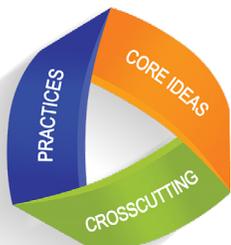


THE THREE DIMENSIONS OF THE CA NGSS



Dimension 1: Science and Engineering Practices (SEPs)

What scientists and engineers **do**. SEPs are skills and behaviors they use to answer a question or solve a problem.

Dimension 2: Disciplinary Core Ideas

What scientists and engineers **know**. These fundamental ideas are organized into four disciplines: life science; physical science; Earth and space science; and engineering, technology, and applications of science.

Dimension 3: Crosscutting Concepts

How scientists and engineers **think**. Understanding these common threads that tie together the four disciplines of science helps students deepen their understanding of core ideas and allows them to implement the practices more effectively.

Combining the Three Dimensions

The CA NGSS define performance expectations (PEs) about what students should know and be able to demonstrate by the end of the school year. These PEs require students to use all three of the dimensions together.

To help your student learn science:

- ▶ Help your student notice interesting phenomena in the world around her/him. Ask and seek answers together about how or why they happen.
- ▶ Engage in discussions about science in the news. Ask your student to explain the impact of medical and technological advances on society.
- ▶ Encourage your student to participate in a science fair, engineering design challenge, or robotics competition.
- ▶ Discuss with your student science-related careers and how to prepare for a career in science.

For more information on the CA NGSS and ideas for helping your student succeed, check out these resources:

- ▶ The California Next Generation Science Standards Web page is online at <https://www.cde.ca.gov/pd/ca/sc/ngssstandards.asp>.
- ▶ The 2016 Science Framework for California Public Schools is available online at <https://www.cde.ca.gov/ci/sc/cf/>.
- ▶ The National Aeronautics and Space Administration (NASA) Web site at <https://www.nasa.gov/audience/forstudents/index.html> features videos and other resources on Earth and space and information on careers in science.

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What Your Student Will Learn: California Next Generation Science Standards

The goal of the California Next Generation Science Standards (CA NGSS) is to prepare California students to be informed citizens and future scientists. Students build science mastery through repeated learning experiences centered around everyday events in nature and their lives (“phenomena”). Focusing instruction around these observable phenomena allows students to understand how their world works and gives them the tools to solve problems they identify in it. Students shift from learning facts about science to actually engaging in the practices of science. *They learn how to be scientists!*

The CA NGSS for high school divide science into four disciplines: life science, Earth and space science, physical science, and engineering. The *Science Framework for California Public Schools* presents three course models for implementing instruction to meet the CA NGSS. Each course model presents a different sequence of instruction and thematic approach to the disciplines. Local districts determine which course sequences to offer based on their local needs and resources.

In every course model, students are challenged to apply science to real-life situations. Following are some examples of the content and skills students will learn.

CA NGSS LIFE SCIENCE (Biology)

- Students act as molecular biologists who explain how the structure of DNA enables specific functions of specialized cells in the body.
- Students act as ecologists who develop a model of how photosynthesis and cellular respiration in plants and animals move carbon between living and non-living components of the Earth system.
- Students act as conservation biologists who design and improve solutions to protect an ecosystem from the impacts of human activity.
- Students act as geneticists who use statistics to explain the variation of traits in populations of plants or animals.

CA NGSS PHYSICAL SCIENCE (Chemistry and Physics)

- Students act as physical chemists who use the periodic table to predict the properties of materials based on patterns in their atomic structure.
- Students act as chemical engineers who refine a chemical system so it yields more products from the same starting materials.
- Students act as mechanical engineers who apply Newton's laws to design and refine a device that minimizes damage during a collision.
- Students act as informed citizens who evaluate the reliability of claims about the health impacts of radio waves or other forms of radiation.



CA NGSS EARTH AND SPACE SCIENCE

- Students act as stellar astronomers who develop a model of how energy produced by fusion in the Sun eventually reaches Earth.
- Students act as energy or resource managers who evaluate the costs and benefits of different solutions to extract or use energy and raw materials from the Earth.
- Students act as climate scientists who analyze data and results from climate models to forecast future changes to the Earth system.

ENGINEERING AND DESIGN IN SCIENCE COURSES

As part of their science learning, students also learn core ideas about the engineering process to solve problems. As CA NGSS engineers, they will:

- Analyze a major global challenge by understanding society's needs and the resources available to meet those needs.
- Break down complex real-world problems into smaller, more manageable problems that can be solved through engineering.
- Evaluate engineering solutions based on cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
- Use computer simulations to model the impact of different solutions.