| 9 | −1.8996 | 0.4089 | 529 | 5 |
| 10 | −1.7373 | 0.3971 | 531 | 4 |
| 11 | −1.5833 | 0.3878 | 533 | 4 |
| 12 | −1.4357 | 0.3804 | 535 | 4 |
| 13 | −1.2932 | 0.3746 | 536 | 4 |
| 14 | −1.1545 | 0.3702 | 538 | 4 |
| 15 | −1.0186 | 0.3669 | 539 | 4 |
| 16 | −0.8848 | 0.3647 | 541 | 4 |
| 17 | −0.7521 | 0.3636 | 542 | 4 |
| 18 | −0.6200 | 0.3633 | 544 | 4 |
| 19 | −0.4877 | 0.3640 | 545 | 4 |
| 20 | −0.3545 | 0.3657 | 547 | 4 |
| 21 | −0.2197 | 0.3684 | 548 | 4 |
| 22 | −0.0826 | 0.3722 | 550 | 4 |
| 23 | 0.0578 | 0.3771 | 551 | 4 |
| 24 | 0.2024 | 0.3834 | 553 | 4 |
| 25 | 0.3525 | 0.3914 | 555 | 4 |
| 26 | 0.5095 | 0.4012 | 557 | 5 |
| 27 | 0.6754 | 0.4135 | 558 | 5 |
| 28 | 0.8527 | 0.4288 | 560 | 5 |
| 29 | 1.0448 | 0.4482 | 563 | 5 |
| 30 | 1.2567 | 0.4732 | 565 | 5 |
| 31 | 1.4962 | 0.5067 | 568 | 6 |
| 32 | 1.7761 | 0.5534 | 571 | 6 |
| 33 | 2.1202 | 0.6240 | 575 | 7 |
| 34 | 2.5818 | 0.7454 | 580 | 8 |
| 35 | 3.3310 | 1.0272 | 588 | 12 |
| 36 | 6.0000 | 3.7079 | 599 | 42 |

Table 8.G.8 Scale Score Conversion Tables with CSEMs, Grade Five Form Two

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.9907 | 502 | 22 |
| 1 | −4.5987 | 1.0233 | 502 | 12 |
| 2 | −3.8569 | 0.7408 | 507 | 8 |
| 3 | −3.4016 | 0.6193 | 512 | 7 |
| 4 | −3.0629 | 0.5490 | 516 | 6 |
| 5 | −2.7875 | 0.5026 | 519 | 6 |
| 6 | −2.5518 | 0.4696 | 522 | 5 |
| 7 | −2.3429 | 0.4450 | 524 | 5 |
| 8 | −2.1534 | 0.4262 | 527 | 5 |
| 9 | −1.9781 | 0.4113 | 528 | 5 |
| 10 | −1.8138 | 0.3996 | 530 | 5 |
| 11 | −1.6579 | 0.3902 | 532 | 4 |
| 12 | −1.5085 | 0.3827 | 534 | 4 |
| 13 | −1.3644 | 0.3767 | 535 | 4 |
| 14 | −1.2241 | 0.3722 | 537 | 4 |
| 15 | −1.0868 | 0.3688 | 539 | 4 |
| 16 | −0.9517 | 0.3664 | 540 | 4 |
| 17 | −0.8178 | 0.3651 | 542 | 4 |
| 18 | −0.6846 | 0.3647 | 543 | 4 |
| 19 | −0.5514 | 0.3653 | 545 | 4 |
| 20 | −0.4173 | 0.3668 | 546 | 4 |
| 21 | −0.2818 | 0.3693 | 548 | 4 |
| 22 | −0.1440 | 0.3730 | 549 | 4 |
| 23 | −0.0031 | 0.3778 | 551 | 4 |
| 24 | 0.1420 | 0.3840 | 552 | 4 |
| 25 | 0.2925 | 0.3919 | 554 | 4 |
| 26 | 0.4499 | 0.4017 | 556 | 5 |
| 27 | 0.6162 | 0.4139 | 558 | 5 |
| 28 | 0.7938 | 0.4292 | 560 | 5 |
| 29 | 0.9863 | 0.4486 | 562 | 5 |
| 30 | 1.1987 | 0.4738 | 564 | 5 |
| 31 | 1.4387 | 0.5073 | 567 | 6 |
| 32 | 1.7193 | 0.5541 | 570 | 6 |
| 33 | 2.0642 | 0.6247 | 574 | 7 |
| 34 | 2.5270 | 0.7463 | 579 | 8 |
| 35 | 3.2776 | 1.0279 | 588 | 12 |
| 36 | 6.0000 | 3.8048 | 599 | 43 |

Table 8.G.9 Scale Score Conversion Tables with CSEMs, Grade Five Form Three

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.9886 | 502 | 22 |
| 1 | −4.6034 | 1.0207 | 502 | 12 |
| 2 | −3.8670 | 0.7372 | 507 | 8 |
| 3 | −3.4171 | 0.6149 | 512 | 7 |
| 4 | −3.0838 | 0.5440 | 516 | 6 |
| 5 | −2.8139 | 0.4972 | 519 | 6 |
| 6 | −2.5836 | 0.4638 | 522 | 5 |
| 7 | −2.3802 | 0.4389 | 524 | 5 |
| 8 | −2.1960 | 0.4198 | 526 | 5 |
| 9 | −2.0261 | 0.4048 | 528 | 5 |
| 10 | −1.8671 | 0.3929 | 530 | 4 |
| 11 | −1.7164 | 0.3835 | 531 | 4 |
| 12 | −1.5722 | 0.3761 | 533 | 4 |
| 13 | −1.4329 | 0.3703 | 535 | 4 |
| 14 | −1.2973 | 0.3659 | 536 | 4 |
| 15 | −1.1645 | 0.3628 | 538 | 4 |
| 16 | −1.0335 | 0.3609 | 539 | 4 |
| 17 | −0.9036 | 0.3600 | 541 | 4 |
| 18 | −0.7739 | 0.3602 | 542 | 4 |
| 19 | −0.6437 | 0.3613 | 544 | 4 |
| 20 | −0.5123 | 0.3635 | 545 | 4 |
| 21 | −0.3789 | 0.3668 | 547 | 4 |
| 22 | −0.2427 | 0.3712 | 548 | 4 |
| 23 | −0.1028 | 0.3769 | 550 | 4 |
| 24 | 0.0420 | 0.3840 | 551 | 4 |
| 25 | 0.1929 | 0.3928 | 553 | 4 |
| 26 | 0.3514 | 0.4036 | 555 | 5 |
| 27 | 0.5197 | 0.4168 | 557 | 5 |
| 28 | 0.7002 | 0.4332 | 559 | 5 |
| 29 | 0.8967 | 0.4537 | 561 | 5 |
| 30 | 1.1142 | 0.4798 | 563 | 5 |
| 31 | 1.3608 | 0.5143 | 566 | 6 |
| 32 | 1.6493 | 0.5621 | 569 | 6 |
| 33 | 2.0042 | 0.6334 | 573 | 7 |
| 34 | 2.4791 | 0.7552 | 579 | 9 |
| 35 | 3.2447 | 1.0359 | 587 | 12 |
| 36 | 6.0000 | 3.8377 | 599 | 43 |

Table 8.G.10 Scale Score Conversion Tables with CSEMs, Grade Five Form Four

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.9472 | 502 | 22 |
| 1 | −4.6462 | 1.0210 | 502 | 12 |
| 2 | −3.9091 | 0.7377 | 507 | 8 |
| 3 | −3.4583 | 0.6156 | 512 | 7 |
| 4 | −3.1240 | 0.5450 | 516 | 6 |
| 5 | −2.8530 | 0.4983 | 519 | 6 |
| 6 | −2.6215 | 0.4652 | 521 | 5 |
| 7 | −2.4167 | 0.4405 | 524 | 5 |
| 8 | −2.2311 | 0.4216 | 526 | 5 |
| 9 | −2.0596 | 0.4068 | 528 | 5 |
| 10 | −1.8989 | 0.3951 | 529 | 4 |
| 11 | −1.7464 | 0.3859 | 531 | 4 |
| 12 | −1.6003 | 0.3786 | 533 | 4 |
| 13 | −1.4590 | 0.3730 | 534 | 4 |
| 14 | −1.3214 | 0.3688 | 536 | 4 |
| 15 | −1.1865 | 0.3658 | 537 | 4 |
| 16 | −1.0534 | 0.3639 | 539 | 4 |
| 17 | −0.9212 | 0.3631 | 540 | 4 |
| 18 | −0.7893 | 0.3632 | 542 | 4 |
| 19 | −0.6569 | 0.3644 | 543 | 4 |
| 20 | −0.5233 | 0.3665 | 545 | 4 |
| 21 | −0.3878 | 0.3697 | 546 | 4 |
| 22 | −0.2494 | 0.3740 | 548 | 4 |
| 23 | −0.1075 | 0.3795 | 550 | 4 |
| 24 | 0.0393 | 0.3865 | 551 | 4 |
| 25 | 0.1920 | 0.3951 | 553 | 4 |
| 26 | 0.3523 | 0.4056 | 555 | 5 |
| 27 | 0.5221 | 0.4186 | 557 | 5 |
| 28 | 0.7040 | 0.4347 | 559 | 5 |
| 29 | 0.9017 | 0.4549 | 561 | 5 |
| 30 | 1.1202 | 0.4808 | 563 | 5 |
| 31 | 1.3676 | 0.5150 | 566 | 6 |
| 32 | 1.6567 | 0.5625 | 569 | 6 |
| 33 | 2.0120 | 0.6336 | 573 | 7 |
| 34 | 2.4870 | 0.7552 | 579 | 9 |
| 35 | 3.2524 | 1.0358 | 587 | 12 |
| 36 | 6.0000 | 3.8235 | 599 | 43 |

Table 8.G.11 Scale Score Conversion Tables with CSEMs, Grade Eight Form One

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.8037 | 802 | 20 |
| 1 | −4.7999 | 1.0250 | 802 | 11 |
| 2 | −4.0548 | 0.7429 | 809 | 8 |
| 3 | −3.5966 | 0.6213 | 814 | 7 |
| 4 | −3.2556 | 0.5509 | 818 | 6 |
| 5 | −2.9784 | 0.5042 | 821 | 5 |
| 6 | −2.7412 | 0.4709 | 824 | 5 |
| 7 | −2.5314 | 0.4459 | 826 | 5 |
| 8 | −2.3412 | 0.4266 | 828 | 5 |
| 9 | −2.1658 | 0.4112 | 830 | 4 |
| 10 | −2.0018 | 0.3989 | 832 | 4 |
| 11 | −1.8466 | 0.3889 | 833 | 4 |
| 12 | −1.6985 | 0.3808 | 835 | 4 |
| 13 | −1.5560 | 0.3742 | 836 | 4 |
| 14 | −1.4180 | 0.3689 | 838 | 4 |
| 15 | −1.2834 | 0.3647 | 839 | 4 |
| 16 | −1.1515 | 0.3616 | 841 | 4 |
| 17 | −1.0214 | 0.3595 | 842 | 4 |
| 18 | −0.8926 | 0.3583 | 844 | 4 |
| 19 | −0.7643 | 0.3580 | 845 | 4 |
| 20 | −0.6359 | 0.3587 | 846 | 4 |
| 21 | −0.5065 | 0.3604 | 848 | 4 |
| 22 | −0.3756 | 0.3633 | 849 | 4 |
| 23 | −0.2421 | 0.3674 | 851 | 4 |
| 24 | −0.1051 | 0.3729 | 852 | 4 |
| 25 | 0.0367 | 0.3802 | 854 | 4 |
| 26 | 0.1847 | 0.3894 | 855 | 4 |
| 27 | 0.3409 | 0.4012 | 857 | 4 |
| 28 | 0.5079 | 0.4162 | 859 | 5 |
| 29 | 0.6889 | 0.4353 | 861 | 5 |
| 30 | 0.8892 | 0.4604 | 863 | 5 |
| 31 | 1.1164 | 0.4940 | 865 | 5 |
| 32 | 1.3832 | 0.5412 | 868 | 6 |
| 33 | 1.7135 | 0.6125 | 872 | 7 |
| 34 | 2.1607 | 0.7354 | 877 | 8 |
| 35 | 2.8945 | 1.0195 | 885 | 11 |
| 36 | 6.0000 | 4.6398 | 899 | 50 |

Table 8.G.12 Scale Score Conversion Tables with CSEMs, Grade Eight Form Two

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.7666 | 802 | 19 |
| 1 | −4.8436 | 1.0240 | 802 | 11 |
| 2 | −4.1007 | 0.7415 | 809 | 8 |
| 3 | −3.6446 | 0.6196 | 814 | 7 |
| 4 | −3.3057 | 0.5491 | 817 | 6 |
| 5 | −3.0304 | 0.5023 | 820 | 5 |
| 6 | −2.7951 | 0.4690 | 823 | 5 |
| 7 | −2.5870 | 0.4441 | 825 | 5 |
| 8 | −2.3984 | 0.4249 | 827 | 5 |
| 9 | −2.2243 | 0.4097 | 829 | 4 |
| 10 | −2.0614 | 0.3977 | 831 | 4 |
| 11 | −1.9070 | 0.3881 | 833 | 4 |
| 12 | −1.7593 | 0.3804 | 834 | 4 |
| 13 | −1.6169 | 0.3744 | 836 | 4 |
| 14 | −1.4784 | 0.3697 | 837 | 4 |
| 15 | −1.3430 | 0.3663 | 839 | 4 |
| 16 | −1.2095 | 0.3641 | 840 | 4 |
| 17 | −1.0774 | 0.3629 | 842 | 4 |
| 18 | −0.9458 | 0.3627 | 843 | 4 |
| 19 | −0.8139 | 0.3635 | 844 | 4 |
| 20 | −0.6810 | 0.3654 | 846 | 4 |
| 21 | −0.5464 | 0.3683 | 847 | 4 |
| 22 | −0.4092 | 0.3724 | 849 | 4 |
| 23 | −0.2685 | 0.3778 | 850 | 4 |
| 24 | −0.1232 | 0.3846 | 852 | 4 |
| 25 | 0.0281 | 0.3932 | 854 | 4 |
| 26 | 0.1868 | 0.4038 | 855 | 4 |
| 27 | 0.3552 | 0.4169 | 857 | 5 |
| 28 | 0.5357 | 0.4332 | 859 | 5 |
| 29 | 0.7322 | 0.4538 | 861 | 5 |
| 30 | 0.9500 | 0.4802 | 864 | 5 |
| 31 | 1.1971 | 0.5152 | 866 | 6 |
| 32 | 1.4871 | 0.5638 | 869 | 6 |
| 33 | 1.8445 | 0.6362 | 873 | 7 |
| 34 | 2.3242 | 0.7593 | 878 | 8 |
| 35 | 3.0976 | 1.0407 | 887 | 11 |
| 36 | 6.0000 | 4.1055 | 899 | 45 |

Table 8.G.13 Scale Score Conversion Tables with CSEMs, Grade Eight Form Three

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.8615 | 802 | 20 |
| 1 | −4.7346 | 1.0252 | 802 | 11 |
| 2 | −3.9892 | 0.7430 | 810 | 8 |
| 3 | −3.5312 | 0.6212 | 815 | 7 |
| 4 | −3.1905 | 0.5504 | 819 | 6 |
| 5 | −2.9139 | 0.5034 | 822 | 5 |
| 6 | −2.6777 | 0.4698 | 824 | 5 |
| 7 | −2.4690 | 0.4445 | 827 | 5 |
| 8 | −2.2802 | 0.4249 | 829 | 5 |
| 9 | −2.1063 | 0.4093 | 830 | 4 |
| 10 | −1.9440 | 0.3968 | 832 | 4 |
| 11 | −1.7906 | 0.3866 | 834 | 4 |
| 12 | −1.6443 | 0.3784 | 835 | 4 |
| 13 | −1.5036 | 0.3717 | 837 | 4 |
| 14 | −1.3673 | 0.3665 | 838 | 4 |
| 15 | −1.2345 | 0.3624 | 840 | 4 |
| 16 | −1.1042 | 0.3595 | 841 | 4 |
| 17 | −0.9756 | 0.3576 | 843 | 4 |
| 18 | −0.8480 | 0.3567 | 844 | 4 |
| 19 | −0.7207 | 0.3568 | 845 | 4 |
| 20 | −0.5929 | 0.3580 | 847 | 4 |
| 21 | −0.4639 | 0.3602 | 848 | 4 |
| 22 | −0.3329 | 0.3637 | 850 | 4 |
| 23 | −0.1989 | 0.3684 | 851 | 4 |
| 24 | −0.0609 | 0.3745 | 853 | 4 |
| 25 | 0.0824 | 0.3824 | 854 | 4 |
| 26 | 0.2324 | 0.3924 | 856 | 4 |
| 27 | 0.3912 | 0.4048 | 858 | 4 |
| 28 | 0.5613 | 0.4203 | 859 | 5 |
| 29 | 0.7463 | 0.4401 | 861 | 5 |
| 30 | 0.9510 | 0.4656 | 864 | 5 |
| 31 | 1.1834 | 0.4996 | 866 | 5 |
| 32 | 1.4561 | 0.5469 | 869 | 6 |
| 33 | 1.7930 | 0.6182 | 873 | 7 |
| 34 | 2.2474 | 0.7406 | 878 | 8 |
| 35 | 2.9893 | 1.0236 | 886 | 11 |
| 36 | 6.0000 | 4.4088 | 899 | 48 |

