California Science Test
Revised Blueprint

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Introduction

The California Science Test (CAST), administered pursuant to California Education Code (EC) Section 60640(b)(2)(B), is part of the California Assessment of Student Performance and Progress System. The CAST measures the full range of the California Next Generation Science Standards (CA NGSS) over a three-year period and is administered to students in grades five and eight and once in high school (i.e., grade ten, eleven, or twelve).

The CAST blueprint documents how test forms for the CAST will be assembled, including rules for the assessment of the CA NGSS Performance Expectations (PEs) and the integration of the Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs). The CA NGSS are referred to as "three dimensional" (3D) because of the interrelationships of the DCIs, SEPs, and CCCs. The CAST is designed to reflect a commitment to the 3D approach in both the writing of test items, each of which is aligned to at least two of the three dimensions, and in the assembly of test forms as detailed in this blueprint.

The test includes three science domains (Physical Sciences, Life Sciences, and Earth and Space Sciences) and one engineering domain (Engineering, Technology, and Application of Science). For scoring and reporting purposes, each of the three science domains will constitute one-third of the test (items written to assess PEs associated with Engineering, Technology, and Application of Science will be assigned to one of the three science domains, depending upon the context of their stimulus). California's Environmental Principles and Concepts will also be used as context for items, as appropriate to the three science domains.

The CAST is an untimed test (meaning that students should be allowed as much time as they need to complete it), and it is expected to take approximately two hours to administer all three segments:

- Segment A contributes to individual student scores, contains discrete items, and is designed to measure a broad sample of PEs.
- Segment B contributes to individual student scores, contains performance tasks (PTs), and is designed to provide deep measurement of a targeted sample of a few PEs in item sets.
- Segment C may contain either a block of discrete field test items or a single field test PT.

CAST test forms will sample PEs as follows:

- For the segments contributing to individual student scores (Segment A and Segment B), it is not possible to assess all PEs in a single testing year. As a result, PEs assessed in Segment A and Segment B will be rotated from year to year so that all PEs can be assessed in the segments contributing to individual scores over the course of a three-year period. For Segment C, administer a number of different versions across the state to allow for all PEs to appear on the CAST annually at a statewide level.

Although the CAST blueprint is not intended to guide instruction, it is a goal of the CAST to sample PEs broadly each year, as explained, so that instruction in a broad range of PEs across the grade spans will both be true to the intentions of the CA NGSS and will also provide solid preparation for the CAST.

CAST Claims

The CAST has four claims—one overall claim for the entire assessment and three separate science domain claims. Table 1 shows the claim statements for the CAST.

Table 1. CAST Claims

Domains	Description
3D Overall	Students can demonstrate performances associated with the expectations of the California Next Generation Science Standards, through the integration of Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts across the domains of Physical Sciences, Life Sciences, Earth and Space Sciences, and Engineering, Technology, and Application of Science.
3D Physical Sciences	Students can demonstrate performances associated with the expectations in the disciplinary area of Physical Sciences within the California Next Generation Science Standards, through the integration of Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.
3D Life Sciences	Students can demonstrate performances associated with the expectations in the disciplinary area of Life Sciences within the California Next Generation Science Standards, through the integration of Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.
3D Earth and Space Sciences	Students can demonstrate performances associated with the expectations in the disciplinary area of Earth and Space Sciences within the California Next Generation Science Standards, through the integration of Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

CAST Segments Contributing to Individual Scores

Table 2 shows the distribution of points by science domain and by DCI for the two sections of the CAST used to generate student scores (Segment A and Segment B). An individual student will receive items with sufficient points in each domain to support the reporting of both an overall score and science domain levels. More detailed tables illustrating the integration of the DCIs, SEPs, and CCCs appear later in this document (see Table 4, Table 5, and Table 6). Note that each assessment draws on PEs from several grades. The grade five assessment draws on PEs from grades three through five (3–5) and includes the foundational concepts that are addressed in kindergarten through grade two (K–2). The grade eight assessment draws on PEs from grades six through eight (6–8), and the high school assessment draws on PEs from grades nine through twelve (9–12).

Table 2. Segments Contributing to Individual Scores—Assessed in Grades Five and Eight and in High School

Science Domain and DCI Strand*	Items by DCI in Segment A—Grade 5	Items by DCI in Segment A—Grade 8	Items by DCI in Segment A—High School	Performance Tasks (PTs) in Segment B—All Grade Levels
Physical Sciences 1: *Matter and Its Interactions*	1–3	1–5	2–7	0–1
Physical Sciences 2: *Motion and Stability: Forces and Interactions*	1–4	1–4	1–5	0–1
Physical Sciences 3: *Energy*	1–4	1–4	1–4	0–1
Physical Sciences 4: *Waves and Their Applications in Technologies for Information Transfer*	1–2	1–2	1–4	0–1
Engineering, Technology, and Applications of Science: *Engineering Design*	0–1	0–1	0–1	0–1
Total Physical Sciences Items or Performance Tasks	8–9	8–10	9–12	1
Life Sciences 1: *From Molecules to Organisms: Structures and Processes*	1–2	1–6	1–6	0–1
Life Sciences 2: *Ecosystems: Interactions, Energy, and Dynamics*	1–2	1–4	1–7	0–1
Life Sciences 3: *Heredity: Inheritance and Variation of Traits*	1–2	1–2	1–2	0–1
Life Sciences 4: *Biological Evolution: Unity and Diversity*	1–4	1–5	1–5	0–1
Engineering, Technology, and Applications of Science: *Engineering Design*	0–1	0–1	0–1	0–1
Total Life Sciences Items or Performance Tasks	8–9	8–10	9–12	1
Earth and Space Sciences 1: *Earth's Place in the Universe*	1–2	1–3	1–5	0–1
Earth and Space Sciences 2: *Earth's Systems*	1–5	1–5	1–6	0–1
Earth and Space Sciences 3: *Earth and Human Activity*	1–3	1–4	1–5	0–1
Engineering, Technology, and Applications of Science: *Engineering Design*	0–1	0–1	0–1	0–1
Total Earth and Space Sciences Items or Performance Tasks	8–9	8–10	9–12	1
Operational Items (and Points) per Form per Grade Level (Segments A and B)	26 Discrete Items (28–32 Points)	28 Discrete Items (30–34 Points)	32 Discrete Items (34–38 Points)	3 PTs, 12–18 Items (18–21 Points)

