

Preparing Students for a Lifetime of Success

Understanding New
Science Standards
for Grades 6-8

How will we prepare students for academic success?

Many states have adopted new standards based on the Next Generation Science Standards (NGSS) because they understand that a robust science education in middle school will pave the way for increased opportunities in high school, college, and future careers.

The NGSS enable teachers to offer all students interactive instruction that promotes analysis and interpretation of data, critical thinking, problem solving, and connections across science disciplines—with a high set of expectations for achievement in grades 6-8.

A quality science education can help expand opportunities for all students.

The science standards complement English/Language Arts and mathematics standards, enabling classroom instruction to reflect a clearer picture of the real world, where solving problems often requires skills and knowledge from multiple disciplines. Further, these standards are designed to benefit and engage all students, whether they currently lack access to a quality science education or already excel in science subjects.



What is our vision for science education?

The NGSS reflect the latest research and advances in modern science. In order to equip students to think critically, analyze information, and solve complex problems, the standards are arranged such that—from elementary through high school—students have multiple opportunities to build on the knowledge and skills gained during each grade, by revisiting important concepts and expanding their understanding of connections across scientific domains. Parents should understand that while some content might be similar to the past, it may look different from how they were taught.

As the science standards are implemented in schools and districts, they will enable students to:

- Develop a deeper understanding of science beyond memorizing facts, and
- Experience similar scientific and engineering practices as those used by professionals in the field.

How will students learn science in the classroom?

Each year, students should be able to demonstrate greater capacity for connecting knowledge across, and between, the physical sciences, life sciences, earth and space sciences, and engineering design.

During grades 6–8, your child will begin to form deeper connections between concepts previously learned in grades K–5, such as collecting evidence and drawing conclusions, understanding relationships between objects, and critical thinking that leads to designing effective solutions for problems.

Upon completion of grades 6–8, your child should have a deeper understanding of:

- Physical and chemical interactions that affect the world around us;
- Factors that affect organism survival and reproduction;
- Factors that influence the Earth and our solar system; and
- How to optimize design solutions.

Physical Sciences

Physical sciences during grades 6–8 may explore topics including atomic chemistry, forces and fields, thermal energy, and the wave model. Such lessons will help prepare students for advanced classes—like physics, forensics, or chemistry—that they might encounter in high school and/or college.

Life Sciences

Life Sciences during grades 6–8 may explore topics including cells, gene variation, biodiversity, and adaptation. Such lessons will help prepare students for advanced classes—like biology, physiology, and genetics—that they might encounter in high school and/or college.

Earth and Space Sciences

Earth and space sciences during grades 6–8 may explore topics including the solar system, the Earth's history, and energy flows. Such lessons will help prepare students for advanced classes—like astronomy, environmental science, or geology—that they might encounter in high school and/or college.

Engineering Design


Engineering design during grades 6–8 may explore how students can refine criteria and constraints when designing engineering solutions. Such lessons will help prepare students for advanced classes—like mechanics, robotics, or engineering-enriched science courses—that they might encounter in high school and/or college.

For additional information about academic expectations for students in Grades 6–8, visit www.nextgenscience.org/parentguides.

How can you support your child's success?

Although this new approach to teaching and learning K–12 science is different than the past, you can still actively support your child's success in the classroom!

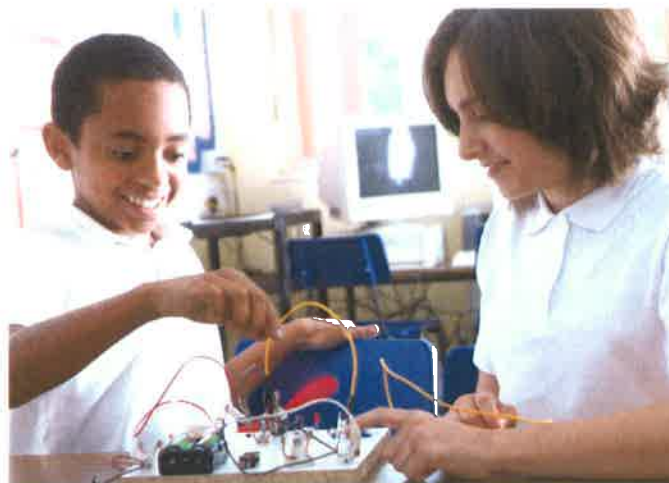
1. Speak to your child's teacher(s) or principal about how these important changes affect your school.
2. Ask your child's teacher thoughtful questions based on the information provided in this brochure.
3. Learn how you can help the teacher(s) reinforce classroom instruction at home.

Classroom activities in Middle School will look less like this:	And look more like this:
Physical Sciences 	Physical Sciences 
Students memorize Newton's Law of Gravity.	Students gather and analyze evidence about gravity's effect on objects with different masses.
Students follow scripted chemistry experiments.	Students use chemistry knowledge to design and explain a heat pack.
Students memorize the difference between Fahrenheit and Celsius.	Students construct arguments about the relationship between particle motion and temperature.
Life Sciences 	Life Sciences 
Students memorize the equation for photosynthesis.	Students explain the chemistry behind photosynthesis and how it relates to the growth of a plant.
Students build a model of a cell out of gelatin and label its parts.	Students design a new cell to optimize a particular function, such as energy production.
Students draw an ecosystem on paper.	Students conduct research to identify significant changes in local ecosystem(s).
Earth & Space Sciences 	Earth & Space Sciences 
Students memorize the water cycle.	Students analyze real data to determine how water moves through the cycle.
Students build a papier-mâché volcano.	Students conduct research to learn how scientists observe and monitor volcanic activity on a continuous or near-real-time basis.
Students paint and position Styrofoam balls to represent planets in the solar system.	Students give presentations describing evidence that gravity controls the motion of the planets around the sun.
Engineering Design 	Engineering Design 
Students learn engineering separately from other science disciplines.	Students consider or apply engineering design principles throughout each science course.
Engineering lessons are only offered to some students.	Engineering lessons are offered to all students and each student is encouraged to connect lessons to their own personal experiences.
Students use trial and error to build a bridge out of popsicle sticks.	Students research various bridge designs, select a design that best aligns to their scientific knowledge about forces, and finally test their selected design.

About NGSS: Reshaping Science Education for All Students

To better prepare American students for college and careers, schools need to ensure that quality science education is accessible to all students—regardless of ethnicity or zip code.

In an effort to bolster America's competitive edge in an increasingly global economy, 26 states led the development of the Next Generation Science Standards (NGSS) by working with teachers, higher education, business, and practicing scientists. This collaborative process produced a set of high quality, college- and career-ready K-12 academic standards that set meaningful expectations for student performance and achievement in science. The NGSS are rich in both content and practice and arranged in a coherent manner across all disciplines and grades.



Fact: “Standards” are not “curriculum”. “Standards” provide clarity about *what students should know and be able to do by the end of each grade level*. “Curriculum” refers to *how students meet those expectations*. Please contact your child’s teacher or school if you have questions about their curriculum.

Three Dimensions of Science Learning

The NGSS emphasizes three distinct, yet equally important dimensions that help students learn science. Each dimension is integrated into the NGSS and—combined—the three dimensions build a powerful foundation to help students build a cohesive understanding of science over time.

Standard behaviors that scientists and engineers use to explain the world or solve problems



Fundamental scientific knowledge

Frameworks for scientific thinking across disciplines

Support your child's success in the classroom!