Table 8.G.14 Scale Score Conversion Tables with CSEMs, Grade Eight Form Four

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 1.9337 | 802 | 21 |
| 1 | −4.6545 | 1.0273 | 803 | 11 |
| 2 | −3.9051 | 0.7456 | 811 | 8 |
| 3 | −3.4433 | 0.6240 | 816 | 7 |
| 4 | −3.0992 | 0.5534 | 820 | 6 |
| 5 | −2.8195 | 0.5065 | 823 | 5 |
| 6 | −2.5803 | 0.4728 | 825 | 5 |
| 7 | −2.3688 | 0.4475 | 828 | 5 |
| 8 | −2.1775 | 0.4278 | 830 | 5 |
| 9 | −2.0012 | 0.4121 | 832 | 4 |
| 10 | −1.8366 | 0.3995 | 833 | 4 |
| 11 | −1.6810 | 0.3893 | 835 | 4 |
| 12 | −1.5327 | 0.3810 | 837 | 4 |
| 13 | −1.3900 | 0.3744 | 838 | 4 |
| 14 | −1.2517 | 0.3691 | 840 | 4 |
| 15 | −1.1169 | 0.3651 | 841 | 4 |
| 16 | −0.9847 | 0.3622 | 843 | 4 |
| 17 | −0.8541 | 0.3603 | 844 | 4 |
| 18 | −0.7245 | 0.3595 | 845 | 4 |
| 19 | −0.5952 | 0.3597 | 847 | 4 |
| 20 | −0.4653 | 0.3609 | 848 | 4 |
| 21 | −0.3342 | 0.3631 | 850 | 4 |
| 22 | −0.2011 | 0.3665 | 851 | 4 |
| 23 | −0.0650 | 0.3712 | 853 | 4 |
| 24 | 0.0751 | 0.3773 | 854 | 4 |
| 25 | 0.2203 | 0.3850 | 856 | 4 |
| 26 | 0.3722 | 0.3946 | 857 | 4 |
| 27 | 0.5327 | 0.4067 | 859 | 4 |
| 28 | 0.7043 | 0.4219 | 861 | 5 |
| 29 | 0.8904 | 0.4412 | 863 | 5 |
| 30 | 1.0960 | 0.4663 | 865 | 5 |
| 31 | 1.3287 | 0.4997 | 868 | 5 |
| 32 | 1.6012 | 0.5465 | 871 | 6 |
| 33 | 1.9374 | 0.6173 | 874 | 7 |
| 34 | 2.3904 | 0.7394 | 879 | 8 |
| 35 | 3.1301 | 1.0223 | 887 | 11 |
| 36 | 6.0000 | 4.1156 | 899 | 45 |

Table 8.G.15 Scale Score Conversion Tables with CSEMs, High School Form One

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 2.1890 | 902 | 25 |
| 1 | −4.4036 | 1.0240 | 902 | 12 |
| 2 | −3.6611 | 0.7408 | 909 | 9 |
| 3 | −3.2065 | 0.6182 | 915 | 7 |
| 4 | −2.8696 | 0.5469 | 919 | 6 |
| 5 | −2.5970 | 0.4994 | 922 | 6 |
| 6 | −2.3649 | 0.4653 | 924 | 5 |
| 7 | −2.1605 | 0.4397 | 927 | 5 |
| 8 | −1.9759 | 0.4199 | 929 | 5 |
| 9 | −1.8062 | 0.4042 | 931 | 5 |
| 10 | −1.6479 | 0.3917 | 933 | 5 |
| 11 | −1.4984 | 0.3816 | 935 | 4 |
| 12 | −1.3559 | 0.3735 | 936 | 4 |
| 13 | −1.2187 | 0.3671 | 938 | 4 |
| 14 | −1.0857 | 0.3622 | 939 | 4 |
| 15 | −0.9558 | 0.3585 | 941 | 4 |
| 16 | −0.8281 | 0.3561 | 942 | 4 |
| 17 | −0.7018 | 0.3548 | 944 | 4 |
| 18 | −0.5760 | 0.3546 | 945 | 4 |
| 19 | −0.4499 | 0.3555 | 947 | 4 |
| 20 | −0.3228 | 0.3576 | 948 | 4 |
| 21 | −0.1937 | 0.3609 | 950 | 4 |
| 22 | −0.0618 | 0.3655 | 951 | 4 |
| 23 | 0.0740 | 0.3715 | 953 | 4 |
| 24 | 0.2149 | 0.3792 | 954 | 4 |
| 25 | 0.3623 | 0.3887 | 956 | 5 |
| 26 | 0.5179 | 0.4003 | 958 | 5 |
| 27 | 0.6838 | 0.4145 | 960 | 5 |
| 28 | 0.8629 | 0.4320 | 962 | 5 |
| 29 | 1.0588 | 0.4536 | 964 | 5 |
| 30 | 1.2769 | 0.4809 | 967 | 6 |
| 31 | 1.5251 | 0.5165 | 970 | 6 |
| 32 | 1.8165 | 0.5652 | 973 | 7 |
| 33 | 2.1754 | 0.6371 | 977 | 7 |
| 34 | 2.6557 | 0.7591 | 983 | 9 |
| 35 | 3.4276 | 1.0393 | 992 | 12 |
| 36 | 6.0000 | 3.4951 | 999 | 41 |

Table 8.G.16 Scale Score Conversion Tables with CSEMs, High School Form Two

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 2.2100 | 902 | 26 |
| 1 | −4.3833 | 1.0247 | 902 | 12 |
| 2 | −3.6394 | 0.7418 | 910 | 9 |
| 3 | −3.1832 | 0.6194 | 915 | 7 |
| 4 | −2.8448 | 0.5483 | 919 | 6 |
| 5 | −2.5707 | 0.5010 | 922 | 6 |
| 6 | −2.3368 | 0.4672 | 925 | 5 |
| 7 | −2.1305 | 0.4419 | 927 | 5 |
| 8 | −1.9439 | 0.4224 | 929 | 5 |
| 9 | −1.7721 | 0.4070 | 931 | 5 |
| 10 | −1.6113 | 0.3949 | 933 | 5 |
| 11 | −1.4593 | 0.3852 | 935 | 4 |
| 12 | −1.3138 | 0.3775 | 937 | 4 |
| 13 | −1.1736 | 0.3715 | 938 | 4 |
| 14 | −1.0372 | 0.3670 | 940 | 4 |
| 15 | −0.9036 | 0.3638 | 941 | 4 |
| 16 | −0.7720 | 0.3617 | 943 | 4 |
| 17 | −0.6415 | 0.3607 | 944 | 4 |
| 18 | −0.5114 | 0.3607 | 946 | 4 |
| 19 | −0.3808 | 0.3618 | 947 | 4 |
| 20 | −0.2491 | 0.3639 | 949 | 4 |
| 21 | −0.1155 | 0.3670 | 951 | 4 |
| 22 | 0.0208 | 0.3713 | 952 | 4 |
| 23 | 0.1607 | 0.3768 | 954 | 4 |
| 24 | 0.3053 | 0.3837 | 955 | 4 |
| 25 | 0.4559 | 0.3923 | 957 | 5 |
| 26 | 0.6138 | 0.4027 | 959 | 5 |
| 27 | 0.7812 | 0.4156 | 961 | 5 |
| 28 | 0.9606 | 0.4316 | 963 | 5 |
| 29 | 1.1554 | 0.4515 | 965 | 5 |
| 30 | 1.3707 | 0.4771 | 968 | 6 |
| 31 | 1.6142 | 0.5110 | 971 | 6 |
| 32 | 1.8988 | 0.5580 | 974 | 6 |
| 33 | 2.2484 | 0.6286 | 978 | 7 |
| 34 | 2.7162 | 0.7498 | 983 | 9 |
| 35 | 3.4724 | 1.0307 | 992 | 12 |
| 36 | 6.0000 | 3.4461 | 999 | 40 |

Table 8.G.17 Scale Score Conversion Tables with CSEMs, High School Form Three

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 2.0528 | 902 | 24 |
| 1 | −4.5362 | 1.0228 | 902 | 12 |
| 2 | −3.7959 | 0.7396 | 908 | 9 |
| 3 | −3.3429 | 0.6170 | 913 | 7 |
| 4 | −3.0073 | 0.5458 | 917 | 6 |
| 5 | −2.7358 | 0.4984 | 920 | 6 |
| 6 | −2.5046 | 0.4645 | 923 | 5 |
| 7 | −2.3007 | 0.4391 | 925 | 5 |
| 8 | −2.1166 | 0.4194 | 927 | 5 |
| 9 | −1.9472 | 0.4039 | 929 | 5 |
| 10 | −1.7891 | 0.3915 | 931 | 5 |
| 11 | −1.6397 | 0.3816 | 933 | 4 |
| 12 | −1.4971 | 0.3737 | 935 | 4 |
| 13 | −1.3597 | 0.3676 | 936 | 4 |
| 14 | −1.2263 | 0.3628 | 938 | 4 |
| 15 | −1.0958 | 0.3594 | 939 | 4 |
| 16 | −0.9674 | 0.3572 | 941 | 4 |
| 17 | −0.8402 | 0.3561 | 942 | 4 |
| 18 | −0.7134 | 0.3561 | 944 | 4 |
| 19 | −0.5862 | 0.3571 | 945 | 4 |
| 20 | −0.4579 | 0.3593 | 947 | 4 |
| 21 | −0.3276 | 0.3626 | 948 | 4 |
| 22 | −0.1944 | 0.3671 | 950 | 4 |
| 23 | −0.0575 | 0.3729 | 951 | 4 |
| 24 | 0.0843 | 0.3803 | 953 | 4 |
| 25 | 0.2325 | 0.3895 | 955 | 5 |
| 26 | 0.3886 | 0.4007 | 956 | 5 |
| 27 | 0.5547 | 0.4145 | 958 | 5 |
| 28 | 0.7335 | 0.4315 | 960 | 5 |
| 29 | 0.9288 | 0.4527 | 963 | 5 |
| 30 | 1.1459 | 0.4798 | 965 | 6 |
| 31 | 1.3928 | 0.5152 | 968 | 6 |
| 32 | 1.6828 | 0.5639 | 971 | 7 |
| 33 | 2.0403 | 0.6360 | 976 | 7 |
| 34 | 2.5191 | 0.7582 | 981 | 9 |
| 35 | 3.2898 | 1.0387 | 990 | 12 |
| 36 | 6.0000 | 3.7429 | 999 | 43 |

Table 8.G.18 Scale Score Conversion Tables with CSEMs, High School Form Four

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Raw Score** | **Theta** | **Theta CSEM** | **Scale Score** | **Scale Score CSEM** |
| 0 | −6.0000 | 2.0575 | 902 | 24 |
| 1 | −4.5321 | 1.0224 | 902 | 12 |
| 2 | −3.7926 | 0.7390 | 908 | 9 |
| 3 | −3.3405 | 0.6164 | 913 | 7 |
| 4 | −3.0057 | 0.5450 | 917 | 6 |
| 5 | −2.7350 | 0.4977 | 920 | 6 |
| 6 | −2.5045 | 0.4638 | 923 | 5 |
| 7 | −2.3013 | 0.4383 | 925 | 5 |
| 8 | −2.1179 | 0.4187 | 927 | 5 |
| 9 | −1.9491 | 0.4031 | 929 | 5 |
| 10 | −1.7916 | 0.3908 | 931 | 5 |
| 11 | −1.6428 | 0.3809 | 933 | 4 |
| 12 | −1.5007 | 0.3730 | 934 | 4 |
| 13 | −1.3638 | 0.3668 | 936 | 4 |
| 14 | −1.2310 | 0.3620 | 938 | 4 |
| 15 | −1.1012 | 0.3585 | 939 | 4 |
| 16 | −0.9734 | 0.3562 | 941 | 4 |
| 17 | −0.8469 | 0.3550 | 942 | 4 |
| 18 | −0.7209 | 0.3549 | 944 | 4 |
| 19 | −0.5946 | 0.3557 | 945 | 4 |
| 20 | −0.4674 | 0.3577 | 946 | 4 |
| 21 | −0.3383 | 0.3607 | 948 | 4 |
| 22 | −0.2066 | 0.3649 | 950 | 4 |
| 23 | −0.0714 | 0.3704 | 951 | 4 |
| 24 | 0.0684 | 0.3774 | 953 | 4 |
| 25 | 0.2142 | 0.3861 | 954 | 4 |
| 26 | 0.3674 | 0.3968 | 956 | 5 |
| 27 | 0.5301 | 0.4100 | 958 | 5 |
| 28 | 0.7048 | 0.4263 | 960 | 5 |
| 29 | 0.8952 | 0.4468 | 962 | 5 |
| 30 | 1.1064 | 0.4730 | 965 | 5 |
| 31 | 1.3461 | 0.5075 | 968 | 6 |
| 32 | 1.6274 | 0.5553 | 971 | 6 |
| 33 | 1.9742 | 0.6267 | 975 | 7 |
| 34 | 2.4400 | 0.7487 | 980 | 9 |
| 35 | 3.1949 | 1.0303 | 989 | 12 |
| 36 | 6.0000 | 3.9551 | 999 | 46 |

#### Test Information Function for Grade Five

Figure 8.G.1 plots TIF by theta level for grade five. The data used to create this graph is found in the table that immediately follows, table 8.G.19. The graph’s y-‍axis shows the TIF values from 0 to 9 in intervals of 1, and its x-axis shows corresponding theta values from −6 to 6 in intervals of 2.

For all four forms, the TIF value is near 0 when theta is −6. The TIF value then increases as theta increases until the TIF value reaches its peak between 7 and 8, where theta is around −0.60 for forms 1 and 2 and −0.90 for forms 3 and 4. After the peak TIF value, the TIF value decreases as theta increases until the TIF value is near 0, where theta is 6.

The plot indicates that the assessment derives more information among students who have theta scores near −0.60 for forms 1 and 2 and −0.90 for forms 3 and 4. The assessment derives little information for students with theta scores that are either less than −5 or greater than 3.

Figure 8.G.1 TIF by theta—grade five

Table 8.G.19 Theta TIF Data, Grade Five

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Theta Form One** | **TIF Form One** | **Theta Form Two** | **TIF Form Two** | **Theta Form Three** | **TIF Form Three** | **Theta Form Four** | **TIF Form Four** |
| −6.0000 | 0.2292 | −6.0000 | 0.2523 | −6.0000 | 0.2529 | −6.0000 | 0.2637 |
| −4.5015 | 0.9574 | −4.5987 | 0.9550 | −4.6034 | 0.9599 | −4.6462 | 0.9593 |
| −3.7623 | 1.8305 | −3.8569 | 1.8220 | −3.8670 | 1.8400 | −3.9091 | 1.8372 |
| −3.3095 | 2.6246 | −3.4016 | 2.6076 | −3.4171 | 2.6448 | −3.4583 | 2.6384 |
| −2.9732 | 3.3450 | −3.0629 | 3.3180 | −3.0838 | 3.3789 | −3.1240 | 3.3670 |
| −2.7003 | 3.9957 | −2.7875 | 3.9586 | −2.8139 | 4.0457 | −2.8530 | 4.0267 |
| −2.4669 | 4.5812 | −2.5518 | 4.5339 | −2.5836 | 4.6487 | −2.6215 | 4.6210 |
| −2.2602 | 5.1054 | −2.3429 | 5.0486 | −2.3802 | 5.1909 | −2.4167 | 5.1532 |
| −2.0728 | 5.5712 | −2.1534 | 5.5060 | −2.1960 | 5.6749 | −2.2311 | 5.6260 |
| −1.8996 | 5.9821 | −1.9781 | 5.9102 | −2.0261 | 6.1029 | −2.0596 | 6.0423 |
| −1.7373 | 6.3404 | −1.8138 | 6.2636 | −1.8671 | 6.4769 | −1.8989 | 6.4044 |
| −1.5833 | 6.6492 | −1.6579 | 6.5693 | −1.7164 | 6.7989 | −1.7464 | 6.7146 |
| −1.4357 | 6.9106 | −1.5085 | 6.8295 | −1.5722 | 7.0703 | −1.6003 | 6.9749 |
| −1.2932 | 7.1264 | −1.3644 | 7.0457 | −1.4329 | 7.2928 | −1.4590 | 7.1873 |
| −1.1545 | 7.2986 | −1.2241 | 7.2202 | −1.2973 | 7.4675 | −1.3214 | 7.3532 |
| −1.0186 | 7.4286 | −1.0868 | 7.3538 | −1.1645 | 7.5955 | −1.1865 | 7.4742 |
| −0.8848 | 7.5175 | −0.9517 | 7.4475 | −1.0335 | 7.6778 | −1.0534 | 7.5515 |
| −0.7521 | 7.5663 | −0.8178 | 7.5022 | −0.9036 | 7.7154 | −0.9212 | 7.5864 |
| −0.6200 | 7.5756 | −0.6846 | 7.5180 | −0.7739 | 7.7090 | −0.7893 | 7.5797 |
| −0.4877 | 7.5457 | −0.5514 | 7.4951 | −0.6437 | 7.6594 | −0.6569 | 7.5321 |
| −0.3545 | 7.4768 | −0.4173 | 7.4330 | −0.5123 | 7.5672 | −0.5233 | 7.4443 |
| −0.2197 | 7.3686 | −0.2818 | 7.3315 | −0.3789 | 7.4328 | −0.3878 | 7.3166 |
| −0.0826 | 7.2206 | −0.1440 | 7.1897 | −0.2427 | 7.2568 | −0.2494 | 7.1491 |
| 0.0578 | 7.0321 | −0.0031 | 7.0068 | −0.1028 | 7.0394 | −0.1075 | 6.9420 |
| 0.2024 | 6.8022 | 0.1420 | 6.7815 | 0.0420 | 6.7806 | 0.0393 | 6.6947 |
| 0.3525 | 6.5295 | 0.2925 | 6.5127 | 0.1929 | 6.4805 | 0.1920 | 6.4070 |
| 0.5095 | 6.2128 | 0.4499 | 6.1987 | 0.3514 | 6.1392 | 0.3523 | 6.0781 |
| 0.6754 | 5.8500 | 0.6162 | 5.8378 | 0.5197 | 5.7556 | 0.5221 | 5.7071 |
| 0.8527 | 5.4394 | 0.7938 | 5.4286 | 0.7002 | 5.3295 | 0.7040 | 5.2927 |
| 1.0448 | 4.9787 | 0.9863 | 4.9685 | 0.8967 | 4.8594 | 0.9017 | 4.8332 |
| 1.2567 | 4.4651 | 1.1987 | 4.4554 | 1.1142 | 4.3439 | 1.1202 | 4.3267 |
| 1.4962 | 3.8952 | 1.4387 | 3.8862 | 1.3608 | 3.7801 | 1.3676 | 3.7702 |
| 1.7761 | 3.2647 | 1.7193 | 3.2567 | 1.6493 | 3.1650 | 1.6567 | 3.1603 |
| 2.1202 | 2.5685 | 2.0642 | 2.5623 | 2.0042 | 2.4923 | 2.0120 | 2.4908 |
| 2.5818 | 1.7994 | 2.5270 | 1.7954 | 2.4791 | 1.7533 | 2.4870 | 1.7533 |
| 3.3310 | 0.9476 | 3.2776 | 0.9462 | 3.2447 | 0.9318 | 3.2524 | 0.9321 |
| 6.0000 | 0.0727 | 6.0000 | 0.0691 | 6.0000 | 0.0679 | 6.0000 | 0.0684 |

Figure 8.G.2 plots TIF by scale score level for grade five. The data used to create this graph is found in the table that immediately follows, table 8.G.20. The graph’s y-axis shows the TIF values from 0 to 9 in intervals of 1, and its x-axis shows corresponding scale score values from 500 to 600 in intervals of 20.

