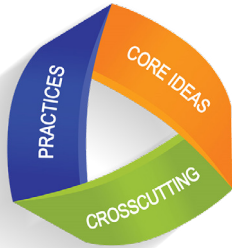


## THE THREE DIMENSIONS OF THE CA NGSS



### 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.
- ▶ Visit museums and hands-on science centers together.
- ▶ Encourage your student to take part 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.

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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 *Science Framework for California Public Schools* presents two course models for implementing instruction to meet the CA NGSS in the middle grades. Both models address the exact same standards but in a different combination and sequence. Local districts determine which course model to offer based on their local needs and resources. The models differ in the way that they treat the four disciplines of science (life science, Earth and space science, physical science, and engineering):

- The Preferred Integrated Model integrates (combines) all four disciplines of science into each grade-level course as students focus on the content they need to understand real-world phenomena. The simplest content from each discipline appears in grade six, and students build on that foundation in subsequent years.
- The Discipline Specific Model allows students to go in depth within one discipline each year. Students learn Earth and space science in grade six, life science in grade seven, and physical science in grade eight.

In both course models, every grade challenges students to apply science to real-life situations and incorporate engineering and technology. Following are some examples of the content and skills students will learn.



## GRADE 6

- Students act as hydrologists who develop a model showing how different energy sources cause water to cycle through Earth's systems.
- Students act as environmental engineers who design solutions to minimize human impact on the environment.
- Students act as meteorologists who collect data showing how the weather changes when air masses move and interact.
- Students act as climate scientists who ask questions about the factors affecting global warming.

## GRADE 7

- Students act as biochemists who develop a model for how cells rearrange food into new molecules that enable living things to survive and grow.
- Students act as ecologists who develop a model of how energy and matter cycle between living and non-living parts of the Earth system.
- Students act as informed citizens who evaluate different designs based on how well they protect the environment and meet economic and social needs.



## GRADE 8

- Students act as physicists who ask and answer questions about the factors that affect the strength of electric and magnetic forces.
- Students act as mechanical engineers who design a device to minimize damage during a collision.
- Students act as electrical engineers who support the claim that digitized signals are more reliable than analog signals.



## 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:

- Define the criteria and constraints of a design problem, taking into account scientific principles and potential impacts on people and the natural environment.
- Develop models that allow them to iteratively test and improve their designs.
- Systematically evaluate competing design solutions.
- Analyze data from tests of several design solutions to identify the best characteristics of each that can be combined into a new, better solution.