*The CAST Item Specifications provide greater detail on the assessment targets by Performance Expectation.

CAST Segment C

Table 3 shows the additional items by science domain and DCI strand that will be assessed in Segment C. In Segment C, each student will complete either a block of discrete field test items or one field test PT.

Note that each assessment draws on PEs from several grades. The grade five assessment draws on PEs from grades three through five (3–5) and includes the foundational concepts that are addressed in kindergarten through grade two (K–2). The grade eight assessment draws on PEs from grades six through eight (6–8), and the high school assessment draws on PEs from grades nine through twelve (9–12).

Table 3. Segment C—Assessed in Grades Five and Eight and in High School

Science Domain and DCI Strand	Discrete Items	Performance Task Items
Physical Sciences 1: *Matter and Its Interactions*	0–1	0–6
Physical Sciences 2: *Motion and Stability: Forces and Interactions*	0–1	0–6
Physical Sciences 3: *Energy*	0–1	0–6
Physical Sciences 4: *Waves and Their Applications in Technologies for Information Transfer*	0–1	0–6
Engineering, Technology, and Applications of Science: *Engineering Design*	0–1	0–4
Total Physical Sciences Items	2	6
Life Sciences 1: *From Molecules to Organisms: Structures and Processes*	0–1	0–6
Life Sciences 2: *Ecosystems: Interactions, Energy, and Dynamics*	0–1	0–6
Life Sciences 3: *Heredity: Inheritance and Variation of Traits*	0–1	0–6
Life Sciences 4: *Biological Evolution: Unity and Diversity*	0–1	0–6
Engineering, Technology, and Applications of Science: *Engineering Design*	0–1	0–4
Total Life Sciences Items	2	6
Earth and Space Sciences 1: *Earth's Place in the Universe*	0–1	0–6
Earth and Space Sciences 2: *Earth's Systems*	0–1	0–6
Earth and Space Sciences 3: *Earth and Human Activity*	0–1	0–6
Engineering, Technology, and Applications of Science: *Engineering Design*	0–1	0–4
Total Earth and Space Sciences Items	2	6
Field Test Items per Form (Segment C)	6 Field Test Discrete Items	6 Field Test Performance Task Items

Segment A—Details of PE Distribution for High School Assessment

Segment A is designed to assess a student's mastery of a breadth of PEs of the CA NGSS in high school (9–12). Table 4 displays an "X" for the intersections of SEPs, DCIs, and CCCs articulated in the PEs. These intersections represent opportunities to develop items that can be used to assemble Segment A. While each individual item reflects the intersection of a SEP, DCI, and CCC, the table that follows indicates the proposed distribution of Segment A items by DCI, SEP, and CCC.

Table 4. PE Distribution for Segment A of the CAST High School Assessment

		Science Domain and DCI Strands																																					
		Physical Sciences (24 PEs)													Life Sciences (24 PEs)													Earth and Space Sciences (19 PEs)												ETS (4 PEs)		Items per SEP
		PS1			PS2				PS3			PS4			LS1				LS2					LS3		LS4		ESS1				ESS2				ESS3						
	CCC	1	5	7	1	2	4	6	2	4	5	2	4	7	4	5	6	7	2	3	4	5	7	2	3	1	2	1	3	5	7	2	5	6	7	2	4	7	n/a	4	n/a	
Science and Engineering Practices	SEP 1													X										X																	2–3
	SEP 1E																																								X	
	SEP 2	X	X						X		X				X	X					X								X			X	X		X						2–6
	SEP 3	X				X				X								X																X							2–5
	SEP 4					X																			X	X										X						2–5
	SEP 5		X		X		X			X		X								X		X					X		X								X	X		X		2–6
	SEP 6	X														X	X					X					X			X	X				X					X	2–6
	SEP 6E			X		X					X												X																			
	SEP 7												X						X				X	X			X	X								X				X			2–6
	SEP 8							X				X														X				X												2–6
	Items per DCI Strand	2–7			1–5				1–4			1–4			1–6				1–7					1–2		1–5		1–5				1–6				1–5				2–4		Total of 32 items
	Items per Domain	9–12													9–12													9–12												2–4		

* For scoring and reporting purposes, items written to assess PEs associated with Engineering, Technology, and Application of Science will be assigned to one of the three science domains, depending upon the context of their stimulus.