For all four forms, the TIF value is near 0 when scale score is 502. The TIF value then increases as scale score increases until the TIF value reaches its peak between 7 and 8, where scale score is around 540 for all four forms. After the peak TIF value, the TIF value decreases as scale score increases until the TIF value is near 0, where scale score is 599.

The plot indicates that the assessment derives more information among students who have scale scores near 540 regardless of form. The assessment derives little information for students with scale scores that are either less than 503 or greater than 580.

Figure 8.G.2 TIF by scale score—grade five

Table 8.G.20 Scale Score TIF Data, Grade Five

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Scale Score Form One** | **TIF Form One** | **Scale Score Form Two** | **TIF Form Two** | **Scale Score Form Three** | **TIF Form Three** | **Scale Score Form Four** | **TIF Form Four** |
| 502 | 0.2292 | 502 | 0.2523 | 502 | 0.2529 | 502 | 0.2637 |
| 502 | 0.9574 | 502 | 0.9550 | 502 | 0.9599 | 502 | 0.9593 |
| 508 | 1.8305 | 507 | 1.8220 | 507 | 1.8400 | 507 | 1.8372 |
| 513 | 2.6246 | 512 | 2.6076 | 512 | 2.6448 | 512 | 2.6384 |
| 517 | 3.3450 | 516 | 3.3180 | 516 | 3.3789 | 516 | 3.3670 |
| 520 | 3.9957 | 519 | 3.9586 | 519 | 4.0457 | 519 | 4.0267 |
| 523 | 4.5812 | 522 | 4.5339 | 522 | 4.6487 | 521 | 4.6210 |
| 525 | 5.1054 | 524 | 5.0486 | 524 | 5.1909 | 524 | 5.1532 |
| 527 | 5.5712 | 527 | 5.5060 | 526 | 5.6749 | 526 | 5.6260 |
| 529 | 5.9821 | 528 | 5.9102 | 528 | 6.1029 | 528 | 6.0423 |
| 531 | 6.3404 | 530 | 6.2636 | 530 | 6.4769 | 529 | 6.4044 |
| 533 | 6.6492 | 532 | 6.5693 | 531 | 6.7989 | 531 | 6.7146 |
| 535 | 6.9106 | 534 | 6.8295 | 533 | 7.0703 | 533 | 6.9749 |
| 536 | 7.1264 | 535 | 7.0457 | 535 | 7.2928 | 534 | 7.1873 |
| 538 | 7.2986 | 537 | 7.2202 | 536 | 7.4675 | 536 | 7.3532 |
| 539 | 7.4286 | 539 | 7.3538 | 538 | 7.5955 | 537 | 7.4742 |
| 541 | 7.5175 | 540 | 7.4475 | 539 | 7.6778 | 539 | 7.5515 |
| 542 | 7.5663 | 542 | 7.5022 | 541 | 7.7154 | 540 | 7.5864 |
| 544 | 7.5756 | 543 | 7.5180 | 542 | 7.7090 | 542 | 7.5797 |
| 545 | 7.5457 | 545 | 7.4951 | 544 | 7.6594 | 543 | 7.5321 |
| 547 | 7.4768 | 546 | 7.4330 | 545 | 7.5672 | 545 | 7.4443 |
| 548 | 7.3686 | 548 | 7.3315 | 547 | 7.4328 | 546 | 7.3166 |
| 550 | 7.2206 | 549 | 7.1897 | 548 | 7.2568 | 548 | 7.1491 |
| 551 | 7.0321 | 551 | 7.0068 | 550 | 7.0394 | 550 | 6.9420 |
| 553 | 6.8022 | 552 | 6.7815 | 551 | 6.7806 | 551 | 6.6947 |
| 555 | 6.5295 | 554 | 6.5127 | 553 | 6.4805 | 553 | 6.4070 |
| 557 | 6.2128 | 556 | 6.1987 | 555 | 6.1392 | 555 | 6.0781 |
| 558 | 5.8500 | 558 | 5.8378 | 557 | 5.7556 | 557 | 5.7071 |
| 560 | 5.4394 | 560 | 5.4286 | 559 | 5.3295 | 559 | 5.2927 |
| 563 | 4.9787 | 562 | 4.9685 | 561 | 4.8594 | 561 | 4.8332 |
| 565 | 4.4651 | 564 | 4.4554 | 563 | 4.3439 | 563 | 4.3267 |
| 568 | 3.8952 | 567 | 3.8862 | 566 | 3.7801 | 566 | 3.7702 |
| 571 | 3.2647 | 570 | 3.2567 | 569 | 3.1650 | 569 | 3.1603 |
| 575 | 2.5685 | 574 | 2.5623 | 573 | 2.4923 | 573 | 2.4908 |
| 580 | 1.7994 | 579 | 1.7954 | 579 | 1.7533 | 579 | 1.7533 |
| 588 | 0.9476 | 588 | 0.9462 | 587 | 0.9318 | 587 | 0.9321 |
| 599 | 0.0727 | 599 | 0.0691 | 599 | 0.0679 | 599 | 0.0684 |

#### Test Information Function for Grade Eight

Figure 8.G.3 plots TIF by theta level for grade eight. The data used to create this graph is found in the table that immediately follows, table 8.G.21. The graph’s y-axis shows the TIF values from 0 to 9 in intervals of 1, and its x-axis shows corresponding theta values from −6 to 6 in intervals of 2.

For all four forms, the TIF value is near 0 when theta is −6. The TIF value then increases as theta increases until the TIF value reaches its peak between 7.5 and 7.9, where theta is around −0.8 for all four forms. After the peak TIF value, the TIF value decreases as theta increases until the TIF value is near 0, where theta is 6.

The plot indicates that the assessment derives more information among students who have theta scores near −0.8 regardless of form. The assessment derives little information for students with theta scores that are either less than −4.5 or greater than 3.

Figure 8.G.3 TIF by theta—grade eight

Table 8.G.21 Theta TIF Data, Grade Eight

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Theta Form One** | **TIF Form One** | **Theta Form Two** | **TIF Form Two** | **Theta Form Three** | **TIF Form Three** | **Theta Form Four** | **TIF Form Four** |
| −6.0000 | 0.3074 | −6.0000 | 0.3204 | −6.0000 | 0.2886 | −6.0000 | 0.2675 |
| −4.7999 | 0.9518 | −4.8436 | 0.9538 | −4.7346 | 0.9514 | −4.6545 | 0.9477 |
| −4.0548 | 1.8119 | −4.1007 | 1.8190 | −3.9892 | 1.8117 | −3.9051 | 1.7992 |
| −3.5966 | 2.5905 | −3.6446 | 2.6046 | −3.5312 | 2.5919 | −3.4433 | 2.5683 |
| −3.2556 | 3.2953 | −3.3057 | 3.3171 | −3.1905 | 3.3010 | −3.0992 | 3.2655 |
| −2.9784 | 3.9331 | −3.0304 | 3.9629 | −2.9139 | 3.9457 | −2.8195 | 3.8984 |
| −2.7412 | 4.5095 | −2.7951 | 4.5460 | −2.6777 | 4.5308 | −2.5803 | 4.4731 |
| −2.5314 | 5.0290 | −2.5870 | 5.0705 | −2.4690 | 5.0611 | −2.3688 | 4.9943 |
| −2.3412 | 5.4959 | −2.3984 | 5.5396 | −2.2802 | 5.5399 | −2.1775 | 5.4648 |
| −2.1658 | 5.9134 | −2.2243 | 5.9562 | −2.1063 | 5.9698 | −2.0012 | 5.8879 |
| −2.0018 | 6.2845 | −2.0614 | 6.3221 | −1.9440 | 6.3528 | −1.8366 | 6.2650 |
| −1.8466 | 6.6119 | −1.9070 | 6.6396 | −1.7906 | 6.6910 | −1.6810 | 6.5980 |
| −1.6985 | 6.8975 | −1.7593 | 6.9101 | −1.6443 | 6.9855 | −1.5327 | 6.8876 |
| −1.5560 | 7.1430 | −1.6169 | 7.1348 | −1.5036 | 7.2372 | −1.3900 | 7.1346 |
| −1.4180 | 7.3494 | −1.4784 | 7.3149 | −1.3673 | 7.4465 | −1.2517 | 7.3395 |
| −1.2834 | 7.5176 | −1.3430 | 7.4511 | −1.2345 | 7.6136 | −1.1169 | 7.5022 |
| −1.1515 | 7.6475 | −1.2095 | 7.5442 | −1.1042 | 7.7384 | −0.9847 | 7.6227 |
| −1.0214 | 7.7390 | −1.0774 | 7.5945 | −0.9756 | 7.8204 | −0.8541 | 7.7010 |
| −0.8926 | 7.7911 | −0.9458 | 7.6024 | −0.8480 | 7.8591 | −0.7245 | 7.7366 |
| −0.7643 | 7.8027 | −0.8139 | 7.5679 | −0.7207 | 7.8535 | −0.5952 | 7.7291 |
| −0.6359 | 7.7723 | −0.6810 | 7.4912 | −0.5929 | 7.8028 | −0.4653 | 7.6781 |
| −0.5065 | 7.6979 | −0.5464 | 7.3723 | −0.4639 | 7.7059 | −0.3342 | 7.5830 |
| −0.3756 | 7.5776 | −0.4092 | 7.2108 | −0.3329 | 7.5619 | −0.2011 | 7.4432 |
| −0.2421 | 7.4092 | −0.2685 | 7.0067 | −0.1989 | 7.3696 | −0.0650 | 7.2580 |
| −0.1051 | 7.1907 | −0.1232 | 6.7595 | −0.0609 | 7.1284 | 0.0751 | 7.0265 |
| 0.0367 | 6.9197 | 0.0281 | 6.4686 | 0.0824 | 6.8373 | 0.2203 | 6.7480 |
| 0.1847 | 6.5946 | 0.1868 | 6.1339 | 0.2324 | 6.4961 | 0.3722 | 6.4212 |
| 0.3409 | 6.2134 | 0.3552 | 5.7540 | 0.3912 | 6.1036 | 0.5327 | 6.0449 |
| 0.5079 | 5.7743 | 0.5357 | 5.3288 | 0.5613 | 5.6595 | 0.7043 | 5.6172 |
| 0.6889 | 5.2765 | 0.7322 | 4.8567 | 0.7463 | 5.1627 | 0.8904 | 5.1364 |
| 0.8892 | 4.7180 | 0.9500 | 4.3365 | 0.9510 | 4.6126 | 1.0960 | 4.5999 |
| 1.1164 | 4.0976 | 1.1971 | 3.7671 | 1.1834 | 4.0067 | 1.3287 | 4.0049 |
| 1.3832 | 3.4140 | 1.4871 | 3.1461 | 1.4561 | 3.3428 | 1.6012 | 3.3479 |
| 1.7135 | 2.6653 | 1.8445 | 2.4709 | 1.7930 | 2.6168 | 1.9374 | 2.6242 |
| 2.1607 | 1.8490 | 2.3242 | 1.7347 | 2.2474 | 1.8233 | 2.3904 | 1.8292 |
| 2.8945 | 0.9622 | 3.0976 | 0.9233 | 2.9893 | 0.9544 | 3.1301 | 0.9567 |
| 6.0000 | 0.0465 | 6.0000 | 0.0593 | 6.0000 | 0.0514 | 6.0000 | 0.0590 |

Figure 8.G.4 plots TIF by scale score level for grade eight. The data used to create this graph is found in the table that immediately follows, table 8.G.22. The graph’s y-axis shows the TIF values from 0 to 9 in intervals of 1, and its x-axis shows corresponding scale score values from 800 to 900 in intervals of 20.

For all four forms, the TIF value is near 0 when scale score is 802. The TIF value then increases as scale score increases until the TIF value reaches its peak between 7.5 and 7.9, where scale score is around 845 for all four forms. After the peak TIF value, the TIF value decreases as scale score increases until the TIF value is near 0, where scale score is 899.

The plot indicates that the assessment derives more information among students who have scale scores near 845 regardless of form. The assessment derives little information for students with scale scores that are either less than 803 or greater than 890.

Figure 8.G.4 TIF by scale score—grade eight

Table 8.G.22 Scale Score TIF Data, Grade Eight

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Scale Score Form One** | **TIF Form One** | **Scale Score Form Two** | **TIF Form Two** | **Scale Score Form Three** | **TIF Form Three** | **Scale Score Form Four** | **TIF Form Four** |
| 802 | 0.3074 | 802 | 0.3204 | 802 | 0.2886 | 802 | 0.2675 |
| 802 | 0.9518 | 802 | 0.9538 | 802 | 0.9514 | 803 | 0.9477 |
| 809 | 1.8119 | 809 | 1.8190 | 810 | 1.8117 | 811 | 1.7992 |
| 814 | 2.5905 | 814 | 2.6046 | 815 | 2.5919 | 816 | 2.5683 |
| 818 | 3.2953 | 817 | 3.3171 | 819 | 3.3010 | 820 | 3.2655 |
| 821 | 3.9331 | 820 | 3.9629 | 822 | 3.9457 | 823 | 3.8984 |
| 824 | 4.5095 | 823 | 4.5460 | 824 | 4.5308 | 825 | 4.4731 |
| 826 | 5.0290 | 825 | 5.0705 | 827 | 5.0611 | 828 | 4.9943 |
| 828 | 5.4959 | 827 | 5.5396 | 829 | 5.5399 | 830 | 5.4648 |
| 830 | 5.9134 | 829 | 5.9562 | 830 | 5.9698 | 832 | 5.8879 |
| 832 | 6.2845 | 831 | 6.3221 | 832 | 6.3528 | 833 | 6.2650 |
| 833 | 6.6119 | 833 | 6.6396 | 834 | 6.6910 | 835 | 6.5980 |
| 835 | 6.8975 | 834 | 6.9101 | 835 | 6.9855 | 837 | 6.8876 |
| 836 | 7.1430 | 836 | 7.1348 | 837 | 7.2372 | 838 | 7.1346 |
| 838 | 7.3494 | 837 | 7.3149 | 838 | 7.4465 | 840 | 7.3395 |
| 839 | 7.5176 | 839 | 7.4511 | 840 | 7.6136 | 841 | 7.5022 |
| 841 | 7.6475 | 840 | 7.5442 | 841 | 7.7384 | 843 | 7.6227 |
| 842 | 7.7390 | 842 | 7.5945 | 843 | 7.8204 | 844 | 7.7010 |
| 844 | 7.7911 | 843 | 7.6024 | 844 | 7.8591 | 845 | 7.7366 |
| 845 | 7.8027 | 844 | 7.5679 | 845 | 7.8535 | 847 | 7.7291 |
| 846 | 7.7723 | 846 | 7.4912 | 847 | 7.8028 | 848 | 7.6781 |
| 848 | 7.6979 | 847 | 7.3723 | 848 | 7.7059 | 850 | 7.5830 |
| 849 | 7.5776 | 849 | 7.2108 | 850 | 7.5619 | 851 | 7.4432 |
| 851 | 7.4092 | 850 | 7.0067 | 851 | 7.3696 | 853 | 7.2580 |
| 852 | 7.1907 | 852 | 6.7595 | 853 | 7.1284 | 854 | 7.0265 |
| 854 | 6.9197 | 854 | 6.4686 | 854 | 6.8373 | 856 | 6.7480 |
| 855 | 6.5946 | 855 | 6.1339 | 856 | 6.4961 | 857 | 6.4212 |
| 857 | 6.2134 | 857 | 5.7540 | 858 | 6.1036 | 859 | 6.0449 |
| 859 | 5.7743 | 859 | 5.3288 | 859 | 5.6595 | 861 | 5.6172 |
| 861 | 5.2765 | 861 | 4.8567 | 861 | 5.1627 | 863 | 5.1364 |
| 863 | 4.7180 | 864 | 4.3365 | 864 | 4.6126 | 865 | 4.5999 |
| 865 | 4.0976 | 866 | 3.7671 | 866 | 4.0067 | 868 | 4.0049 |
| 868 | 3.4140 | 869 | 3.1461 | 869 | 3.3428 | 871 | 3.3479 |
| 872 | 2.6653 | 873 | 2.4709 | 873 | 2.6168 | 874 | 2.6242 |
| 877 | 1.8490 | 878 | 1.7347 | 878 | 1.8233 | 879 | 1.8292 |
| 885 | 0.9622 | 887 | 0.9233 | 886 | 0.9544 | 887 | 0.9567 |
| 899 | 0.0465 | 899 | 0.0593 | 899 | 0.0514 | 899 | 0.0590 |

#### Test Information Function for High School

Figure 8.G.5 plots TIF by theta level for high school. The data used to create this graph is found in the table that immediately follows, table 8.G.23. The graph’s y-axis shows the TIF values from 0 to 9 in intervals of 1, and its x-axis shows corresponding theta values from −6 to 6 in intervals of 2.

