

Information About the NGSS for Parents and Guardians of Fourth Graders

What Are the Next Generation Science Standards?

The Next Generation Science Standards (NGSS) are a new set of science standards for kindergarten through high school. The NGSS were designed with the idea that students should have a science education that they can use in their lives. It should empower students to be able to make sense of the world around them. And it should give students the critical thinking, problem solving, and data analysis and interpretation skills they can use in any career, and that will help them make decisions that affect themselves, their families, and their communities. Many states have adopted the NGSS or very similar standards.

In order to accomplish this, the NGSS call for science learning in which students do not just memorize a set of science facts, but rather engage in figuring out how and why things happen. Core ideas in life science, Earth science, physical science, and engineering are intentionally arranged from kindergarten through twelfth grade so that students can build their understanding over time, and see the connections between different ideas and across disciplines. To figure out these core ideas, students engage in the same practices that real scientists and engineers do. For example, students develop and use models, analyze data, and make evidence-based arguments. They also learn to make sense of core ideas using crosscutting concepts, such as systems or cause and effect, which are useful ways of thinking about and making connections across different areas of science and engineering. The NGSS website provides additional information and resources for families.

The NGSS call for these three dimensions—core ideas, practices, and crosscutting concepts—to work together in science classes. For example, students could design and test (an engineering practice) wind turbines for converting motion energy to electrical energy (a core science idea) using what they have learned about systems and system models (a crosscutting concept). In each Amplify Science unit, students figure out a real-world problem by assuming the role of a scientist or engineer. Students engage in the three dimensions of the NGSS as they build their understanding of concepts and skills, which they can use in their lives.

Three-Dimensional Learning in the Amplify Science Fourth-Grade Course

The Amplify Science Grade 4 Course includes four units that support students in meeting the NGSS. The following unit summaries demonstrate how students engage in three-dimensional learning to solve real-world questions and problems.

Energy Conversions: Blackout in Ergstown. Students take on the role of systems engineers for Ergstown, a fictional town that experiences frequent blackouts, and explore reasons why an electrical system may fail. They obtain information from science books and system models to learn about types of energy, energy sources, energy transfer, and energy conversion. They define engineering problems related to the town's electrical system and design wind turbines using what they have learned about energy and matter.

Vision and Light: Investigating Animal Eyes. Students investigate why there is a decline in the number of Tokay geckos living in one area of a rainforest in the Philippines. They plan and conduct investigations and analyze data related to animal senses to figure out cause-and-effect relationships between environmental changes, the parts of an animal's vision system, and the animal's ability to see well. They make models and write explanations to share what they learn about how animals' body structures perform functions related to senses and survival.

Earth's Features: Mystery in Desert Rocks Canyon. In the role of geologists, students investigate a fossil and the geologic history of the area where the fossil was found. Students write scientific arguments about how the fossil formed and what the environment of that area was like in the past. They gather evidence for their arguments by finding patterns in rock layers, reading science books, and using digital and physical models. They analyze rock layers to draw conclusions about times of stability and times of change in the environments of a particular place.

Waves, Energy, and Information: Investigating How Dolphins Communicate. Students take on the role of marine scientists investigating how bottlenose dolphin mothers and their calves use patterns of sound to communicate across distances. Students ask questions about sound and gather evidence from physical models and a digital model. They investigate sound waves at the nanoscale and also investigate observable properties of sounds, such as volume and pitch. They use mathematical thinking to make sense of the wavelength and amplitude of waves.