Notes on Table 4:

- X indicates that there is at least one PE at the given intersection of the three dimensions that can be sampled on a test form for Segment A.
- N/A indicates there is no CCC for at least some of the PEs in the column.
- SEPs 1 and 6 have separate components for science and engineering (SEP 1E and SEP 6E). All other SEPs incorporate the same components for both science and engineering.
    - CA NGSS calls out the distinctive purposes of practices primarily in two specific SEPs: SEP 1 and SEP 6. For SEP 1 in science (SEP 1), the practice focuses on identifying questions about phenomena. For SEP 1 in engineering (SEP 1E), the practice focuses on defining a problem to be solved. For SEP 6 in science (SEP 6), the goal of the practice is to construct logically coherent explanations of phenomena to incorporate students' current understanding of science. For SEP 6 in engineering (SEP 6E), the goal is to propose design solutions to balance competing criteria of desired functions.
- Details on the naming conventions and full names of SEPs, DCIs, and CCCs are provided in Appendix B: Full Titles for SEPs, DCIs, and CCCs.

Segment A—Details of PE Distribution for Grade Eight Assessment

Segment A is designed to assess a student's mastery of a breadth of PEs of the CA NGSS in grades six through eight (6–8). Table 5 displays an "X" for the intersections of SEPs, DCIs, and CCCs articulated in the PEs. These intersections represent opportunities to develop items that can be used to assemble Segment A. While each individual item reflects the intersection of a SEP, DCI, and CCC, the table that follows indicates the proposed distribution of Segment A items by DCI, SEP, and CCC.

Table 5. PE Distribution for Segment A of the CAST Grade Eight Assessment

		Science Domain and DCI Strands																																					
		Physical Sciences (19 PEs)												Life Sciences (21 PEs)												Earth and Space Sciences (15 PEs)												ETS (4 PEs)	Items per SEP
		PS1					PS2			PS3			PS4		LS1					LS2				LS3		LS4		ESS1			ESS2					ESS3				
	CCC	1	2	3	5	6	2	4	7	3	4	5	1	6	2	3	4	5	6	1	2	5	7	2	6	1	2	1	3	4	1	2	3	4	5	7	1	2	7	n/a	
Science and Engineering Practices	SEP 1						X																															X	X	1–3
	SEP 1E																																								
	SEP 2		X	X	X						X			X				X	X			X		X	X			X		X				X	X	X				X	1–16
	SEP 3						X		X	X						X																X								1–5
	SEP 4	X								X												X				X			X		X						X			X	1–9
	SEP 5												X														X														1–2
	SEP 6														X			X		X						X	X		X				X						X			1–12
	SEP 6E				X			X				X																										X			
	SEP 7							X				X			X		X							X														X		X	1–8
	SEP 8					X								X	X												X														1–4
	Items per DCI Strand	1–5					1–4			1–4			1–2		1–6					1–4				1–2		1–5		1–3			1–5					1–4				2–4	Total of 28 items
	Items per Domain	8–10													8–10													8–10												2–4	

* For scoring and reporting purposes, items written to assess PEs associated with Engineering, Technology, and Application of Science will be assigned to one of the three science domains, depending upon the context of their stimulus.

Notes on Table 5:

- X indicates that there is at least one PE at the given intersection of the three dimensions that can be sampled on a test form for Segment A.
- N/A indicates there is no CCC for at least some of the PEs in the column.
- SEPs 1 and 6 have separate components for science and engineering (SEP 1E and SEP 6E). All other SEPs incorporate the same components for both science and engineering.
    - CA NGSS calls out the distinctive purposes of practices primarily in two specific SEPs: SEP 1 and SEP 6. For SEP 1 in science (SEP 1), the practice focuses on identifying questions about phenomena. For SEP 1 in engineering (SEP 1E), the practice focuses on defining a problem to be solved. For SEP 6 in science (SEP 6), the goal of the practice is to construct logically coherent explanations of phenomena to incorporate students' current understanding of science. For SEP 6 in engineering (SEP 6E), the goal is to propose design solutions to balance competing criteria of desired functions.
- Details on the naming conventions and full names of SEPs, DCIs, and CCCs are provided in Appendix B: Full Titles for SEPs, DCIs, and CCCs.

Segment A—Details of PE Distribution for Grade Five Assessment

Segment A is designed to assess a student's mastery of a breadth of PEs of the CA NGSS in grades three through five (3–5) and includes the foundational concepts that are introduced in kindergarten through grade two (K–2). Table 6 displays an "X" for the intersections of SEPs, DCIs, and CCCs articulated in the PEs. These intersections represent opportunities to develop items that can be used to assemble Segment A. While each individual item reflects the intersection of a SEP, DCI, and CCC, the tables that follow indicate the proposed distribution of Segment A items by DCI, SEP, and CCC.