For all four forms, the TIF value is near 0 when theta is −6. The TIF value then increases as theta increases until the TIF value reaches its peak between 7.5 and 8.2, where theta is around −0.5 for forms 1 and 2 and −0.7 for forms 3 and 4. After the peak TIF value, the TIF value decreases as theta increases until the TIF value is near 0, where theta is 6.

The plot indicates that the assessment derives more information among students who have theta scores near −0.5 for forms 1 and 2 and −0.7 for forms 3 and 4. The assessment derives little information for students with theta scores that are either less than −4 or greater than 3.

Figure 8.G.5 TIF by theta—high school

Table 8.G.23 Theta TIF Data, High School

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Theta Form One** | **TIF Form One** | **Theta Form Two** | **TIF Form Two** | **Theta Form Three** | **TIF Form Three** | **Theta Form Four** | **TIF Form Four** |
| −6.0000 | 0.2087 | −6.0000 | 0.2047 | −6.0000 | 0.2373 | −6.0000 | 0.2362 |
| −4.4036 | 0.9536 | −4.3833 | 0.9524 | −4.5362 | 0.9559 | −4.5321 | 0.9567 |
| −3.6611 | 1.8220 | −3.6394 | 1.8171 | −3.7959 | 1.8282 | −3.7926 | 1.8313 |
| −3.2065 | 2.6161 | −3.1832 | 2.6061 | −3.3429 | 2.6264 | −3.3405 | 2.6323 |
| −2.8696 | 3.3437 | −2.8448 | 3.3265 | −3.0073 | 3.3570 | −3.0057 | 3.3663 |
| −2.5970 | 4.0101 | −2.5707 | 3.9834 | −2.7358 | 4.0249 | −2.7350 | 4.0374 |
| −2.3649 | 4.6184 | −2.3368 | 4.5808 | −2.5046 | 4.6336 | −2.5045 | 4.6493 |
| −2.1605 | 5.1714 | −2.1305 | 5.1207 | −2.3007 | 5.1862 | −2.3013 | 5.2047 |
| −1.9759 | 5.6715 | −1.9439 | 5.6052 | −2.1166 | 5.6844 | −2.1179 | 5.7052 |
| −1.8062 | 6.1200 | −1.7721 | 6.0356 | −1.9472 | 6.1298 | −1.9491 | 6.1529 |
| −1.6479 | 6.5182 | −1.6113 | 6.4139 | −1.7891 | 6.5234 | −1.7916 | 6.5484 |
| −1.4984 | 6.8671 | −1.4593 | 6.7405 | −1.6397 | 6.8662 | −1.6428 | 6.8931 |
| −1.3559 | 7.1672 | −1.3138 | 7.0173 | −1.4971 | 7.1589 | −1.5007 | 7.1880 |
| −1.2187 | 7.4194 | −1.1736 | 7.2448 | −1.3597 | 7.4021 | −1.3638 | 7.4336 |
| −1.0857 | 7.6235 | −1.0372 | 7.4244 | −1.2263 | 7.5961 | −1.2310 | 7.6304 |
| −0.9558 | 7.7794 | −0.9036 | 7.5572 | −1.0958 | 7.7413 | −1.1012 | 7.7791 |
| −0.8281 | 7.8870 | −0.7720 | 7.6441 | −0.9674 | 7.8381 | −0.9734 | 7.8802 |
| −0.7018 | 7.9456 | −0.6415 | 7.6862 | −0.8402 | 7.8868 | −0.8469 | 7.9341 |
| −0.5760 | 7.9547 | −0.5114 | 7.6845 | −0.7134 | 7.8878 | −0.7209 | 7.9412 |
| −0.4499 | 7.9137 | −0.3808 | 7.6397 | −0.5862 | 7.8413 | −0.5946 | 7.9020 |
| −0.3228 | 7.8222 | −0.2491 | 7.5527 | −0.4579 | 7.7479 | −0.4674 | 7.8167 |
| −0.1937 | 7.6800 | −0.1155 | 7.4241 | −0.3276 | 7.6080 | −0.3383 | 7.6856 |
| −0.0618 | 7.4876 | 0.0208 | 7.2543 | −0.1944 | 7.4218 | −0.2066 | 7.5091 |
| 0.0740 | 7.2458 | 0.1607 | 7.0436 | −0.0575 | 7.1902 | −0.0714 | 7.2873 |
| 0.2149 | 6.9561 | 0.3053 | 6.7921 | 0.0843 | 6.9138 | 0.0684 | 7.0204 |
| 0.3623 | 6.6202 | 0.4559 | 6.4994 | 0.2325 | 6.5928 | 0.2142 | 6.7084 |
| 0.5179 | 6.2405 | 0.6138 | 6.1656 | 0.3886 | 6.2282 | 0.3674 | 6.3517 |
| 0.6838 | 5.8195 | 0.7812 | 5.7893 | 0.5547 | 5.8206 | 0.5301 | 5.9498 |
| 0.8629 | 5.3588 | 0.9606 | 5.3695 | 0.7335 | 5.3708 | 0.7048 | 5.5029 |
| 1.0588 | 4.8602 | 1.1554 | 4.9049 | 0.9288 | 4.8787 | 0.8952 | 5.0101 |
| 1.2769 | 4.3237 | 1.3707 | 4.3927 | 1.1459 | 4.3446 | 1.1064 | 4.4706 |
| 1.5251 | 3.7484 | 1.6142 | 3.8299 | 1.3928 | 3.7676 | 1.3461 | 3.8827 |
| 1.8165 | 3.1306 | 1.8988 | 3.2114 | 1.6828 | 3.1452 | 1.6274 | 3.2429 |
| 2.1754 | 2.4636 | 2.2484 | 2.5306 | 2.0403 | 2.4724 | 1.9742 | 2.5462 |
| 2.6557 | 1.7352 | 2.7162 | 1.7785 | 2.5191 | 1.7393 | 2.4400 | 1.7837 |
| 3.4276 | 0.9258 | 3.4724 | 0.9413 | 3.2898 | 0.9268 | 3.1949 | 0.9419 |
| 6.0000 | 0.0818 | 6.0000 | 0.0842 | 6.0000 | 0.0714 | 6.0000 | 0.0639 |

Figure 8.G.6 plots TIF by scale score level for high school. The data used to create this graph is found in the table that immediately follows, table 8.G.24. The graph’s y-axis shows the TIF values from 0 to 9 in intervals of 1, and its x-axis shows corresponding scale score values from 900 to 1000 in intervals of 20.

For all four forms, the TIF value is near 0 when scale score is 902. The TIF value then increases as scale score increases until the TIF value reaches its peak between 7.5 and 8.2, where scale score is around 940 for all four forms. After the peak TIF value, the TIF value decreases as scale score increases until the TIF value is near 0, where scale score is 999.

The plot indicates that the assessment derives more information among students who have scale scores near 940 regardless of form. The assessment derives little information for students with scale scores that are either less than 903 or greater than 990.

Figure 8.G.6 TIF by scale score—high school

Table 8.G.24 Scale Score TIF Data, High School

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Scale Score Form One** | **TIF Form One** | **Scale Score Form Two** | **TIF Form Two** | **Scale Score Form Three** | **TIF Form Three** | **Scale Score Form Four** | **TIF Form Four** |
| 902 | 0.2087 | 902 | 0.2047 | 902 | 0.2373 | 902 | 0.2362 |
| 902 | 0.9536 | 902 | 0.9524 | 902 | 0.9559 | 902 | 0.9567 |
| 909 | 1.8220 | 910 | 1.8171 | 908 | 1.8282 | 908 | 1.8313 |
| 915 | 2.6161 | 915 | 2.6061 | 913 | 2.6264 | 913 | 2.6323 |
| 919 | 3.3437 | 919 | 3.3265 | 917 | 3.3570 | 917 | 3.3663 |
| 922 | 4.0101 | 922 | 3.9834 | 920 | 4.0249 | 920 | 4.0374 |
| 924 | 4.6184 | 925 | 4.5808 | 923 | 4.6336 | 923 | 4.6493 |
| 927 | 5.1714 | 927 | 5.1207 | 925 | 5.1862 | 925 | 5.2047 |
| 929 | 5.6715 | 929 | 5.6052 | 927 | 5.6844 | 927 | 5.7052 |
| 931 | 6.1200 | 931 | 6.0356 | 929 | 6.1298 | 929 | 6.1529 |
| 933 | 6.5182 | 933 | 6.4139 | 931 | 6.5234 | 931 | 6.5484 |
| 935 | 6.8671 | 935 | 6.7405 | 933 | 6.8662 | 933 | 6.8931 |
| 936 | 7.1672 | 937 | 7.0173 | 935 | 7.1589 | 934 | 7.1880 |
| 938 | 7.4194 | 938 | 7.2448 | 936 | 7.4021 | 936 | 7.4336 |
| 939 | 7.6235 | 940 | 7.4244 | 938 | 7.5961 | 938 | 7.6304 |
| 941 | 7.7794 | 941 | 7.5572 | 939 | 7.7413 | 939 | 7.7791 |
| 942 | 7.8870 | 943 | 7.6441 | 941 | 7.8381 | 941 | 7.8802 |
| 944 | 7.9456 | 944 | 7.6862 | 942 | 7.8868 | 942 | 7.9341 |
| 945 | 7.9547 | 946 | 7.6845 | 944 | 7.8878 | 944 | 7.9412 |
| 947 | 7.9137 | 947 | 7.6397 | 945 | 7.8413 | 945 | 7.9020 |
| 948 | 7.8222 | 949 | 7.5527 | 947 | 7.7479 | 946 | 7.8167 |
| 950 | 7.6800 | 951 | 7.4241 | 948 | 7.6080 | 948 | 7.6856 |
| 951 | 7.4876 | 952 | 7.2543 | 950 | 7.4218 | 950 | 7.5091 |
| 953 | 7.2458 | 954 | 7.0436 | 951 | 7.1902 | 951 | 7.2873 |
| 954 | 6.9561 | 955 | 6.7921 | 953 | 6.9138 | 953 | 7.0204 |
| 956 | 6.6202 | 957 | 6.4994 | 955 | 6.5928 | 954 | 6.7084 |
| 958 | 6.2405 | 959 | 6.1656 | 956 | 6.2282 | 956 | 6.3517 |
| 960 | 5.8195 | 961 | 5.7893 | 958 | 5.8206 | 958 | 5.9498 |
| 962 | 5.3588 | 963 | 5.3695 | 960 | 5.3708 | 960 | 5.5029 |
| 964 | 4.8602 | 965 | 4.9049 | 963 | 4.8787 | 962 | 5.0101 |
| 967 | 4.3237 | 968 | 4.3927 | 965 | 4.3446 | 965 | 4.4706 |
| 970 | 3.7484 | 971 | 3.8299 | 968 | 3.7676 | 968 | 3.8827 |
| 973 | 3.1306 | 974 | 3.2114 | 971 | 3.1452 | 971 | 3.2429 |
| 977 | 2.4636 | 978 | 2.5306 | 976 | 2.4724 | 975 | 2.5462 |
| 983 | 1.7352 | 983 | 1.7785 | 981 | 1.7393 | 980 | 1.7837 |
| 992 | 0.9258 | 992 | 0.9413 | 990 | 0.9268 | 989 | 0.9419 |
| 999 | 0.0818 | 999 | 0.0842 | 999 | 0.0714 | 999 | 0.0639 |

Table 8.G.25 Decision Accuracy, Grade Five

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** | **Category Total** |
| 502–544 | 0.27 | 0.07 | 0.00 | 0.34 |
| 545–559 | 0.05 | 0.32 | 0.04 | 0.41 |
| 560–599 | 0.00 | 0.06 | 0.19 | 0.24 |

All-forms average, estimated proportion correctly classified: total = 0.79

Table 8.G.26 Decision Accuracy, Grade Eight

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** | **Category Total** |
| 802–844 | 0.21 | 0.08 | 0.00 | 0.29 |
| 845–859 | 0.08 | 0.28 | 0.05 | 0.41 |
| 860–899 | 0.00 | 0.06 | 0.24 | 0.30 |

All-forms average, estimated proportion correctly classified: total = 0.73

Table 8.G.27 Decision Accuracy, High School

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** | **Category Total** |
| 902–944 | 0.26 | 0.07 | 0.00 | 0.32 |
| 945–959 | 0.07 | 0.30 | 0.04 | 0.41 |
| 960–999 | 0.00 | 0.05 | 0.21 | 0.27 |

All-forms average, estimated proportion correctly classified: total = 0.77

Table 8.G.28 Decision Consistency, Grade Five

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** | **Category Total** |
| 502–544 | 0.26 | 0.08 | 0.00 | 0.34 |
| 545–559 | 0.08 | 0.27 | 0.07 | 0.41 |
| 560–599 | 0.00 | 0.07 | 0.18 | 0.24 |

All-forms average, estimated proportion consistency classified: total = 0.70

Table 8.G.29 Decision Consistency, Grade Eight

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** | **Category Total** |
| 802–844 | 0.19 | 0.10 | 0.00 | 0.29 |
| 845–859 | 0.11 | 0.22 | 0.08 | 0.41 |
| 860–899 | 0.00 | 0.07 | 0.23 | 0.30 |

All-forms average, estimated proportion consistency classified: total = 0.64

Table 8.G.30 Decision Consistency, High School

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scale Score** | **Level 1—Limited Understanding** | **Level 2—Foundational Understanding** | **Level 3—Understanding** | **Category Total** |
| 902–944 | 0.24 | 0.09 | 0.00 | 0.32 |
| 945–959 | 0.09 | 0.25 | 0.07 | 0.41 |
| 960–999 | 0.00 | 0.06 | 0.20 | 0.27 |

All-forms average, estimated proportion consistency classified: total = 0.68

### Appendix 8.H: Validity Analyses

Table 8.H.1 Correlations Between CAA for Science and CAA for ELA Test Scores for All Students

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | 4,421 | 4,363 | 4,117 | 0.74 |
| Grade 8 | 4,316 | 4,216 | 4,032 | 0.68 |
| Grade 11 | 4,118 | 2,733 | 2,635 | 0.67 |

Table 8.H.2 Correlations Between CAA for Science and CAA for Mathematics Test Scores for All Students

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grade Level** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | 4,348 | 4,363 | 4,070 | 0.57 |
| Grade 8 | 4,180 | 4,216 | 3,951 | 0.66 |
| Grade 11 | 4,045 | 2,733 | 2,609 | 0.68 |

Table 8.H.3 Correlations Between CAA for Science and CAA for ELA Test Scores by Gender

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Male | 3,037 | 3,004 | 2,823 | 0.75 |
| Grade 5 | Female | 1,384 | 1,359 | 1,294 | 0.73 |
| Grade 5 | Nonbinary | 0 | 0 | 0 | N/A |
| Grade 8 | Male | 2,955 | 2,893 | 2,763 | 0.68 |
| Grade 8 | Female | 1,361 | 1,323 | 1,269 | 0.69 |
| Grade 8 | Nonbinary | 0 | 0 | 0 | N/A |
| Grade 11 | Male | 2,751 | 1,827 | 1,766 | 0.68 |
| Grade 11 | Female | 1,365 | 905 | 868 | 0.65 |
| Grade 11 | Nonbinary | 2 | 1 | 1 | N/A |

Table 8.H.4 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Gender

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Male | 2,982 | 3,004 | 2,790 | 0.59 |
| Grade 5 | Female | 1,366 | 1,359 | 1,280 | 0.52 |
| Grade 5 | Nonbinary | 0 | 0 | 0 | N/A |
| Grade 8 | Male | 2,861 | 2,893 | 2,704 | 0.68 |
| Grade 8 | Female | 1,319 | 1,323 | 1,247 | 0.63 |
| Grade 8 | Nonbinary | 0 | 0 | 0 | N/A |
| Grade 11 | Male | 2,704 | 1,827 | 1,748 | 0.68 |
| Grade 11 | Female | 1,339 | 905 | 860 | 0.67 |
| Grade 11 | Nonbinary | 2 | 1 | 1 | N/A |

Table 8.H.5 Correlations Between CAA for Science and CAA for ELA Test Scores by Primary Ethnicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | American Indian or Alaska Native | 25 | 24 | 23 | 0.78 |
| Grade 5 | Asian | 407 | 397 | 372 | 0.71 |
| Grade 5 | Native Hawaiian or Other Pacific Islander | 15 | 13 | 13 | 0.83 |
| Grade 5 | Filipino | 135 | 138 | 128 | 0.73 |
| Grade 5 | Hispanic or Latino | 2,590 | 2,561 | 2,434 | 0.73 |
| Grade 5 | Black or African American | 333 | 331 | 316 | 0.77 |
| Grade 5 | White | 701 | 679 | 627 | 0.75 |
| Grade 5 | Two or more races | 215 | 220 | 204 | 0.77 |
| Grade 8 | American Indian or Alaska Native | 24 | 24 | 24 | 0.72 |
| Grade 8 | Asian | 340 | 317 | 303 | 0.70 |
| Grade 8 | Native Hawaiian or Other Pacific Islander | 17 | 19 | 17 | 0.72 |
| Grade 8 | Filipino | 116 | 112 | 106 | 0.48 |
| Grade 8 | Hispanic or Latino | 2,580 | 2,551 | 2,447 | 0.67 |
| Grade 8 | Black or African American | 339 | 329 | 309 | 0.66 |
| Grade 8 | White | 723 | 692 | 660 | 0.70 |
| Grade 8 | Two or more races | 177 | 172 | 166 | 0.71 |
| Grade 11 | American Indian or Alaska Native | 21 | 11 | 10 | N/A |
| Grade 11 | Asian | 326 | 212 | 203 | 0.59 |
| Grade 11 | Native Hawaiian or Other Pacific Islander | 18 | 8 | 8 | N/A |
| Grade 11 | Filipino | 112 | 77 | 75 | 0.74 |
| Grade 11 | Hispanic or Latino | 2,486 | 1,664 | 1,608 | 0.65 |
| Grade 11 | Black or African American | 318 | 205 | 193 | 0.66 |
| Grade 11 | White | 704 | 469 | 456 | 0.72 |
| Grade 11 | Two or more races | 133 | 87 | 82 | 0.72 |

