

# Glossary Part 2

## 2016 Science Framework

### FOR CALIFORNIA PUBLIC SCHOOLS Kindergarten Through Grade Twelve



Adopted by the California State Board of Education  
November 2016

*Published by the California Department of Education  
Sacramento, 2018*

To view the remaining sections of the 2016 California Science Framework on the CDE website, go to:  
<https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp>

Items in this document that relate to crosscutting concepts are highlighted in green and followed by the abbreviation CCC in brackets, **[CCC]**, with a number corresponding to the concept. The same items that correspond to the science and engineering practices are highlighted in blue and followed by the abbreviation SEP in brackets, **[SEP]**, with a number corresponding to the practice.

The Web links in this document have been replaced with links that redirect the reader to a California Department of Education (CDE) Web page containing the actual Web addresses and short descriptions. Here the reader can access the Web page referenced in the text. This approach allows CDE to ensure the links remain current.

## Common Next Generation Science Standards Acronyms

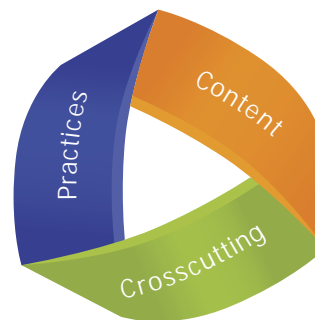
CCC:	Crosscutting Concept
CCSS:	Common Core State Standards
DCI:	Disciplinary Core Idea
FB:	Foundation Box
PE:	Performance Expectation
SEP:	Science and Engineering Practices

## CCSS Connection

CC:	Counting and Cardinality
EE:	Expressions and Equations
F:	Functions
G:	Geometry
MD:	Measurement & Data
NBT:	Number and Operations in Base Ten
NF:	Number and Operations— Fractions
NS:	The Number System
OA:	Operations and Algebraic Thinking
RI:	Reading Informational Text
RL:	Reading Literature
RP:	Ratios and Proportional Relationships
RST:	Reading in Science and Technical Subjects
SL:	Speaking & Listening
SP:	Statistics & Probability
W:	Writing
WHST:	Writing in History/Social Studies, Science, and Technical Subjects

Developed by the California Science Project based on the NRC Framework for K-12 Science Education and supporting documents from the CA NGSS. Download a copy at: <https://www.cde.ca.gov/ci/sc/cf/gls2.asp#link1>

## The Three Dimensions of the Next Generation Science Standards



### Dimension 1: Science and Engineering Practices

The science and engineering practices describe behaviors that scientists engage in as they investigate phenomena and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems.

- Asking questions (science) and defining problems (engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (science) and designing solutions (engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information.

### Dimension 2: Crosscutting Concepts

Crosscutting concepts are themes that apply across all domains of science. As such, they are a way of linking the different domains of science.

- Patterns
- Cause and effect
- Scale, proportion and quantity
- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