Table 6. PE Distribution for Segment A of the CAST Grade 5 Assessment

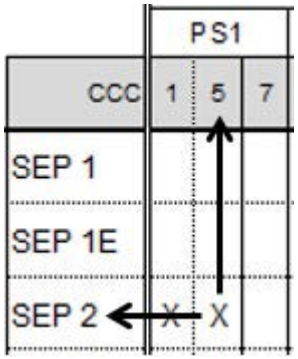
		Science Domain and DCI Strands																												
		Physical Sciences (17 PEs)								Life Sciences (12 PEs)										Earth and Space Sciences (13 PEs)								ETS (3 PEs)	Items per SEP
		PS1		PS2			PS3	PS4		LS1			LS2		LS3		LS4			ESS1		ESS2				ESS3			
	CCC	2	3	1	2	n/a	5	1	2	1	4	5	2	4	1	2	2	3	4	1	3	1	2	3	4	2	4	n/a	
Science and Engineering Practices	SEP 1				X		X																					X	1–4
	SEP 1E					X																							
	SEP 2		X				X	X	X	X	X			X											X				1–7
	SEP 3	X	X	X	X		X																X					X	1–7
	SEP 4														X			X		X		X							2–4
	SEP 5		X																					X					1–2
	SEP 6						X									X	X			X									2–8
	SEP 6E						X	X																		X		X	
	SEP 7				X						X	X	X				X		X		X					X			1–8
	SEP 8																					X				X	X		1–3
	Items per DCI Strand	1–3		1–4			1–4	1–2		1–2			1–2		1–2		1–4			1–2		1–5				1–3		2–4	Total of 26 items
	Items per Domain	8–9								8–9										8–9								2–4	

* For scoring and reporting purposes, items written to assess PEs associated with Engineering, Technology, and Application of Science will be assigned to one of the three science domains, depending upon the context of their stimulus.

Notes on Table 6:

- X indicates that there is at least one PE at the given intersection of the three dimensions that can be sampled on a test form for Segment A.
- N/A indicates there is no CCC for at least some of the PEs in the column.
- SEPs 1 and 6 have separate components for science and engineering (SEP 1E and SEP 6E). All other SEPs incorporate the same components for both science and engineering.
    - CA NGSS calls out the distinctive purposes of practices primarily in two specific SEPs: SEP 1 and SEP 6. For SEP 1 in science (SEP 1), the practice focuses on identifying questions about phenomena. For SEP 1 in engineering (SEP 1E), the practice focuses on defining a problem to be solved. For SEP 6 in science (SEP 6), the goal of the practice is to construct logically coherent explanations of phenomena to incorporate students' current understanding of science. For SEP 6 in engineering (SEP 6E), the goal is to propose design solutions to balance competing criteria of desired functions.
- Details on the naming conventions and full names of SEPs, DCIs, and CCCs are provided in Appendix B: Full Titles for SEPs, DCIs, and CCCs.

Appendix A: Guidance on Interpreting Tables 4, 5, and 6

Excerpt	Description
	In the excerpt shown (from Table 4), the “X” corresponds to a PE that has DCI(s) in the PS1 strand and is coded to SEP 2 (Developing and Using Models) and CCC 5 (Energy and Matter). The corresponding PE, HS-PS1-4, is excerpted from the CA NGSS Item Specifications on the CDE website here: https://www.cde.ca.gov/ta/tg/ca/documents/itemspecs-hs-ps1-4.docx

Appendix B: Full Titles for SEPs, DCIs, and CCCs

Science and Engineering Practices (SEPs)

SEP 1—Asking Questions (Science)
SEP 1E—Defining Problems (Engineering)
SEP 2—Developing and Using Models
SEP 3—Planning and Carrying Out Investigations
SEP 4—Analyzing and Interpreting Data
SEP 5—Using Mathematics and Computational Thinking
SEP 6—Constructing Explanations (Science)
SEP 6E—Designing Solutions (Engineering)
SEP 7—Engaging in Argument from Evidence
SEP 8—Obtaining, Evaluating, and Communicating Information

Disciplinary Core Ideas (DCIs)

PS1—Matter and Its Interactions
PS2—Motion and Stability: Forces and Interactions
PS3—Energy
PS4—Waves and Their Applications in Technologies for Information Transfer
LS1—From Molecules to Organisms: Structures and Processes
LS2—Ecosystems: Interactions, Energy, and Dynamics
LS3—Heredity: Inheritance and Variation of Traits
LS4—Biological Evolution: Unity and Diversity
ESS1—Earth's Place in the Universe
ESS2—Earth's Systems
ESS3—Earth and Human Activity
ETS1—Engineering, Technology, and Application of Science

Crosscutting Concepts (CCCs)

1—Patterns
2—Cause and effect
3—Scale, proportion, and quantity
4—Systems and system models
5—Energy and matter
6—Structure and function
7—Stability and change

Appendix C: Details from Table 4

In the table, an X indicates that there is at least one Performance Expectation (PE) at the given intersection of the three dimensions that can be sampled on a test form for Segment A. The table has an X only in the locations described in the bulleted text that follows for each science domain and the Engineering, Technology, and Applications of Science (ETS) sub-domain.

In the Physical Sciences (PS) domain for high school, there are twenty-four PEs, organized into four Disciplinary Core Idea (DCI) strands, that are distributed among the eight Science and Engineering Practices (SEPs) and six of the seven Crosscutting Concepts (CCCs).

- For the science component of SEP 1, there is at least one PE in DCI strand PS4, with CCC 7.
- For SEP 2, there are at least four PEs.
    - There are at least two PEs in DCI strand PS1, with CCC 1 and CCC 5.
    - There are at least two PEs in DCI strand PS3, with CCC 2 and CCC 5.
- For SEP 3, there are at least three PEs.
    - There is at least one PE in DCI strand PS1, with CCC 1.
    - There is at least one PE in DCI strand PS2, with CCC 2.
    - There is at least one PE in DCI strand PS3, with CCC 4.
- For SEP 4, there is at least one PE in DCI strand PS2, with CCC 2.
- For SEP 5, there are at least five PEs.
    - There is at least one PE in DCI strand PS1, with CCC 5.
    - There are at least two PEs in DCI strand PS2, with CCC 1 and CCC 4.
    - There is at least one PE in DCI strand PS3, with CCC 4.
    - There is at least one PE in DCI strand PS4, with CCC 2.
- For the science component of SEP 6, there is at least one PE in DCI strand PS1, with CCC 1.
- For the engineering component of SEP 6 (SEP 6E), there are at least three PEs.
    - There is at least one PE in DCI strand PS1, with CCC 7.