Table 8.H.6 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Primary Ethnicity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | American Indian or Alaska Native | 23 | 24 | 21 | 0.61 |
| Grade 5 | Asian | 399 | 397 | 366 | 0.57 |
| Grade 5 | Native Hawaiian or Other Pacific Islander | 12 | 13 | 12 | 0.75 |
| Grade 5 | Filipino | 130 | 138 | 122 | 0.52 |
| Grade 5 | Hispanic or Latino | 2,539 | 2,561 | 2,403 | 0.56 |
| Grade 5 | Black or African American | 330 | 331 | 310 | 0.67 |
| Grade 5 | White | 698 | 679 | 629 | 0.56 |
| Grade 5 | Two or more races | 217 | 220 | 207 | 0.62 |
| Grade 8 | American Indian or Alaska Native | 25 | 24 | 24 | 0.69 |
| Grade 8 | Asian | 330 | 317 | 303 | 0.69 |
| Grade 8 | Native Hawaiian or Other Pacific Islander | 18 | 19 | 18 | 0.70 |
| Grade 8 | Filipino | 115 | 112 | 106 | 0.55 |
| Grade 8 | Hispanic or Latino | 2,494 | 2,551 | 2,389 | 0.65 |
| Grade 8 | Black or African American | 335 | 329 | 309 | 0.66 |
| Grade 8 | White | 696 | 692 | 645 | 0.73 |
| Grade 8 | Two or more races | 167 | 172 | 157 | 0.64 |
| Grade 11 | American Indian or Alaska Native | 21 | 11 | 10 | N/A |
| Grade 11 | Asian | 317 | 212 | 199 | 0.64 |
| Grade 11 | Native Hawaiian or Other Pacific Islander | 17 | 8 | 8 | N/A |
| Grade 11 | Filipino | 106 | 77 | 70 | 0.74 |
| Grade 11 | Hispanic or Latino | 2,448 | 1,664 | 1,597 | 0.68 |
| Grade 11 | Black or African American | 315 | 205 | 192 | 0.62 |
| Grade 11 | White | 689 | 469 | 450 | 0.68 |
| Grade 11 | Two or more races | 132 | 87 | 83 | 0.72 |

Table 8.H.7 Correlations Between CAA for Science and CAA for ELA Test Scores by English Language Fluency

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | EL | 1,156 | 1,160 | 1,084 | 0.74 |
| Grade 5 | English only | 2,712 | 2,659 | 2,514 | 0.74 |
| Grade 5 | RFEP | 512 | 504 | 481 | 0.72 |
| Grade 5 | IFEP | 40 | 39 | 37 | 0.77 |
| Grade 5 | ADEL | 0 | 0 | 0 | N/A |
| Grade 5 | English classification—To be determined | 0 | 0 | 0 | N/A |
| Grade 5 | English classification—No response | 1 | 1 | 1 | N/A |
| Grade 8 | EL | 936 | 919 | 872 | 0.66 |
| Grade 8 | English only | 2,454 | 2,386 | 2,276 | 0.70 |
| Grade 8 | RFEP | 891 | 878 | 851 | 0.65 |
| Grade 8 | IFEP | 34 | 32 | 32 | 0.67 |
| Grade 8 | ADEL | 0 | 0 | 0 | N/A |
| Grade 8 | English classification—To be determined | 0 | 0 | 0 | N/A |
| Grade 8 | English classification—No response | 1 | 1 | 1 | N/A |
| Grade 11 | EL | 736 | 475 | 446 | 0.65 |
| Grade 11 | English only | 2,246 | 1,486 | 1,439 | 0.68 |
| Grade 11 | RFEP | 1,092 | 743 | 722 | 0.64 |
| Grade 11 | IFEP | 44 | 29 | 28 | 0.79 |
| Grade 11 | ADEL | 0 | 0 | 0 | N/A |
| Grade 11 | English classification—To be determined | 0 | 0 | 0 | N/A |
| Grade 11 | English classification—No response | 0 | 0 | 0 | N/A |

Table 8.H.8 Correlations Between CAA for Science and CAA for Mathematics Test Scores by English Language Fluency

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | EL | 1,140 | 1,160 | 1,076 | 0.57 |
| Grade 5 | English only | 2,672 | 2,659 | 2,488 | 0.57 |
| Grade 5 | RFEP | 501 | 504 | 472 | 0.57 |
| Grade 5 | IFEP | 34 | 39 | 33 | 0.51 |
| Grade 5 | ADEL | 0 | 0 | 0 | N/A |
| Grade 5 | English classification—To be determined | 0 | 0 | 0 | N/A |
| Grade 5 | English classification—No response | 1 | 1 | 1 | N/A |
| Grade 8 | EL | 905 | 919 | 855 | 0.66 |
| Grade 8 | English only | 2,385 | 2,386 | 2,239 | 0.67 |
| Grade 8 | RFEP | 858 | 878 | 827 | 0.65 |
| Grade 8 | IFEP | 31 | 32 | 29 | 0.76 |
| Grade 8 | ADEL | 0 | 0 | 0 | N/A |
| Grade 8 | English classification—To be determined | 0 | 0 | 0 | N/A |
| Grade 8 | English classification—No response | 1 | 1 | 1 | N/A |
| Grade 11 | EL | 704 | 475 | 441 | 0.70 |
| Grade 11 | English only | 2,217 | 1,486 | 1,426 | 0.68 |
| Grade 11 | RFEP | 1,080 | 743 | 713 | 0.66 |
| Grade 11 | IFEP | 44 | 29 | 29 | 0.61 |
| Grade 11 | ADEL | 0 | 0 | 0 | N/A |
| Grade 11 | English classification—To be determined | 0 | 0 | 0 | N/A |
| Grade 11 | English classification—No response | 0 | 0 | 0 | N/A |

Table 8.H.9 Correlations Between CAA for Science and CAA for ELA Test Scores by Economic Status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Economically disadvantaged | 2,956 | 2,913 | 2,763 | 0.74 |
| Grade 5 | Not economically disadvantaged | 1,465 | 1,450 | 1,354 | 0.75 |
| Grade 8 | Economically disadvantaged | 2,962 | 2,898 | 2,777 | 0.67 |
| Grade 8 | Not economically disadvantaged | 1,354 | 1,318 | 1,255 | 0.70 |
| Grade 11 | Economically disadvantaged | 2,842 | 1,906 | 1,841 | 0.67 |
| Grade 11 | Not economically disadvantaged | 1,276 | 827 | 794 | 0.67 |

Table 8.H.10 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Economic Status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Economically disadvantaged | 2,917 | 2,913 | 2,734 | 0.56 |
| Grade 5 | Not economically disadvantaged | 1,431 | 1,450 | 1,336 | 0.59 |
| Grade 8 | Economically disadvantaged | 2,878 | 2,898 | 2,734 | 0.66 |
| Grade 8 | Not economically disadvantaged | 1,302 | 1,318 | 1,217 | 0.67 |
| Grade 11 | Economically disadvantaged | 2,795 | 1,906 | 1,824 | 0.68 |
| Grade 11 | Not economically disadvantaged | 1,250 | 827 | 785 | 0.68 |

Table 8.H.11 Correlations Between CAA for Science and CAA for ELA Test Scores by Migrant Status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Migrant education | 31 | 30 | 30 | 0.76 |
| Grade 5 | Not migrant education | 4,390 | 4,333 | 4,087 | 0.74 |
| Grade 8 | Migrant education | 19 | 21 | 19 | 0.64 |
| Grade 8 | Not migrant education | 4,297 | 4,195 | 4,013 | 0.68 |
| Grade 11 | Migrant education | 22 | 14 | 13 | 0.60 |
| Grade 11 | Not migrant education | 4,096 | 2,719 | 2,622 | 0.67 |

Table 8.H.12 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Migrant Status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Migrant education | 30 | 30 | 30 | 0.49 |
| Grade 5 | Not migrant education | 4,318 | 4,333 | 4,040 | 0.57 |
| Grade 8 | Migrant education | 20 | 21 | 20 | 0.66 |
| Grade 8 | Not migrant education | 4,160 | 4,195 | 3,931 | 0.66 |
| Grade 11 | Migrant education | 21 | 14 | 12 | 0.74 |
| Grade 11 | Not migrant education | 4,024 | 2,719 | 2,597 | 0.68 |

Table 8.H.13 Correlations Between CAA for Science and CAA for ELA Test Scores by Disability Group

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Intellectual disability | 1,508 | 1,491 | 1,416 | 0.73 |
| Grade 5 | Hearing impairment | 27 | 26 | 26 | 0.76 |
| Grade 5 | Speech or language impairment | 73 | 68 | 65 | 0.56 |
| Grade 5 | Visual impairment | 9 | 9 | 9 | N/A |
| Grade 5 | Emotional disturbance | 18 | 18 | 17 | 0.48 |
| Grade 5 | Orthopedic impairment | 51 | 54 | 46 | 0.66 |
| Grade 5 | Other health impairment | 252 | 243 | 236 | 0.73 |
| Grade 5 | Specific learning disability | 165 | 161 | 159 | 0.62 |
| Grade 5 | Deaf-blindness | 1 | 1 | 1 | N/A |
| Grade 5 | Multiple disabilities | 157 | 157 | 138 | 0.71 |
| Grade 5 | Autism | 2,149 | 2,123 | 1,993 | 0.73 |
| Grade 5 | Traumatic brain injury | 11 | 12 | 11 | 0.67 |
| Grade 8 | Intellectual disability | 1,661 | 1,620 | 1,563 | 0.65 |
| Grade 8 | Hearing impairment | 39 | 37 | 37 | 0.60 |
| Grade 8 | Speech or language impairment | 27 | 26 | 26 | 0.26 |
| Grade 8 | Visual impairment | 9 | 8 | 8 | N/A |
| Grade 8 | Emotional disturbance | 17 | 15 | 15 | 0.69 |
| Grade 8 | Orthopedic impairment | 67 | 62 | 62 | 0.68 |
| Grade 8 | Other health impairment | 237 | 235 | 228 | 0.66 |
| Grade 8 | Specific learning disability | 216 | 203 | 201 | 0.63 |
| Grade 8 | Deaf-blindness | 2 | 2 | 2 | N/A |
| Grade 8 | Multiple disabilities | 190 | 192 | 167 | 0.64 |
| Grade 8 | Autism | 1,831 | 1,796 | 1,703 | 0.67 |
| Grade 8 | Traumatic brain injury | 20 | 20 | 20 | 0.81 |
| Grade 11 | Intellectual disability | 1,827 | 1,212 | 1,177 | 0.63 |
| Grade 11 | Hearing impairment | 45 | 32 | 32 | 0.54 |
| Grade 11 | Speech or language impairment | 17 | 13 | 12 | 0.91 |
| Grade 11 | Visual impairment | 4 | 3 | 3 | N/A |
| Grade 11 | Emotional disturbance | 17 | 12 | 11 | 0.67 |
| Grade 11 | Orthopedic impairment | 77 | 55 | 54 | 0.54 |
| Grade 11 | Other health impairment | 166 | 92 | 90 | 0.66 |
| Grade 11 | Specific learning disability | 195 | 125 | 123 | 0.58 |
| Grade 11 | Deaf-blindness | 1 | 1 | 1 | N/A |
| Grade 11 | Multiple disabilities | 234 | 155 | 142 | 0.66 |
| Grade 11 | Autism | 1,514 | 1,016 | 975 | 0.68 |
| Grade 11 | Traumatic brain injury | 21 | 17 | 15 | 0.68 |

Table 8.H.14 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Disability Group

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Intellectual disability | 1,476 | 1,491 | 1,399 | 0.52 |
| Grade 5 | Hearing impairment | 25 | 26 | 24 | 0.39 |
| Grade 5 | Speech or language impairment | 74 | 68 | 67 | 0.49 |
| Grade 5 | Visual impairment | 9 | 9 | 9 | N/A |
| Grade 5 | Emotional disturbance | 18 | 18 | 17 | 0.54 |
| Grade 5 | Orthopedic impairment | 51 | 54 | 48 | 0.31 |
| Grade 5 | Other health impairment | 249 | 243 | 233 | 0.58 |
| Grade 5 | Specific learning disability | 166 | 161 | 159 | 0.56 |
| Grade 5 | Deaf-blindness | 1 | 1 | 1 | N/A |
| Grade 5 | Multiple disabilities | 147 | 157 | 130 | 0.45 |
| Grade 5 | Autism | 2,119 | 2,123 | 1,971 | 0.59 |
| Grade 5 | Traumatic brain injury | 13 | 12 | 12 | 0.70 |
| Grade 8 | Intellectual disability | 1,602 | 1,620 | 1,521 | 0.64 |
| Grade 8 | Hearing impairment | 37 | 37 | 36 | 0.52 |
| Grade 8 | Speech or language impairment | 27 | 26 | 26 | 0.45 |
| Grade 8 | Visual impairment | 8 | 8 | 8 | N/A |
| Grade 8 | Emotional disturbance | 16 | 15 | 15 | 0.69 |
| Grade 8 | Orthopedic impairment | 63 | 62 | 59 | 0.55 |
| Grade 8 | Other health impairment | 231 | 235 | 227 | 0.55 |
| Grade 8 | Specific learning disability | 217 | 203 | 202 | 0.59 |
| Grade 8 | Deaf-blindness | 1 | 2 | 1 | N/A |
| Grade 8 | Multiple disabilities | 176 | 192 | 159 | 0.57 |
| Grade 8 | Autism | 1,782 | 1,796 | 1,678 | 0.67 |
| Grade 8 | Traumatic brain injury | 20 | 20 | 19 | 0.78 |
| Grade 11 | Intellectual disability | 1,797 | 1,212 | 1,168 | 0.66 |
| Grade 11 | Hearing impairment | 47 | 32 | 32 | 0.74 |
| Grade 11 | Speech or language impairment | 18 | 13 | 13 | 0.50 |
| Grade 11 | Visual impairment | 4 | 3 | 3 | N/A |
| Grade 11 | Emotional disturbance | 18 | 12 | 11 | 0.81 |
| Grade 11 | Orthopedic impairment | 77 | 55 | 54 | 0.58 |
| Grade 11 | Other health impairment | 165 | 92 | 91 | 0.64 |
| Grade 11 | Specific learning disability | 195 | 125 | 123 | 0.57 |
| Grade 11 | Deaf-blindness | 1 | 1 | 1 | N/A |
| Grade 11 | Multiple disabilities | 224 | 155 | 142 | 0.65 |
| Grade 11 | Autism | 1,478 | 1,016 | 956 | 0.66 |
| Grade 11 | Traumatic brain injury | 21 | 17 | 15 | 0.43 |

Table 8.H.15 Correlations Between CAA for Science and CAA for ELA Test Scores by Foster Status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **ELA Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Foster youth | 42 | 46 | 39 | 0.76 |
| Grade 5 | Not foster youth | 4,379 | 4,317 | 4,078 | 0.74 |
| Grade 8 | Foster youth | 42 | 41 | 36 | 0.80 |
| Grade 8 | Not foster youth | 4,274 | 4,175 | 3,996 | 0.68 |
| Grade 11 | Foster youth | 46 | 24 | 21 | 0.66 |
| Grade 11 | Not foster youth | 4,072 | 2,709 | 2,614 | 0.67 |

Table 8.H.16 Correlations Between CAA for Science and CAA for Mathematics Test Scores by Foster Status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade Level** | **Demographic Student Group** | **Mathematics Sample Size** | **Science Sample Size** | **Correlation Sample Size** | **Correlation** |
| Grade 5 | Foster youth | 44 | 46 | 41 | 0.53 |
| Grade 5 | Not foster youth | 4,304 | 4,317 | 4,029 | 0.57 |
| Grade 8 | Foster youth | 42 | 41 | 36 | 0.53 |
| Grade 8 | Not foster youth | 4,138 | 4,175 | 3,915 | 0.66 |
| Grade 11 | Foster youth | 43 | 24 | 21 | 0.64 |
| Grade 11 | Not foster youth | 4,002 | 2,709 | 2,588 | 0.68 |

## Quality-Control Procedures

The California Department of Education (CDE) and ETS implemented rigorous quality-control procedures throughout the assessment development, administration, scoring, analyses, and reporting processes for the California Alternate Assessment (CAA) for Science. As part of this effort, ETS’ staff worked with its Office of Professional Standards Compliance, which publishes and maintains the *ETS Standards for Quality and Fairness* (ETS, 2014). These *Standards* support the goals of delivering technically sound, fair, and useful products and services; and assisting the public and auditors evaluating those products and services. Quality-control procedures are outlined in this chapter.

### Quality Control of Item Development

ETS’ goal is to provide the best standards-based and innovative items for the CAA for Science. Items developed for the CAA for Science were subject to an extensive item review process. The item writers responsible for developing CAA for Science items were trained in California Assessment of Student Performance and Progress (CAASPP) and ETS’ policies on quality control of item content, bias and sensitivity guidelines, as well as guidelines for accessibility, to ensure that the items allow the widest possible range of students to demonstrate their abilities.