### Dimension 3: Disciplinary Core Ideas

#### Physical Science

##### PS1: Matter and Its Interactions

PS1.A: Structure and Properties of Matter

PS1.B: Chemical Reactions

PS1.C: Nuclear Processes

##### PS2: Motion and Stability: Forces and Interactions

PS2.A: Forces and Motion

PS2.B: Types of Interactions

PS2.C: Stability and Instability in Physical Systems

##### PS3: Energy

PS3.A: Definitions of Energy

PS3.B: Conservation of Energy and Energy Transfer

PS3.C: Relationship Between Energy and Forces

PS3.D: Energy in Chemical Processes and Everyday Life

##### PS4: Waves and Their Applications in Technologies for Information Transfer

PS4.A: Wave Properties

PS4.B: Electromagnetic Radiation

PS4.C: Information Technologies and Instrumentation

#### Earth & Space Science

##### ESS1: Earth's Place in the Universe

ESS1.A: The Universe and Its Stars

ESS1.B: Earth and the Solar System

ESS1.C: The History of Planet Earth

##### ESS2: Earth's Systems

ESS2.A: Earth Materials and Systems

ESS2.B: Plate Tectonics and Large-Scale System Interactions

ESS2.C: The Roles of Water in Earth's Surface Processes

ESS2.D: Weather and Climate

ESS2.E: Biogeology

##### ESS3: Earth and Human Activity

ESS3.A: Natural Resources

ESS3.B: Natural Hazards

ESS3.C: Human Impacts on Earth Systems

ESS3.D: Global Climate Change

#### Life Science

LS1: From Molecules to Organisms: Structures and Processes

LS1.A: Structure and Function

LS1.B: Growth and Development of Organisms

LS1.C: Organization for Matter and Energy Flow in Organisms

LS1.D: Information Processing

LS2: Ecosystems: Interactions, Energy, and Dynamics

LS2.A: Interdependent Relationships in Ecosystems

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

LS2.D: Social Interactions and Group Behavior

LS3: Heredity: Inheritance and Variation of Traits

LS3.A: Inheritance of Traits

LS3.B: Variation of Traits

LS4: Biological Evolution: Unity and Diversity

LS4.A: Evidence of Common Ancestry and Diversity

LS4.B: Natural Selection

LS4.C: Adaptation

LS4.D: Biodiversity and Humans

#### Engineering, Technology, and Application of Science

##### ETS1: Engineering Design

ETS1.A: Defining and Delimiting an Engineering Problem

ETS1.B: Developing Possible Solutions

ETS1.C: Optimizing the Design Solution

#### NGSS Websites

NGSS Official Site:

<https://www.cde.ca.gov/ci/sc/cf/gls2.asp#link2>

California NGSS:

<https://www.cde.ca.gov/ci/sc/cf/gls2.asp#link3>

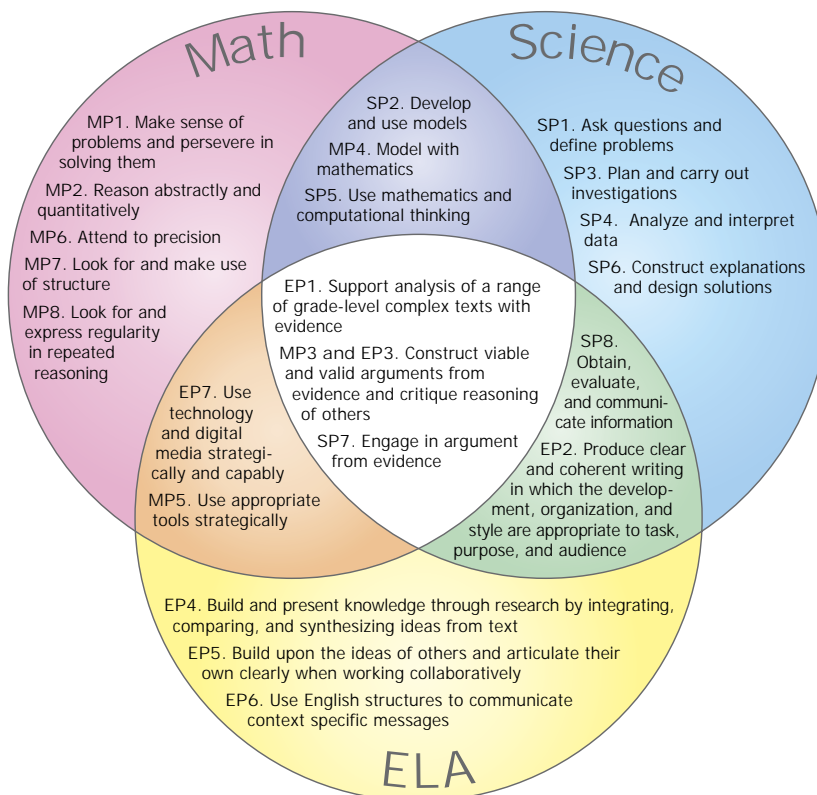
CSTA NGSS:

<https://www.cde.ca.gov/ci/sc/cf/gls2.asp#link4>

NSTA NGSS:

<https://www.cde.ca.gov/ci/sc/cf/gls2.asp#link5>

## Commonalities Among the Practices in Science, Mathematics, and English



Based on work by Tina Chuek  
ell.stanford.edu

## Conceptual Shifts in the CA NGSS

1. K–12 science education should reflect the interconnected Nature of Science as it is practiced and experienced in the real world.
  2. The CA NGSS are student performance expectations—NOT curriculum.
  3. The science concepts in CA NGSS build coherently from K–12.
  4. The CA NGSS focus on deeper understanding of content as well as application of content.
  5. Science and engineering are integrated in the CA NGSS from K–12.
  6. The CA NGSS are designed to prepare students for college, career, and citizenship.
  7. The CA NGSS and Common Core State Standards are aligned.
- Scientific investigations use a variety of methods.
  - Scientific knowledge is based on empirical evidence.
  - Scientific knowledge is open to revision in light of new evidence.
  - Scientific models, laws, mechanisms, and theories explain natural phenomena.
  - Science is a way of knowing.
  - Scientific knowledge assumes an order and consistency in natural systems.
  - Science is a human endeavor.
  - Science addresses questions about the natural and material world.

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