  - There is at least one PE in DCI strand PS2, with CCC 2.
  - There is at least one PE in DCI strand PS3, with CCC 5.
- For SEP 7, there is at least one PE in DCI strand PS4, with CCC 4.
- For SEP 8, there are at least two PEs.
  - There is at least one PE in DCI strand PS2, with CCC 6.
  - There is at least one PE in DCI strand PS4, with CCC 2.

The range of items per DCI strand is described as follows:

- Between two and seven items aligned to PEs from DCI strand PS1 will be assessed on Segment A of the CAST.
- Between one and five items aligned to PEs from DCI strand PS2 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand PS3 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand PS4 will be assessed on Segment A of the CAST.

For the entire PS domain, between nine and twelve items will be assessed on Segment A of the CAST.

In the Life Sciences (LS) domain for high school, there are twenty-four PEs, organized into four DCI strands, that are distributed among eight SEPs and seven CCCs.

- For the science component of SEP 1, there is at least one PE in DCI strand LS3, with CCC 2.
- For SEP 2, there are at least three PEs.
  - There are at least two PEs in DCI strand LS1, with CCC 4 and CCC 5.
  - There is at least one PE in DCI strand LS2, with CCC 4.
- For SEP 3, there is at least one PE in DCI strand LS1, with CCC 7.
- For SEP 4, there are at least two PEs.
  - There is at least one PE in DCI strand LS3, with CCC 3.
  - There is at least one PE in DCI strand LS4, with CCC 1.
- For SEP 5, there are at least three PEs.
  - There are at least two PEs in DCI strand LS2, with CCC 3 and CCC 5.
  - There is at least one PE in DCI strand LS4, with CCC 2.

- For the science component of SEP 6, there are at least four PEs.
    - There are at least two PEs in DCI strand LS1, with CCC 5 and CCC 6.
    - There is at least one PE in DCI strand LS2, with CCC 5.
    - There is at least one PE in DCI strand LS4, with CCC 2.
- For the engineering component of SEP 6 (SEP 6E), there is at least one PE in DCI strand LS2, with CCC 7.
- For SEP 7, there are at least four PEs.
    - There are at least two PEs in DCI strand LS2, with CCC 2 and CCC 7.
    - There is at least one PE in DCI strand LS3, with CCC 2.
    - There is at least one PE in DCI strand LS4, with CCC 2.
- For SEP 8, there is at least one PE in DCI strand LS4, with CCC 1.

The range of items per DCI strand is described as follows:

- Between one and six items aligned to PEs from DCI strand LS1 will be assessed on Segment A of the CAST.
- Between one and seven items aligned to PEs from DCI strand LS2 will be assessed on Segment A of the CAST.
- Between one and two items aligned to PEs from DCI strand LS3 will be assessed on Segment A of the CAST.
- Between one and five items aligned to PEs from DCI strand LS4 will be assessed on Segment A of the CAST.

For the entire LS domain, between nine and twelve items will be assessed on Segment A of the CAST.

In the Earth and Space Sciences (ESS) domain for high school, there are nineteen PEs, organized into three DCI strands, that are distributed among seven of the eight SEPs and seven CCCs.

- For SEP 2, there are at least four PEs.
    - There is at least one PE in DCI strand ESS1, with CCC 3.
    - There are at least three PEs in DCI strand ESS2, with CCC 2, CCC 5, and CCC 7.
- For SEP 3, there is at least one PE in DCI strand ESS2, with CCC 6.
- For SEP 4, there are at least two PEs.
    - There is at least one PE in DCI strand ESS2, with CCC 7.
    - There is at least one PE in DCI strand ESS3, with CCC 7.

- For SEP 5, there are at least three PEs.
    - There is at least one PE in DCI strand ESS1, with CCC 3.
    - There are at least two PEs in DCI strand ESS3, with CCC 4 and CCC 7.
- For the science component of SEP 6, there are at least three PEs.
    - There are at least two PEs in DCI strand ESS1, with CCC 5 and CCC 7.
    - There is at least one PE in DCI strand ESS3, with CCC 2.
- For the engineering component of SEP 6 (SEP 6E), there is at least one PE in DCI strand ESS3, with CCC 7.
- For SEP 7, there are at least three PEs.
    - There is at least one PE in DCI strand ESS1, with CCC 1.
    - There is at least one PE in DCI strand ESS2, with CCC 7.
    - There is at least one PE in DCI strand ESS3, with no CCC.
- For SEP 8, there is at least one PE in DCI strand ESS1, with CCC 5.

The range of items per DCI strand is described as follows:

- Between one and five items aligned to PEs from DCI strand ESS1 will be assessed on Segment A of the CAST.
- Between one and six items aligned to PEs from DCI strand ESS2 will be assessed on Segment A of the CAST.
- Between one and five items aligned to PEs from DCI strand ESS3 will be assessed on Segment A of the CAST.