Once a draft item was accepted for authoring—that is, once it was entered into ETS’ item bank and formatted for use in an assessment—ETS employed a series of internal reviews and an initial CDE review. These reviews used established criteria and specifications to judge the quality of an item’s content and ensured that each item measured what it was intended to measure. These reviews also examined the overall quality of the test items before presentation to the CDE and item reviewers. To finish the process, a group of California educators reviewed the items for accessibility, bias and sensitivity, and content, and made recommendations for item enhancement. The details on quality control of item development are described in section [*3.2 ETS Item Review Process*](#_ETS_Item_Review_1).

During administrations of the CAA for Science, when sufficient student response data on each item became available, ETS’ Psychometric Analysis & Research (PAR) staff conducted item analyses and a key check to examine whether the items performed as expected. ETS’ psychometric staff conducted a thorough evaluation of all item statistics using the statistical criteria described in subsection [*8.2.7 Summary of Classical Item Analyses Flagging Criteria*](#_Summary_of_Classical_2) to flag items that were potentially problematic because of poor item performance, content issues, item bias, or accessibility challenges. Flagged items were then reviewed by ETS’ Assessment & Learning Technology Development (ALTD) staff, the CDE, and California educators to determine whether issues existed.

### Quality Control of Test Assembly and Delivery

The assembly of all test forms must conform to blueprints that represent a set of constraints and specifications. ETS conducted multiple levels of quality assurance (QA) checks on each assembled CAA for Science form to ensure it met the form-building specifications. Both ETS’ ALTD and PAR staff reviewed and signed off on the accuracy of forms before the test forms were posted for CDE review. Detailed information related to test assembly can be found in [*Chapter 4: Test Assembly*](#_Test_Assembly_1).

In particular, the assembly of all test forms went through a certification process that involved various checks, including verifying that

* all item answers in the key were correctly identified and documented in the scoring system;
* items were scored correctly in the item bank and incorrect responses were scored as incorrect;
* all items assessed the intended standard;
* all content in the item was correct with the exception of distractors, which are intended to be incorrect;
* all items met the statistical criteria, to the extent possible;
* distractors were plausible;
* multiple-choice (MC) item options were parallel in structure;
* language was grade-level appropriate;
* no more than three MC items in a row had the same key;
* all graphics were correct (copyright, spelling, relevance, etc.);
* there were no unintended mechanical errors in grammar, spelling, punctuation, and the like; and
* items adhered to the approved style guide.

Reviews were also conducted for functionality and sequencing during the user acceptance testing (UAT) process to ensure all items functioned as expected. Three cycles of UAT were conducted: the first by the test delivery system (TDS) vendor, the second by ETS, and the third by the CDE. CDE staff made a final quality check to ensure that all issues identified during UAT were resolved before the release of the operational assessment.

#### Quality Control of Test Assignment

Test assignment for the California Assessment of Student Performance and Progress, including the CAA for Science, is controlled by the Test Operations Management System (TOMS) using student information received from the California Longitudinal Pupil Achievement Data System (CALPADS) (CDE, 2023b). The two systems are kept in sync during the testing window.

Students at eligible grade levels were assigned to the Smarter Balanced assessments (in grades three through eight and grade eleven) and the California Science Test (CAST) for grades five and eight and the high school grade band (i.e., grade ten, eleven, or twelve [if the student is not repeating grade twelve]) by default. For students eligible for the CAA for Science, local educational agencies (LEAs) logged on to TOMS and assigned students to take the alternate assessment, which automatically unassigned those students from taking the CAST. The CDE provided guidance to support LEAs in determining which students were eligible for the CAAs (CDE, 2023a).

The quality of test assignment for the CAA for Science was monitored and controlled through several strategies. TOMS enforced preconditions for eligibility for the CAAs by permitting assignment only for students with an Individuals with Disabilities Education Act (IDEA)[[7]](#footnote-8) indicator of “Yes” as sent by CALPADS.

Additionally, TOMS ensured that a student assigned to take an alternate assessment for any content area was automatically prevented from assignment to a general assessment for another content area.

### Quality Control of Test Materials

Brief descriptions of the types of materials used for and during testing appear in the following subsections.

#### Test Administration Manuals

ETS’ staff verified that test instruction manuals accurately matched the test materials and testing processes. Editors reviewed each document for spelling, grammar, accuracy, and adherence to CDE style. Each document was approved by the CDE before being published to the CAASPP website. Only nonsecure documents were posted to this website. Secure materials, such as the *CAASPP Directions for Administration (DFAs)*, were made available to designated LEA staff through TOMS, which required a secure logon.

The manuals used in the administration of the CAA for Science are listed in subsection [*5.2.4 Instructions for Test Administration*](#_Instructions_for_Test_1).

#### Collecting Test Materials for Computer-based Assessments

During the 2022–23 CAA for Science administration, there were no test materials to be collected as a result of computer-based testing.

#### Processing Test Materials for Computer-based Assessments

Computer-based assessments submitted by students were transmitted from Cambium Assessment, Inc. (CAI), to ETS each day. Each system checked for the completeness of the student record and stopped records that were identified as having an error. (For example, the system would identify a test part that was missing a content registration ID, a unique identifier that matches the student’s opportunities.)

### Quality Control of Test Administration

The quality of test administration for the CAA for Science was monitored and controlled through several strategies.

A fully supported Outreach team that includes California Technical Assistance Center phone support and Success Agents supported all LEAs in the administration of the CAASPP. In addition to providing guidance and answering questions, the Outreach team regularly conducted campaigns on particular administration topics to ensure all LEAs understood correct test administration procedures. Outreach was guided by individuals who managed communications to LEAs; provided regional and web-based trainings; and hosted a website, [the](https://www.caaspp.org/) CAASPP website, that housed a full range of manuals, videos, and other instructional and support materials.

The quality of test administration was further managed through comprehensive rules and guidelines for maintaining the security and standardization of the CAASPP. LEAs received training on these topics and were provided tools for reporting security incidents and resolving testing discrepancies for specific testing sessions.

The ETS Office of Testing Integrity (OTI) reinforced the quality-control procedures for test administration, providing quality assurance services for all testing programs managed by ETS. The detailed procedures the OTI developed and applied in quality control are described in subsection [*5.7.1 ETS’ Office of Testing Integrity*](#_ETS’_Office_of_1).

### Quality Control of Scoring

ETS conforms to high standards of quality and fairness when scoring assessments and reporting scores. These standards dictate that ETS provides accurate and understandable assessment results to the intended recipients. It is also ETS’ mission to provide appropriate guidelines for score interpretation and cautions about the limitations in the meaning and use of the test scores. Finally, ETS conducts analyses needed to ensure that the assessments are equitable for various student demographic groups.

#### Machine-Scoring Procedures

To ensure valid item-level scoring for the CAA for Science, quality-control procedures were employed by CAI, the CAASPP subcontractor responsible for providing the TDS and scoring machine-scorable items. CAI staff independently reviewed all CAA for Science forms by producing sample results for assessments. The sample results were compared with the answer keys for each form to confirm the accuracy of scoring keys. The scores for all applicable items were recorded. A final comparison of the test map to each computer-based form as configured in the UAT environment ensured that no changes to the form were introduced prior to operational deployment.

A real-time, quality-monitoring component was built into the TDS. After an assessment was administered to a student, the TDS passed the resulting data to the QA system. QA conducted a series of data integrity checks, ensuring, for example, that the record for each assessment contained information for each item, keys for MC items, score points in each item, and the total number of operational items. In addition, QA also checked to ensure that the test record contained no data from items that might have been invalidated.

Data passed directly from the Quality Monitoring System to the database of record, which served as the repository for all test information, and from which all test information was pulled and transmitted to ETS in a predetermined results format.

#### Development of Scoring Specifications

A number of measures were taken to ascertain that the scoring keys were applied to the student responses as intended and the student scores were computed accurately. ETS built and reviewed the scoring system models based on the reporting specifications approved by the CDE. These specifications contain detailed scoring procedures, along with the procedures for determining whether a student has attempted an assessment and whether that student’s response data should be included in the statistical analyses and calculations for computing summary data.

Prior to the test administration, ETS’ ALTD staff reviewed and verified the keys and scoring rubrics for each item. Then, these keys andrubrics were provided to CAI for implementing machine scoring of the selected-response items. In addition, the student’s original response string was stored for data verification and auditing purposes. Standard quality inspections were performed on all data files, including the evaluation of each student data record for correctness and completeness. Student results were kept confidential and secure at all times.

ETS’ scoring specifications for the CAA for Science were completed, approved, and checked well in advance of the receipt of student response data. These specifications contained detailed scoring procedures, as well as the procedures for determining whether a student attempted an assessment and whether that student’s response data should be included in the statistical analyses and computing summary data.

### Quality Control of Psychometric Processes

#### Scoring Verification

ETS developed two independent and parallel scoring structures to produce students’ scores: the Enterprise Score Key Management (eSKM) scoring system, which collected, scored, and delivered individual students’ scores to the ETS reporting system; and then the ETS PAR team computed individual student scores based on the same scoring specifications as described in subsection [*9.5.2 Development of Scoring Specifications*](#_Development_of_Scoring_1). The scores from the two sources were then compared for internal quality control. Any differences in the scores were discussed and resolved. All scores complied with the ETS scoring specifications and passed the parallel scoring process. This ensured the quality and accuracy of scoring and supported the transfer of scores into TOMS, the database of the student records scoring.

#### Psychometric Analyses

The psychometric procedures for the CAA for Science were developed, reviewed, and approved prior to the receipt of student response data. The ETS psychometric team also developed specifications for each of the psychometric analyses performed. These specifications contain detailed descriptions of the analysis steps such as sample inclusion, analyses methods, and special handling of the data.

All psychometric analyses conducted at ETS underwent comprehensive quality checks by a team of psychometricians and data analysts. Detailed checklists and psychometric specifications were developed by members of the team for each of the statistical procedures performed on CAA for Science results data, including item analyses, differential item functioning analyses, item response theory (IRT) calibration, equating, and scaling.

Detailed checklists were developed by members of the team for each of the statistical procedures. Classical item analyses were performed to evaluate the performance of the operational items. Classical item statistics included item difficulty and correlations between item scores and total scores. Items that were flagged for questionable statistical attributes were sent to ETS’ ALTD staff for review; their comments were then reviewed by the psychometricians before the review by the CDE. The ETS ALTD and PAR teams worked together to evaluate and make recommendations to the CDE about any problematic items that should be removed from IRT calibration.

IRT calibration of field test items included checks to ascertain that the input files were established accurately. Checks were also made on the number of items, number of students with valid scores, IRT item difficulty and discrimination estimates, standard errors for the item difficulty estimates, and the equating and scaling process. Two psychometricians conducted parallel calibration processing and compared the results to check for any inconsistency. Psychometricians also performed detailed reviews of relevant statistics to determine whether the chosen IRT model fits the data. ETS then presented and reviewed the calibration results with the CDE for approval.

Once raw-to-scale-score conversion tables for each form were generated, psychometricians carried out quality-control checks on each scoring table to verify

* all possible raw scores for each form were included in the tables;
* the lowest obtainable scale score and the highest obtainable scale score matched the specifications for each grade level, respectively; and
* the threshold score for the achievement level was correctly identified.

After all quality-control steps were completed and any differences were resolved, one final inspection of scoring tables was conducted prior to uploading the tables to eSKM for score reporting.

### Quality Control of Reporting

To ensure the quality of CAA for Science results, for both individual student and summary reports, three general areas were evaluated:

1. Comparison of report formats with input sources from the CDE-approved samples
2. Validation of the report data through quality-control checks performed by ETS’ Data Quality Services and Center of Reporting & Scoring Services teams, as well as running of all Student Score Reports (SSRs) through ETS’ patented QC Interrogator software, which compares elements of the SSR to acceptable values to identify errors and is used in conjunction with human review to detect errors on every score report batch as part of quality-control procedures
3. Proofreading of the quality-control and production reports by the CDE and ETS prior to making reports available to the LEA for download in TOMS and the California Educator Reporting System as well as via the LEA’s student information system

All reports were required to include a single, accurate LEA code, an LEA name, and a school name. All elements conformed to the CDE’s official county/district/school (CDS) code and naming records. From the start of processing through scoring and reporting, the CDS Master File was used to verify and confirm accurate codes and names. The CDE provided a revised LEA Master File to ETS throughout the year as updates became available.

After the reports were validated in accordance with the CDE’s requirements, a set of reports representing all possible grade levels, content areas, and reporting outcomes was provided to the CDE and ETS for review and approval. Electronic reports were sent on the actual report template to the CDE. The CDE and ETS reviewed and approved the reports after a thorough examination.

Upon the CDE’s approval of the reports generated for the quality-control LEAs, ETS proceeded with the first batch of report production. The reviewed set of reports incorporated CDE-selected LEAs and provided the final check prior to generating all reports and making them available electronically for download in TOMS and for student information systems through an application programming interface.

#### Exclusion of Student Scores from Summary Reports

ETS provided the CDE with reporting specifications that documented when to exclude student scores from summary reports. These specifications included the logic for handling submitted assessments that, for example, indicated the student tested but responded to no items, was absent, was not tested because of parent/guardian request, or did not complete the assessment because of illness. The methods for handling other anomalies were also covered in the specifications. These anomalies are described in more detail in [*7.3.2 Special Cases*](#_Special_Cases_3).

### Quality Control of End-to-End Testing

ETS conducted end-to-end testing prior to the start of the test administration. The purpose of this testing is to verify that all systems, processes, and resources were ready for the operational administration. Once released from processing, the test results were sent through the system for scoring and reporting. SSRs were created, along with data files for subject-matter experts in the teams to review and verify.

#### Computer-based Assessments

ETS employed a number of strategies to verify ongoing systems performance, including monitoring of system availability and system usage. Time was allotted for UAT to confirm that the systems met requirements and to make identified corrections before final deployment. To accomplish system acceptance and sign-off, ETS deployed systems to a staging area, which mirrors the final production environment, for operational testing and UAT. Final approval by the CDE triggered final deployment of the system.

To begin the quality-control process for end-to-end testing of the administration, the ETS program and resolutions teams prepared by entering responses in computer-based assessments for all grade levels and the grade band. These responses were entered for fictitious students in selected schools and across several LEAs. Each student’s assessment was completed with responses that were all correct, all incorrect, and combinations of correct and incorrect. These response combinations were the expected results across achievement levels and score ranges. The responses were sent for processing, including for system quality control of computer-based assessments.

Once released from processing, the test results were sent through the system for scoring and reporting. SSRs were created, along with data files for subject-matter experts in the teams to review and verify. Individual SSRs were generated on the basis of the fictitious students when 100 percent quality control was demonstrated by ETS’ Resolution staff.

### References

California Department of Education. (2023a). *Alternate assessment decision-making tool for California.* Sacramento, CA: California Department of Education.

California Department of Education. (2023b). *CAASPP and ELPAC Test Operations Management System user guide*. Sacramento, CA: California Department of Education.

Educational Testing Service. (2014). *ETS Standards for Quality and Fairness*. Princeton, NJ: Educational Testing Service.

## Test Examiner Survey

This chapter describes the development and administration of the survey questionnaires for California Alternate Assessment (CAA) for Science test examiners to complete for each embedded performance task (PT) and the results from the analyses of their responses.

### Test Examiner Survey Design and Development

The surveys were designed and developed by members of the ETS validity research team, whose members have extensive experience in designing and developing surveys that elicit the kinds of responses that assist assessment developers with improving assessments.

#### Test Examiner Survey on the Test Administration

Survey responses were provided by the test examiner and collected from local educational agencies via the California Assessment of Student Performance and Progress test delivery system (TDS) for every embedded PT administered to every student. The survey was included in the last section of the embedded PT delivered through the TDS. The purpose of the survey was to collect basic information about students’ experiences with the assessment process.

After the embedded PT was administered to the student, the test examiner was asked to state whether the student had been responsive during the testing session. Depending on how the test examiner answered the question about their student’s responsiveness level, the test examiner was then presented with one of two surveys. Table 10.1 summarizes, by embedded PT, the numbers and the percentages of students who were responsive and nonresponsive. A vast majority of students were responsive.

Table 10.1 Numbers and Percentages of Students Responsive and Nonresponsive by Embedded PT

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Grade Level or Grade Band** | **Number of Responses—Earth and Space Sciences PT** | **Responsive—Earth and Space Sciences PT** | **Nonresponsive—Earth and Space Sciences PT** | **Number of Responses—Life Science PT** | **Responsive—Life Sciences PT** | **Nonresponsive—Life Sciences PT** | **Number of Responses—Physical Science PT** | **Responsive—Physical Sciences PT** | **Nonresponsive—Physical Sciences PT** |
| Grade 5 | 4,329 | 97% | 3% | 4,351 | 96% | 4% | 4,316 | 97% | 3% |
| Grade 8 | 4,159 | 98% | 2% | 4,178 | 98% | 2% | 4,162 | 98% | 2% |
| High school | 4,375 | 98% | 2% | 4,388 | 98% | 2% | 4,347 | 98% | 2% |

##### Test Examiner Survey for Students Who Were Responsive

The survey for students who were responsive consisted of the following four questions:

1. Using a scale from 5 to 1, rate your student’s level of engagement for this embedded performance task (5 = fully engaged; 1 = minimally engaged). How engaged was your student:
2. During the administration of Orienting Activities?
3. When answering questions that included pictures?
4. When answering questions that included videos?
5. When answering questions that consisted of text only?
6. When answering questions that consisted of multiple-choice-style questions?
7. When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.?
8. During classroom instruction, which mode or modes of communication does your student use? Select all that apply.
   1. Eye gaze
   2. Verbal response
   3. Written response
   4. Gestures or pointing
   5. Augmentative and alternative communication device
   6. Mouse, touch screen, computer keyboard, or any combination of these
   7. Nonresponsive
   8. Other (Please enter additional information.)
9. Did you individualize any aspect of Orienting Activity 1 or the first five test questions, where identified? If you answered yes, briefly describe the specific materials used to individualize the activity. (Please provide a brief description.)
10. Did you individualize any aspect of Orienting Activity 2 or the last five test questions, where identified? If you answered yes, briefly describe the specific materials used to individualize the activity. (Please provide a brief description.)

##### Test Examiner Survey for Students Who Were Nonresponsive

The survey for the students who were nonresponsive consisted of the following four questions:

1. In your best judgment, which of the following statements best explains why your student did not provide any responses?
   1. No established modes of communication
   2. No observable engagement with the embedded performance task
   3. Test questions seemed too complex
   4. Scientific concepts seemed too complex
   5. Other (Please enter additional information.)
2. During classroom instruction, which mode or modes of communication does your student use? (Select all that apply.)
   1. Eye gaze
   2. Verbal response
   3. Written response
   4. Gestures or pointing
   5. Augmentative and alternative communication device
   6. Mouse, touch screen, computer keyboard, or any combination of these
   7. Nonresponsive
   8. Other (Please enter additional information.)
3. What method(s) did you use to elicit a response from your student? (Please provide a brief description.)
4. How might this embedded performance task be changed so your student can be successful in showing what they know and can do? (Please provide a brief description.)

### Test Examiner Survey Results for Students Who Were Responsive

Across all embedded PTs and grade levels, students who were responsive accounted for more than 95 percent of the testing population. Table 10.A.1 through table 10.A.9 in [appendix 10.A](#_Appendix_10.A:_Distribution) summarize the responses to six survey items measuring the students’ level of engagement during various portions of the embedded PTs’ administration. For each portion of an embedded PT’s administration examined by the survey, a plurality of students who were responsive were reported to be fully engaged, across all grade levels. Students were more likely to be fully engaged when answering items that included pictures than when answering items that included videos or only text. Students were also more likely to be fully engaged for most embedded PTs when answering items that consisted of multiple-choice-style items than when answering items that consisted of technology-enhanced formats.

The number and percentage of students who were responsive and used each mode of communication during classroom instruction for each domain is summarized in table 10.A.10 through table 10.A.12. The most common modes of communication across the grade levels and the high school grade band were verbal responses, the use of gestures or pointing, and a combination of either a mouse, touch screen, or computer keyboard. Overall, the use of these modes of communication was fairly consistent across embedded PTs and the grade levels and the high school grade band. Note that in these tables, the total number of students does not equal the sum of the number of survey responses because a student can have multiple modes of communication.

Table 5.1 through table 5.3 display the results of the survey regarding the kinds of individualization provided. Although test examiners were permitted to individualize the administration of the CAA for Science, table 5.1 through table 5.3 indicate that few students received individualizations, meaning most students were administered the embedded PTs as outlined in the *Directions for Administration*.

### Test Examiner Survey Results for Students Who Were Nonresponsive

Across all embedded PTs and grade levels, students who were nonresponsive accounted for approximately less than 5 percent of the testing population. As presented in table 10.B.1 through table 10.B.3 in [appendix 10.B](#_Appendix_10.B:_Distribution), the most common explanation for why the test examiner indicated the student was nonresponsive during the administration of the embedded PT was that the student exhibited no observable engagement with the embedded PT. The test examiner also more commonly cited the complexity of the test items as an explanation.

The number and percentage of students who were nonresponsive and who used each mode of communication during classroom instruction for each domain are summarized in table 10.B.4 through table 10.B.6. Among the students who were nonresponsive, the most common mode of communication during classroom instruction was the use of gestures or pointing. Other common modes of communication during classroom instruction included eye gaze and verbal response. Students who were nonresponsive rarely used a written response as a mode of communication during classroom instruction. Note that in these tables, the total number of students does not equal the sum of the number of survey responses because a student can have multiple modes of communication.

The methods used to elicit a response from the students who were nonresponsive are listed in table 10.B.7 through table 10.B.15. To elicit a response from their student, the test examiners preferred either using a verbal prompt or the use of gestures or pointing. Other common methods included using an accommodation or designated support, repeating the instructions, prompting the student physically, and using materials.

Table 10.B.16 through table 10.B.24 list the changes to the embedded PTs suggested most to allow the student to successfully show what the student knows and can do. Across all grade levels and the high school grade band, the most common request was to reduce the complexity of the content. Other common requests included using more visuals or pictures, using more interactive videos, and introducing more physical objects as part of the embedded PTs.

### Appendix 10.A: Distribution of Test Examiner Survey Responses for Students Who Were Responsive

**Notes:**

* The denominator for each percentage in table 10.A.1 through table 10.A.12 is the number of responses.
* Percentages for table 10.A.1 through table 10.A.9 may not sum up to 100, because “N/A” was considered a response and because of rounding.
* In table 10.A.10 through table 10.A.12, the total number of students does not equal the sum of the number of responses for each mode of communication because a student can have multiple modes of communication.

Table 10.A.1 “How engaged was the student with this performance task?”—Grade Five, Earth and Space Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,138 | 50% | 18% | 13% | 8% | 9% |
| When answering questions that included pictures? | 4,142 | 54% | 20% | 12% | 7% | 7% |
| When answering questions that included videos? | 4,137 | 32% | 10% | 7% | 4% | 6% |
| When answering questions that consisted of text only? | 4,134 | 36% | 12% | 13% | 12% | 16% |
| When answering questions that consisted of multiple-choice-style questions? | 4,125 | 46% | 17% | 16% | 10% | 10% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,989 | 41% | 14% | 12% | 9% | 11% |

Table 10.A.2 “How engaged was the student with this performance task?”—Grade Five, Life Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,185 | 51% | 17% | 14% | 8% | 9% |
| When answering questions that included pictures? | 4,184 | 56% | 18% | 13% | 7% | 6% |
| When answering questions that included videos? | 4,174 | 34% | 10% | 8% | 5% | 6% |
| When answering questions that consisted of text only? | 4,169 | 36% | 11% | 13% | 12% | 15% |
| When answering questions that consisted of multiple-choice-style questions? | 4,165 | 47% | 16% | 16% | 10% | 10% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 4,017 | 45% | 15% | 14% | 8% | 11% |

Table 10.A.3 “How engaged was the student with this performance task?”—Grade Five, Physical Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,124 | 53% | 16% | 14% | 8% | 8% |
| When answering questions that included pictures? | 4,124 | 55% | 17% | 13% | 8% | 6% |
| When answering questions that included videos? | 4,115 | 56% | 16% | 13% | 8% | 6% |
| When answering questions that consisted of text only? | 4,113 | 38% | 11% | 13% | 12% | 15% |
| When answering questions that consisted of multiple-choice-style questions? | 4,106 | 47% | 16% | 16% | 10% | 11% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,928 | 42% | 12% | 12% | 8% | 10% |

Table 10.A.4 “How engaged was the student with this performance task?”—Grade Eight, Earth and Space Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 3,980 | 60% | 16% | 12% | 5% | 7% |
| When answering questions that included pictures? | 3,970 | 62% | 17% | 10% | 5% | 5% |
| When answering questions that included videos? | 3,964 | 47% | 12% | 8% | 4% | 5% |
| When answering questions that consisted of text only? | 3,963 | 48% | 13% | 13% | 10% | 13% |
| When answering questions that consisted of multiple-choice-style questions? | 3,961 | 53% | 17% | 13% | 8% | 8% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,785 | 47% | 13% | 9% | 6% | 8% |

Table 10.A.5 “How engaged was the student with this performance task?”—Grade Eight, Life Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,024 | 60% | 16% | 12% | 5% | 6% |
| When answering questions that included pictures? | 4,017 | 65% | 17% | 9% | 4% | 4% |
| When answering questions that included videos? | 3,999 | 43% | 11% | 7% | 3% | 4% |
| When answering questions that consisted of text only? | 3,995 | 47% | 14% | 14% | 9% | 12% |
| When answering questions that consisted of multiple-choice-style questions? | 4,001 | 54% | 16% | 14% | 7% | 7% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,848 | 46% | 13% | 11% | 6% | 7% |

Table 10.A.6 “How engaged was the student with this performance task?”—Grade Eight, Physical Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 3,969 | 61% | 15% | 12% | 5% | 6% |
| When answering questions that included pictures? | 3,969 | 63% | 17% | 11% | 5% | 5% |
| When answering questions that included videos? | 3,956 | 63% | 16% | 11% | 5% | 5% |
| When answering questions that consisted of text only? | 3,958 | 49% | 12% | 13% | 10% | 12% |
| When answering questions that consisted of multiple-choice-style questions? | 3,945 | 54% | 15% | 14% | 8% | 8% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,795 | 46% | 12% | 9% | 6% | 7% |

Table 10.A.7 “How engaged was the student with this performance task?”—High School, Earth and Space Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,174 | 65% | 14% | 11% | 4% | 6% |
| When answering questions that included pictures? | 4,168 | 66% | 15% | 9% | 4% | 4% |
| When answering questions that included videos? | 4,162 | 64% | 13% | 9% | 4% | 5% |
| When answering questions that consisted of text only? | 4,142 | 55% | 11% | 12% | 7% | 9% |
| When answering questions that consisted of multiple-choice-style questions? | 4,143 | 61% | 14% | 11% | 6% | 7% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,925 | 62% | 13% | 10% | 6% | 8% |

Table 10.A.8 “How engaged was the student with this performance task?”—High School, Life Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,220 | 65% | 13% | 11% | 5% | 6% |
| When answering questions that included pictures? | 4,218 | 67% | 14% | 9% | 5% | 5% |
| When answering questions that included videos? | 4,208 | 52% | 9% | 8% | 4% | 5% |
| When answering questions that consisted of text only? | 4,203 | 55% | 11% | 12% | 7% | 9% |
| When answering questions that consisted of multiple-choice-style questions? | 4,206 | 62% | 13% | 12% | 5% | 7% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,982 | 59% | 12% | 11% | 6% | 8% |

Table 10.A.9 “How engaged was the student with this performance task?”—High School, Physical Sciences Embedded PT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Survey Question** | **Number of Responses** | **5 (Fully Engaged)** | **4** | **3** | **2** | **1 (Minimally Engaged)** |
| During the administration of Orienting Activities? | 4,130 | 66% | 13% | 11% | 4% | 5% |
| When answering questions that included pictures? | 4,124 | 66% | 13% | 11% | 4% | 5% |
| When answering questions that included videos? | 4,126 | 66% | 13% | 10% | 5% | 5% |
| When answering questions that consisted of text only? | 4,104 | 56% | 10% | 12% | 7% | 9% |
| When answering questions that consisted of multiple-choice-style questions? | 4,109 | 62% | 12% | 12% | 6% | 7% |
| When answering questions that consisted of technology-enhanced formats, such as drag and drop, grid-type, etc.? | 3,908 | 56% | 9% | 10% | 5% | 7% |

Table 10.A.10 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Five

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| Eye gaze | 778 | 18% | 794 | 18% | 769 | 18% |
| Verbal response | 3,004 | 69% | 3,034 | 70% | 2,966 | 69% |
| Written response | 743 | 17% | 758 | 17% | 729 | 17% |
| Gestures or pointing | 2,874 | 66% | 2,927 | 67% | 2,882 | 67% |
| Augmentative and alternative communication device | 441 | 10% | 450 | 10% | 433 | 10% |
| Mouse, touch screen, computer keyboard, or any combination of these | 1,795 | 41% | 1,812 | 42% | 1,793 | 42% |
| Nonresponsive | 126 | 3% | 160 | 4% | 126 | 3% |
| Other | 88 | 2% | 112 | 3% | 75 | 2% |
| **Total Number of Students:** | **4,329** | **N/A** | **4,351** | **N/A** | **4,316** | **N/A** |

Table 10.A.11 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Eight

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| Eye gaze | 734 | 18% | 761 | 18% | 709 | 17% |
| Verbal response | 2,850 | 69% | 2,893 | 69% | 2,827 | 68% |
| Written response | 1,021 | 25% | 993 | 24% | 987 | 24% |
| Gestures or pointing | 2,391 | 57% | 2,440 | 58% | 2,391 | 57% |
| Augmentative and alternative communication device | 327 | 8% | 334 | 8% | 334 | 8% |
| Mouse, touch screen, computer keyboard, or any combination of these | 1,827 | 44% | 1,856 | 44% | 1,848 | 44% |
| Nonresponsive | 99 | 2% | 89 | 2% | 80 | 2% |
| Other | 134 | 3% | 145 | 3% | 120 | 3% |
| **Total Number of Students:** | **4,159** | **N/A** | **4,178** | **N/A** | **4,162** | **N/A** |

Table 10.A.12 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—High School

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| Eye gaze | 776 | 18% | 809 | 18% | 761 | 18% |
| Verbal response | 2,890 | 66% | 2,916 | 66% | 2,849 | 66% |
| Written response | 1,218 | 28% | 1,215 | 28% | 1,227 | 28% |
| Gestures or pointing | 2,268 | 52% | 2,337 | 53% | 2,265 | 52% |
| Augmentative and alternative communication device | 300 | 7% | 298 | 7% | 296 | 7% |
| Mouse, touch screen, computer keyboard, or any combination of these | 2,132 | 49% | 2,115 | 48% | 2,131 | 49% |
| Nonresponsive | 69 | 2% | 87 | 2% | 69 | 2% |
| Other | 139 | 3% | 169 | 4% | 163 | 4% |
| **Total Number of Students:** | **4,375** | **N/A** | **4,388** | **N/A** | **4,347** | **N/A** |

### Appendix 10.B: Distribution of Test Examiner Survey Responses for Students Who Were Nonresponsive

**Notes:**

* The denominator for each percentage in table 10.B.1 through table 10.B.12 is the number of responses.
* In table 10.B.4 through table 10.B.6, the total number of students does not equal to the sum of the number of responses for each mode of communication because a student can have multiple modes of communication.
* In table 10.B.7 through table 10.B.24, the total number of students is not equal to the sum of the number of responses because a student can have multiple responses.

Table 10.B.1 “In your best judgment, which of the following statements best explains why your student did not provide any responses?”—Grade Five

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| No established modes of communication | 17 | 6% | 19 | 7% | 17 | 6% |
| No observable engagement with the embedded PT | 123 | 45% | 124 | 49% | 133 | 50% |
| Test questions seemed too complex | 66 | 24% | 56 | 22% | 57 | 21% |
| Scientific concepts seemed too complex | 33 | 12% | 30 | 12% | 25 | 9% |
| Other | 33 | 12% | 26 | 10% | 36 | 13% |
| **Total Number of Students:** | **272** | **N/A** | **255** | **N/A** | **268** | **N/A** |

Table 10.B.2 “In your best judgment, which of the following statements best explains why your student did not provide any responses?”—Grade Eight

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| No established modes of communication | 24 | 11% | 20 | 9% | 22 | 10% |
| No observable engagement with the embedded PT | 80 | 35% | 69 | 33% | 74 | 34% |
| Test questions seemed too complex | 59 | 26% | 65 | 31% | 68 | 32% |
| Scientific concepts seemed too complex | 28 | 12% | 24 | 11% | 28 | 13% |
| Other | 37 | 16% | 33 | 16% | 23 | 11% |
| **Total Number of Students:** | **228** | **N/A** | **211** | **N/A** | **215** | **N/A** |

Table 10.B.3 “In your best judgment, which of the following statements best explains why your student did not provide any responses?”—High School

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| No established modes of communication | 24 | 12% | 24 | 13% | 16 | 7% |
| No observable engagement with the embedded PT | 67 | 35% | 68 | 35% | 100 | 47% |
| Test questions seemed too complex | 54 | 28% | 57 | 30% | 60 | 28% |
| Scientific concepts seemed too complex | 29 | 15% | 18 | 9% | 19 | 9% |
| Other | 19 | 10% | 25 | 13% | 19 | 9% |
| **Total Number of Students:** | **193** | **N/A** | **192** | **N/A** | **214** | **N/A** |

Table 10.B.4 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Five

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| Eye gaze | 84 | 36% | 73 | 33% | 66 | 30% |
| Verbal response | 67 | 29% | 53 | 24% | 48 | 22% |
| Written response | 7 | 3% | 11 | 5% | 6 | 3% |
| Gestures or pointing | 166 | 71% | 136 | 62% | 157 | 71% |
| Augmentative and alternative communication device | 44 | 19% | 32 | 15% | 43 | 19% |
| Mouse, touch screen, computer keyboard, or any combination of these | 41 | 17% | 43 | 20% | 34 | 15% |
| Nonresponsive | 53 | 23% | 53 | 24% | 61 | 28% |
| Other | 9 | 4% | 6 | 3% | 6 | 3% |
| **Total Number of Students:** | **235** | **N/A** | **220** | **N/A** | **221** | **N/A** |

Table 10.B.5 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—Grade Eight

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| Eye gaze | 60 | 31% | 77 | 39% | 69 | 37% |
| Verbal response | 59 | 30% | 65 | 33% | 60 | 32% |
| Written response | 19 | 10% | 7 | 4% | 18 | 10% |
| Gestures or pointing | 124 | 64% | 118 | 60% | 123 | 65% |
| Augmentative and alternative communication device | 42 | 22% | 38 | 19% | 37 | 20% |
| Mouse, touch screen, computer keyboard, or any combination of these | 39 | 20% | 41 | 21% | 35 | 19% |
| Nonresponsive | 45 | 23% | 38 | 19% | 49 | 26% |
| Other | 5 | 3% | 11 | 6% | 7 | 4% |
| **Total Number of Students:** | **195** | **N/A** | **197** | **N/A** | **189** | **N/A** |

Table 10.B.6 “During classroom instruction, which mode or modes of communication does your student use?” (Select all that apply)—High School