For the entire ESS domain, between nine and twelve items will be assessed on Segment A of the CAST.

In the ETS sub-domain for high school, there are four PEs, organized into one DCI strand, that are distributed among three of the eight SEPs and one of the seven CCCs.

- For the engineering component of SEP 1 (SEP 1E), there is at least one PE in the DCI strand ETS1, with no CCC.
- For SEP 5, there is at least one PE in the DCI strand ETS1, with CCC 4.
- For the science component of SEP 6, there is at least one PE in the DCI strand ETS1, with no CCC.

The range of items per DCI strand is described as follows:

- Between two and four items aligned to PEs from DCI strand ETS1 will be assessed on Segment A of the CAST.

For the entire ETS sub-domain, between two and four items will be assessed on Segment A of the CAST.

The range of items per SEP across all domains is described as follows:

- Between two and three items representing both the science and engineering components of SEP 1 will be assessed on Segment A of the CAST.
- Between two and six items representing SEP 2 will be assessed on Segment A of the CAST.
- Between two and five items representing SEP 3 will be assessed on Segment A of the CAST.
- Between two and five items representing SEP 4 will be assessed on Segment A of the CAST.
- Between two and six items representing SEP 5 will be assessed on Segment A of the CAST.
- Between two and six items representing both the science and engineering components of SEP 6 will be assessed on Segment A of the CAST.
- Between two and six items representing SEP 7 will be assessed on Segment A of the CAST.
- Between two and six items representing SEP 8 will be assessed on Segment A of the CAST.

For high school, a total of thirty-two items representing a selection of PEs across all three science domains and the ETS sub-domain will be assessed on Segment A of the CAST.

Appendix D: Details from Table 5

In the table, an X indicates that there is at least one performance expectation (PE) at the given intersection of the three dimensions that can be sampled on a test form for Segment A. The table has an X only in the locations described in the bulleted text that follows for each science domain and the Engineering, Technology, and Applications of Science (ETS) sub-domain.

In the Physical Sciences (PS) domain for grade eight, there are nineteen PEs, organized into four Disciplinary Core Idea (DCI) strands, that are distributed among eight Science and Engineering Practices (SEPs) and seven Crosscutting Concepts (CCCs).

- For the science component of SEP 1, there is at least one PE in DCI strand PS2, with CCC 2.
- For SEP 2, there are at least five PEs.
    - There are at least three PEs in DCI strand PS1, with CCC 2, CCC 3, and CCC 5.
    - There is at least one PE in DCI strand PS3, with CCC 4.
    - There is at least one PE in DCI strand PS4, with CCC 6.
- For SEP 3, there are at least three PEs.
    - There are at least two PEs in DCI strand PS2, with CCC 2 and CCC 7.
    - There is at least one PE in DCI strand PS3, with CCC 3.
- For SEP 4, there are at least two PEs.
    - There is at least one PE in DCI strand PS1, with CCC 1.
    - There is at least one PE in DCI strand PS3, with CCC 3.
- For SEP 5, there is at least one PE in DCI strand PS4, with CCC 1.
- For the engineering component of SEP 6 (SEP 6E), there are at least three PEs.
    - There is at least one PE in DCI strand PS1, with CCC 5.
    - There is at least one PE in DCI strand PS2, with CCC 4.
    - There is at least one PE in DCI strand PS3, with CCC 5.
- For SEP 7, there are at least two PEs.

  - There is at least one PE in DCI strand PS2, with CCC 4.
  - There is at least one PE in DCI strand PS3, with CCC 5.
- For SEP 8, there are at least two PEs.
  - There is at least one PE in DCI strand PS1, with CCC 6.
  - There is at least one PE in DCI strand PS4, with CCC 6.

The range of items per DCI strand is described as follows:

- Between one and five items aligned to PEs from DCI strand PS1 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand PS2 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand PS3 will be assessed on Segment A of the CAST.
- Between one and two items aligned to PEs from DCI strand PS4 will be assessed on Segment A of the CAST.

For the entire PS domain, between eight and ten items will be assessed on Segment A of the CAST.
In the Life Sciences (LS) domain for grade eight, there are twenty-one PEs, organized into four DCI strands, that are distributed among seven of the eight SEPs and seven CCCs.

- For SEP 2, there are at least five PEs.
  - There are at least two PEs in DCI strand LS1, with CCC 5 and CCC 6.
  - There is at least one PE in DCI strand LS2, with CCC 5.
  - There are at least two PEs in DCI strand LS3, with CCC 2 and CCC 6.
- For SEP 3, there is at least one PE in DCI strand LS1, with CCC 3.
- For SEP 4, there are at least two PEs.
  - There is at least one PE in DCI strand LS2, with CCC 2.
  - There is at least one PE in DCI strand LS4, with CCC 1.
- For SEP 5, there is at least one PE in DCI strand LS4, with CCC 2.
- For the science component of SEP 6 (SEP 6), there are at least five PEs.
  - There are at least two PEs in DCI strand LS1, with CCC 2 and CCC 5.
  - There is at least one PE in DCI strand LS2, with CCC 1.

    - There are at least two PEs in DCI strand LS4, with CCC 1 and CCC 2.
- For SEP 7, there are at least three PEs.
    - There are at least two PEs in DCI strand LS1, with CCC 2 and CCC 4.
    - There is at least one PE in DCI strand LS2, with CCC 7.
- For SEP 8, there are at least two PEs.
    - There is at least one PE in DCI strand LS1, with CCC 2.
    - There is at least one PE in DCI strand LS4, with CCC 2.

The range of items per DCI strand is described as follows:

- Between one and six items aligned to PEs from DCI strand LS1 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand LS2 will be assessed on Segment A of the CAST.
- Between one and two items aligned to PEs from DCI strand LS3 will be assessed on Segment A of the CAST.
- Between one and five items aligned to PEs from DCI strand LS4 will be assessed on Segment A of the CAST.

For the entire LS domain, between eight and ten items will be assessed on Segment A of the CAST.

In the Earth and Space Sciences (ESS) domain for grade eight, there are fifteen PEs, organized into three DCI strands, that are distributed among six of the eight SEPs and six of the seven CCCs.

- For the science component of SEP 1, there is at least one PE in DCI strand ESS3, with CCC 7.
- For SEP 2, there are at least five PEs.
    - There are at least two PEs in DCI strand ESS1, with CCC 1 and CCC 4.
    - There are at least three PEs in DCI strand ESS2, with CCC 4, CCC 5, and CCC 7.
- For SEP 3, there is at least one PE in DCI strand ESS2, with CCC 2.
- For SEP 4, there are at least three PEs.
    - There is at least one PE in DCI strand ESS1, with CCC 3.
    - There is at least one PE in DCI strand ESS2, with CCC 1.
    - There is at least one PE in DCI strand ESS3, with CCC 1.
- For the science component of SEP 6, there are at least three PEs.

  - There is at least one PE in DCI strand ESS1, with CCC 3.
  - There is at least one PE in DCI strand ESS2, with CCC 3.
  - There is at least one PE in DCI strand ESS3, with CCC 2.
- For the engineering component of SEP 6 (SEP 6E), there is at least one PE in DCI strand ESS3, with CCC 2.
- For SEP 7, there is at least one PE in DCI strand ESS3, with CCC 2.

The range of items per DCI strand is described as follows:

- Between one and three items aligned to PEs from DCI strand ESS1 will be assessed on Segment A of the CAST.
- Between one and five items aligned to PEs from DCI strand ESS2 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand ESS3 will be assessed on Segment A of the CAST.

For the entire ESS domain, between eight and ten items will be assessed on Segment A of the CAST.

In the ETS sub-domain for grade eight, there are four PEs, organized into one DCI strand, that are distributed among four of the eight SEPs and no CCCs.

- For the science component of SEP 1, there is at least one PE aligned to DCI strand ETS1.
- For SEP 2, there is at least one PE aligned to DCI strand ETS1.
- For SEP 4, there is at least one PE aligned to DCI strand ETS1.
- For SEP 7, there is at least one PE aligned to DCI strand ETS1.

The range of items per DCI strand is described as follows:

- Between two and four items aligned to PEs from DCI strand ETS1 will be assessed on Segment A of the CAST.

For the entire ETS sub-domain, between two and four items will be assessed on Segment A of the CAST.

The range of items per SEP across all domains is described as follows:

- Between one and three items representing both the science and engineering components of SEP 1 will be assessed on Segment A of the CAST.
- Between one and sixteen items representing SEP 2 will be assessed on Segment A of the CAST.
- Between one and five items representing SEP 3 will be assessed on Segment A of the CAST.
- Between one and nine items representing SEP 4 will be assessed on Segment A of the CAST.
- Between one and two items representing SEP 5 will be assessed on Segment A of the CAST.

- Between one and twelve items representing both the science and engineering components of SEP 6 will be assessed on Segment A of the CAST.
- Between one and eight items representing SEP 7 will be assessed on Segment A of the CAST.
- Between one and four items representing SEP 8 will be assessed on Segment A of the CAST.

For grade eight, a total of twenty-eight items representing a selection of PEs across all three science domains and the ETS sub-domain will be assessed on Segment A of the CAST.

Appendix E: Details from Table 6

In the table, an X indicates that there is at least one Performance Expectation (PE) at the given intersection of the three dimensions that can be sampled on a test form for Segment A. The table has an X only in the locations described in the bulleted text that follows for each science domain and the Engineering, Technology, and Applications of Science (ETS) sub-domain.

In the Physical Sciences (PS) domain for grade five, there are seventeen PEs, organized into four Disciplinary Core Idea (DCI) strands, that are distributed among six of the eight Science and Engineering Practices (SEPs) and four of the seven Crosscutting Concepts (CCCs).

- For the science component of SEP 1, there are at least two PEs.
    - There is at least one PE in DCI strand PS2, with CCC 2.
    - There is at least one PE in DCI strand PS3, with CCC 5.
- For the engineering component of SEP 1 (SEP 1E), there is at least one PE in DCI strand PS2, with no CCC.
- For SEP 2, there are at least four PEs.
    - There is at least one PE in DCI strand PS1, with CCC 3.
    - There is at least one PE in DCI strand PS3, with CCC 5.
    - There are at least two PEs in DCI strand PS4, with CCC 1 and CCC 2.
- For SEP 3, there are at least five PEs.
    - There are at least two PEs in DCI strand PS1, with CCC 2 and CCC 3.
    - There are at least two PEs in DCI strand PS2, with CCC 1 and CCC 2.
    - There is at least one PE in DCI strand PS4, with CCC 5.
- For SEP 5, there is at least one PE in DCI strand PS1, with CCC 3.
- For the science component of SEP 6, there is at least one PE in DCI strand PS3, with CCC 5.
- For the engineering component of SEP 6 (SEP 6E), there are at least two PEs.
    - There is at least one PE in DCI strand PS3, with CCC 5.
    - There is at least one PE in DCI strand PS4, with CCC 1.