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mode of Communication** | **Number of Responses—Earth and Space Sciences** | **Percent of Responses—Earth and Space Sciences** | **Number of Responses—Life Sciences** | **Percent of Responses—Life Sciences** | **Number of Responses—Physical Sciences** | **Percent of Responses—Physical Sciences** |
| Eye gaze | 63 | 37% | 54 | 33% | 63 | 35% |
| Verbal response | 55 | 32% | 44 | 27% | 53 | 30% |
| Written response | 16 | 9% | 14 | 8% | 22 | 12% |
| Gestures or pointing | 99 | 58% | 87 | 53% | 108 | 60% |
| Augmentative and alternative communication device | 35 | 21% | 27 | 16% | 40 | 22% |
| Mouse, touch screen, computer keyboard, or any combination of these | 31 | 18% | 41 | 25% | 38 | 21% |
| Nonresponsive | 28 | 16% | 29 | 18% | 29 | 16% |
| Other | 12 | 7% | 10 | 6% | 10 | 6% |
| **Total Number of Students:** | **170** | **N/A** | **165** | **N/A** | **179** | **N/A** |

Table 10.B.7 “What method(s) did you use to elicit a response from your student?”—Grade Five, Earth and Space Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 75 | 53% |
| Gestures | 55 | 39% |
| Accommodation or designated support | 21 | 15% |
| Material | 21 | 15% |
| Repeated instructions | 15 | 11% |
| Modeled behavior | 8 | 6% |
| Physical prompt | 7 | 5% |
| Simplified language | 5 | 4% |
| **Total Number of Students:** | **141** | **N/A** |

Table 10.B.8 “What method(s) did you use to elicit a response from your student?”—Grade Five, Life Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 72 | 58% |
| Gestures | 50 | 40% |
| Accommodation or designated support | 20 | 16% |
| Material | 19 | 15% |
| Repeated instructions | 14 | 11% |
| Physical prompt | 13 | 10% |
| Modeled behavior | 8 | 6% |
| Simplified language | 4 | 3% |
| **Total Number of Students:** | **125** | **N/A** |

Table 10.B.9 “What method(s) did you use to elicit a response from your student?”—Grade Five, Physical Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 67 | 51% |
| Gestures | 51 | 39% |
| Material | 26 | 20% |
| Accommodation or designated support | 20 | 15% |
| Repeated instructions | 19 | 15% |
| Physical prompt | 8 | 6% |
| Simplified language | 7 | 5% |
| Modeled behavior | 7 | 5% |
| **Total Number of Students:** | **131** | **N/A** |

Table 10.B.10 “What method(s) did you use to elicit a response from your student?”—Grade Eight, Earth and Space Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 64 | 55% |
| Gestures | 42 | 36% |
| Accommodation or designated support | 24 | 21% |
| Repeated instructions | 23 | 20% |
| Material | 15 | 13% |
| Physical prompt | 8 | 7% |
| Simplified language | 6 | 5% |
| Modeled behavior | 3 | 3% |
| **Total Number of Students:** | **116** | **N/A** |

Table 10.B.11 “What method(s) did you use to elicit a response from your student?”—Grade Eight, Life Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 74 | 58% |
| Gestures | 52 | 41% |
| Repeated instructions | 20 | 16% |
| Accommodation or designated support | 19 | 15% |
| Material | 19 | 15% |
| Physical prompt | 14 | 11% |
| Simplified language | 6 | 5% |
| Modeled behavior | 5 | 4% |
| **Total Number of Students:** | **128** | **N/A** |

Table 10.B.12 “What method(s) did you use to elicit a response from your student?”—Grade Eight, Physical Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 64 | 60% |
| Gestures | 44 | 41% |
| Repeated instructions | 22 | 21% |
| Material | 20 | 19% |
| Accommodation or designated support | 15 | 14% |
| Physical prompt | 7 | 7% |
| Simplified language | 7 | 7% |
| Modeled behavior | 7 | 7% |
| **Total Number of Students:** | **107** | **N/A** |

Table 10.B.13 “What method(s) did you use to elicit a response from your student?”—High School, Earth and Space Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 64 | 68% |
| Gestures | 35 | 37% |
| Material | 14 | 15% |
| Repeated instructions | 11 | 12% |
| Accommodation or designated support | 11 | 12% |
| Physical prompt | 8 | 9% |
| Simplified language | 5 | 5% |
| Modeled behavior | 2 | 2% |
| **Total Number of Students:** | **94** | **N/A** |

Table 10.B.14 “What method(s) did you use to elicit a response from your student?”—High School, Life Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 60 | 70% |
| Gestures | 32 | 37% |
| Material | 16 | 19% |
| Accommodation or designated support | 11 | 13% |
| Repeated instructions | 8 | 9% |
| Physical prompt | 7 | 8% |
| Simplified language | 3 | 3% |
| Modeled behavior | 1 | 1% |
| **Total Number of Students:** | **86** | **N/A** |

Table 10.B.15 “What method(s) did you use to elicit a response from your student?”—High School, Physical Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Verbal prompt | 58 | 64% |
| Gestures | 29 | 32% |
| Material | 13 | 14% |
| Repeated instructions | 12 | 13% |
| Physical prompt | 8 | 9% |
| Accommodation or designated support | 7 | 8% |
| Simplified language | 4 | 4% |
| Modeled behavior | 2 | 2% |
| **Total Number of Students:** | **90** | **N/A** |

Table 10.B.16 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Five, Earth and Space Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 44 | 45% |
| More visuals or pictures | 12 | 12% |
| More physical objects/tasks | 11 | 11% |
| Lack of engagement | 10 | 10% |
| More interactive videos | 9 | 9% |
| More technological support for responses | 9 | 9% |
| Change item type | 6 | 6% |
| Paper-based testing | 5 | 5% |
| Allow for more test examiner guided control | 4 | 4% |
| Enlarged items | 3 | 3% |
| More physical prompts | 3 | 3% |
| More audio | 2 | 2% |
| Animation | 1 | 1% |
| Printed material | 1 | 1% |
| **Total Number of Students:** | **98** | **N/A** |

Table 10.B.17 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Five, Life Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 34 | 38% |
| More visuals or pictures | 20 | 22% |
| More interactive videos | 13 | 15% |
| Lack of engagement | 11 | 12% |
| Change item type | 9 | 10% |
| More physical objects/tasks | 7 | 8% |
| More technological support for responses | 7 | 8% |
| More physical prompts | 6 | 7% |
| More audio | 4 | 4% |
| Paper-based testing | 3 | 3% |
| Allow for more test examiner guided control | 2 | 2% |
| Animation | 1 | 1% |
| **Total Number of Students:** | **89** | **N/A** |

Table 10.B.18 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Five, Physical Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 37 | 42% |
| Lack of engagement | 17 | 19% |
| More visuals or pictures | 17 | 19% |
| More interactive videos | 12 | 14% |
| More physical objects/tasks | 11 | 13% |
| More technological support for responses | 7 | 8% |
| Change item type | 6 | 7% |
| More audio | 6 | 7% |
| More physical prompts | 4 | 5% |
| Paper-based testing | 4 | 5% |
| Allow for more test examiner guided control | 3 | 3% |
| Enlarged items | 2 | 2% |
| Printed material | 1 | 1% |
| **Total Number of Students:** | **88** | **N/A** |

Table 10.B.19 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Eight, Earth and Space Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 39 | 41% |
| More visuals or pictures | 28 | 29% |
| Change item type | 16 | 17% |
| More technological support for responses | 9 | 9% |
| Allow for more test examiner guided control | 8 | 8% |
| Lack of engagement | 7 | 7% |
| Enlarged items | 5 | 5% |
| More audio | 4 | 4% |
| More interactive videos | 4 | 4% |
| Paper-based testing | 3 | 3% |
| Change to vocal-only test | 2 | 2% |
| More physical objects/tasks | 2 | 2% |
| Printed material | 2 | 2% |
| **Total Number of Students:** | **95** | **N/A** |

Table 10.B.20 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Eight, Life Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 33 | 32% |
| More visuals or pictures | 24 | 23% |
| Allow for more test examiner guided control | 13 | 13% |
| Change item type | 11 | 11% |
| More physical objects/tasks | 11 | 11% |
| Lack of engagement | 10 | 10% |
| More interactive videos | 10 | 10% |
| More technological support for responses | 9 | 9% |
| More audio | 3 | 3% |
| Paper-based testing | 3 | 3% |
| More physical prompts | 2 | 2% |
| Printed material | 2 | 2% |
| Change to vocal-only test | 1 | 1% |
| Enlarged items | 1 | 1% |
| **Total Number of Students:** | **103** | **N/A** |

Table 10.B.21 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—Grade Eight, Physical Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 49 | 52% |
| More visuals or pictures | 19 | 20% |
| Change item type | 14 | 15% |
| More physical objects/tasks | 14 | 15% |
| More technological support for responses | 6 | 6% |
| Lack of engagement | 5 | 5% |
| More audio | 5 | 5% |
| Allow for more test examiner guided control | 4 | 4% |
| Change to vocal-only test | 3 | 3% |
| Paper-based testing | 3 | 3% |
| More interactive videos | 2 | 2% |
| Printed material | 2 | 2% |
| Enlarged items | 1 | 1% |
| More physical prompts | 1 | 1% |
| **Total Number of Students:** | **94** | **N/A** |

Table 10.B.22 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—High School, Earth and Space Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 32 | 48% |
| More visuals or pictures | 12 | 18% |
| More physical objects/tasks | 8 | 12% |
| Lack of engagement | 6 | 9% |
| More physical prompts | 5 | 7% |
| More technological support for responses | 5 | 7% |
| Change item type | 4 | 6% |
| More audio | 4 | 6% |
| More interactive videos | 4 | 6% |
| Allow for more test examiner guided control | 3 | 4% |
| Enlarged items | 1 | 1% |
| Paper-based testing | 1 | 1% |
| **Total Number of Students:** | **67** | **N/A** |

Table 10.B.23 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—High School, Life Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 27 | 38% |
| More visuals or pictures | 15 | 21% |
| More technological support for responses | 8 | 11% |
| Lack of engagement | 7 | 10% |
| Enlarged items | 6 | 8% |
| Allow for more test examiner guided control | 4 | 6% |
| Change to vocal-only test | 4 | 6% |
| More audio | 4 | 6% |
| More interactive videos | 4 | 6% |
| More physical objects/tasks | 4 | 6% |
| More physical prompts | 4 | 6% |
| Change item type | 3 | 4% |
| Paper-based testing | 2 | 3% |
| Printed material | 2 | 3% |
| **Total Number of Students:** | **71** | **N/A** |

Table 10.B.24 “How might this embedded performance task be changed so your student could be successful in showing what they know and can do?”—High School, Physical Sciences

|  |  |  |
| --- | --- | --- |
| **Response** | **Number of Responses** | **Percent of Responses** |
| Less complexity | 33 | 45% |
| More visuals or pictures | 15 | 21% |
| Lack of engagement | 10 | 14% |
| More technological support for responses | 9 | 12% |
| Change item type | 8 | 11% |
| More physical objects/tasks | 5 | 7% |
| More interactive videos | 3 | 4% |
| More physical prompts | 3 | 4% |
| Allow for more test examiner guided control | 2 | 3% |
| Change to vocal-only test | 2 | 3% |
| More audio | 2 | 3% |
| Animation | 1 | 1% |
| Enlarged items | 1 | 1% |
| Paper-based testing | 1 | 1% |
| Printed material | 1 | 1% |
| **Total Number of Students:** | **73** | **N/A** |

## Continuous and Systematic Improvement

The third operational administration of the California Alternate Assessment (CAA) for Science occurred in 2022–23. Throughout the past three years, continuous efforts have been made to improve the assessments. This chapter summarizes accomplishments and ongoing improvements for the CAA for Science as well as strategies to implement possible future improvements.

### 2022–23 Feedback for Continuous Improvement Survey

The California Assessment of Student Performance and Progress (CAASPP) program annually solicits feedback from educators through the Feedback for Continuous Improvement Survey. Local educational agency (LEA) and test site staff, as well as test administrators and test examiners, were invited to participate in the 2022–23 Feedback for Continuous Improvement Survey. Its goal was to highlight successes and identify areas for improvement. A total of 3,869 survey respondents participated in this survey for the 2022–‍23 administration, compared to 4,834 respondents for the previous year. The California Department of Education (CDE) and ETS use key recommendations from educators to implement positive changes in the following administration year.

Educators provided valuable feedback for potential improvements to the future administration of CAASPP and the English Language Proficiency Assessments for California (ELPAC) by reporting some lessons they learned in 2021–22. Based on those lessons and suggestions for improvement, the *CAASPP and ELPAC Feedback for Continuous Improvement Survey and Focus Groups Report* (CDE, 2023) presents recommendations for the CDE, with the goal of enhancing the administrative support provided to LEAs and schools for future CAASPP and ELPAC test administrations. Refer also to subsection [*5.3.4 Feedback for Continuous Improvement Survey*](#_Feedback_for_Continuous_1) for assessment-specific results.

#### Recommendations for Improvement

In response to the LEA feedback, ETS and the CDE will consider implementing the following improvements in future test administrations:

* Shorten and simplify the *Preparing for Administration* documents and *Directions for Administration* *(DFAs)*
* Clarify and expand the use of universal tools, designated supports, and accommodations in daily instruction and on assessments to address respondents’ confusion regarding the assignment and use of embedded accessibility resources
* Emphasize stopping markers in materials and trainings for the CAA for Science

### ETS Administration and Delivery

#### Scripts for Orienting Activities

Starting with the 2023–24 test administration, the orienting activity scripts in the *DFAs* will begin with the same “SAY” direction, “Now we are going to do a science activity together. Then I will ask you five questions about this science topic.” The intent of this added script is to better prepare students for the start of the assessment.

### Research-based Operational Work

A feature of the CAA for Science embedded PTs is that the test examiners have the option to individualize certain elements of the assessment. Potential individualizations are designed so that the premise of the item and the scientific principles tested would remain the same. Individualization options in embedded PTs often involve the use of objects that may be more familiar to the student than the contexts or objects presented in the items themselves, causing concerns about the potential impact of giving test examiners the flexibility to choose materials to conduct activities associated with the embedded PTs.

ETS evaluated the impact of the use of individualization after the 2017–18 second-year pilot, after the 2018–19 field test, and after the 2021–22 second operational field test administration. In general, individualization and material choice do not explain a significant proportion of the variance of the students’ Science Connector scores, which reflect the sum of the number of points each student achieved from the Science Connector’s five items. Student engagement and student disability explained significant proportions of the Science Connector scores.

When interpreting the results of the material choice analyses, caution should be taken because of the small percentage of students who received an individualization (e.g., individualized script) or who received individualized materials. Because of the low rates of students receiving individualization, there is low statistical power to detect possible effects of the choice to use individualized materials if an effect exists. Additionally, the test examiner chose to use individualizations or individualized materials to make the Science Connector orienting activity more accessible to the student based on the needs of the student. Therefore, the results of these analyses are nested within student disability and test examiners’ understanding of the needs of each individual student.

ETS’ psychometricians will continue to monitor the number of students receiving an individualization and, for future administrations, will continue to evaluate the impact of the individualizations on student scores.

### Student Score Reports Redesign

Redesigned Student Score Reports (SSRs) will be made available for the 2023–24 test administration; changes will include the following:

* + - 1. SSR formats are PDF and HTML. For an HTML SSR, an LEA or parent or student portal vendor will provide a link to a parent/guardian.
      2. Where applicable, results of a science assessment will be included in the same PDF SSR as the results of the English language arts/literacy and mathematics assessments.
      3. All SSRs will include score comparison data.

Additionally, SSRs for all CAASPP assessments will be available in Arabic.

### Test Delivery

#### Changes to the Test Administrator Interface

The Test Administrator Interface will be updated to a cleaner, more user-friendly appearance. This will include a new functionality that allows the test examiner to pin information for specific students to the top of the screen for monitoring.

#### Changes to Ending the Assessment in the Test Delivery System

The process for ending the assessment will be streamlined. After the last question is presented, students will select [**Next**] (instead of [**End Test**]) to reach the review screen, which will include the [**Submit Test**] button.

### Accessibility Resources

Like all CAASPP assessments, the CAA for Science is administered using the test delivery system (TDS) created by Cambium Assessment, Inc. for the Smarter Balanced assessments. As such, implementation of new computer-based universal tools, designated supports, and accommodations are aligned with the TDS.

The following changes will be implemented during the 2023–24 CAA for Science administration:

* The definition of the non-embedded medical supports designated support will be updated to mention “Bluetooth hearing aids.”
* The definition of the non-embedded amplification designated support will be amended to remove noise buffers and white noise machines.

### Reference

California Department of Education. (2023). *2022–23 CAASPP and ELPAC feedback for continuous improvement survey and focus groups report* [Unpublished manuscript]. Sacramento, CA: California Department of Education.

1. The total population of students with the most significant cognitive disabilities in the California kindergarten through grade twelve public school system is approximately 38,000 (1 percent of the total student enrollment; this is provided on the CDE DataQuest website for the 2015–16 school year). [↑](#footnote-ref-2)
2. Data for 2022–23 was retrieved from the *CalEdFacts* web page on the CDE website. [↑](#footnote-ref-3)
3. This definition was retrieved from the CDE California Longitudinal Pupil Achievement Data System (CALPADS) web page on the CDE website. [↑](#footnote-ref-4)
4. This technical report is based on the versions of the Accessibility Matrix and the *Usability, Accessibility, and Accommodations Guidelines* that were available during the 2022–23 CAASPP administration. [↑](#footnote-ref-5)
5. Detailed information regarding the determination of the achievement levels can be found in the *CAA for Science Standard Setting Report* (ETS, 2022). [↑](#footnote-ref-6)
6. S. 1177—114th Congress: Every Student Succeeds Act. 2015. Title 1, Part A, Subpart 1, Section 1111(b)(2)(D)(ii)(I) [↑](#footnote-ref-7)
7. The IDEA is the primary federal program that authorizes state and local aid for special education and related services for children with disabilities. [↑](#footnote-ref-8)