- For SEP 7, there is at least one PE in DCI strand PS2, with CCC 2.

The range of items per DCI strand is described as follows:

- Between one and three items aligned to PEs from DCI strand PS1 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand PS2 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand PS3 will be assessed on Segment A of the CAST.
- Between one and two items aligned to PEs from DCI strand PS4 will be assessed on Segment A of the CAST.

For the entire PS domain, between eight and nine items will be assessed on Segment A of the CAST.

In the Life Sciences (LS) domain for grade five, there are twelve PEs, organized into four DCI strands, that are distributed among four of the eight SEPs and five of the seven CCCs.

- For SEP 2, there are at least three PEs.
    - There are at least two PEs in DCI strand LS1, with CCC 1 and CCC 4.
    - There is at least one PE in DCI strand LS2, with CCC 4.
- For SEP 4, there are at least two PEs.
    - There is at least one PE in DCI strand LS3, with CCC 1.
    - There is at least one PE in DCI strand LS4, with CCC 3.
- For the science component of SEP 6 (SEP 6), there are at least two PEs.
    - There is at least one PE in DCI strand LS3, with CCC 2.
    - There is at least one PE in DCI strand LS4, with CCC 2.
- For SEP 7, there are at least five PEs.
    - There are at least two PEs in DCI strand LS1, with CCC 4 and CCC 5.
    - There is at least one PE in DCI strand LS2, with CCC 2.
    - There are at least two PEs in DCI strand LS4, with CCC 2 and CCC 4.

The range of items per DCI strand is described as follows:

- Between one and two items aligned to PEs from DCI strand LS1 will be assessed on Segment A of the CAST.
- Between one and two items aligned to PEs from DCI strand LS2 will be assessed on Segment A of the CAST.

- Between one and two items aligned to PEs from DCI strand LS3 will be assessed on Segment A of the CAST.
- Between one and four items aligned to PEs from DCI strand LS4 will be assessed on Segment A of the CAST.

For the entire LS domain, between eight and nine items will be assessed on Segment A of the CAST.

In the Earth and Space Sciences (ESS) domain for grade five, there are thirteen PEs, organized into three DCI strands, that are distributed among seven of the eight SEPs and four of the seven CCCs.

- For SEP 2, there is at least one PE in DCI strand ESS2, with CCC 4.
- For SEP 3, there is at least one PE in DCI strand ESS2, with CCC 2.
- For SEP 4, there are at least two PEs.
    - There is at least one PE in DCI strand ESS1, with CCC 1.
    - There is at least one PE in DCI strand ESS2, with CCC 1.
- For SEP 5, there is at least one PE in DCI strand ESS2, with CCC 3.
- For the science component of SEP 6, there is at least one PE in DCI strand ESS1, with CCC 1.
- For the engineering component of SEP 6 (SEP 6E), there is at least one PE in DCI strand ESS3, with CCC 2.
- For SEP 7, there are at least two PEs.
    - There is at least one PE in DCI strand ESS1, with CCC 3.
    - There is at least one PE in DCI strand ESS3, with CCC 2.
- For SEP 8, there are at least three PEs.
    - There is at least one PE in DCI strand ESS2, with CCC 1.
    - There are at least two PEs in DCI strand ESS3, with CCC 2 and CCC 4.

The range of items per DCI strand is described as follows:

- Between one and two items aligned to PEs from DCI strand ESS1 will be assessed on Segment A of the CAST.
- Between one and five items aligned to PEs from DCI strand ESS2 will be assessed on Segment A of the CAST.
- Between one and three items aligned to PEs from DCI strand ESS3 will be assessed on Segment A of the CAST.

For the entire ESS domain, between eight and nine items will be assessed on Segment A of the CAST.

In the ETS sub-domain for grade five, there are three PEs, organized into one DCI strand, that are distributed among three of the eight SEPs and no CCCs.

- For the science component of SEP 1, there is at least one PE.
- For SEP 3, there is at least one PE.
- For the engineering component of SEP 6 (SEP 6E), there is at least one PE.

The range of items per DCI strand is described as follows:

- Between two and four items aligned to PEs from DCI strand ETS1 will be assessed on Segment A of the CAST.

For the entire ETS sub-domain, between two and four items will be assessed on Segment A of the CAST.

The range of items per SEP across all domains in grade five is described as follows:

- Between one and four items representing both the science and engineering components of SEP 1 will be assessed on Segment A of the CAST.
- Between one and seven items representing SEP 2 will be assessed on Segment A of the CAST.
- Between one and seven items representing SEP 3 will be assessed on Segment A of the CAST.
- Between two and four items representing SEP 4 will be assessed on Segment A of the CAST.
- Between one and two items representing SEP 5 will be assessed on Segment A of the CAST.
- Between two and eight items representing both the science and engineering components of SEP 6 will be assessed on Segment A of the CAST.
- Between one and eight items representing SEP 7 will be assessed on Segment A of the CAST.
- Between one and three items representing SEP 8 will be assessed on Segment A of the CAST.

In grade five, a total of thirty-two items representing a selection of PEs across all three science domains and the ETS sub-domain will be assessed on Segment A of the CAST.