

# NGSSS Science Standards

## Grade 4

### Big Idea 1: The Practice of Science

**A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.**

**B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."**

**C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.**

**D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.**

BENCHMARK CODE	BENCHMARK
SC.4.N.1.1	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.N.1.2	Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.N.1.3	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.N.1.4	Attempt reasonable answers to scientific questions and cite evidence in support. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.N.1.5	Compare the methods and results of investigations done by other classmates. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.N.1.6	Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.N.1.7	Recognize and explain that scientists base their explanations on evidence. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.N.1.8	Recognize that science involves creativity in designing experiments. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

### Big Idea 2: The Characteristics of Scientific Knowledge

**A: Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.**

**B: Scientific knowledge is durable and robust, but open to change.**

**C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.**

BENCHMARK CODE	BENCHMARK
SC.4.N.2.1	Explain that science focuses solely on the natural world. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**Big Idea 3: The Role of Theories, Laws, Hypotheses, and Models**

The terms that describe examples of scientific knowledge, for example; "theory," "law," "hypothesis," and "model" have very specific meanings and functions within science.

BENCHMARK CODE	BENCHMARK
SC.4.N.3.1	<p>Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>

**Big Idea 5: Earth in Space and Time**

Humans continue to explore Earth's place in space. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the Solar System, and Earth. Humankind's need to explore continues to lead to the development of knowledge and understanding of our Solar System.

BENCHMARK CODE	BENCHMARK
SC.4.E.5.1	<p>Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.4.E.5.2	<p>Describe the changes in the observable shape of the moon over the course of about a month.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.4.E.5.3	<p>Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.4.E.5.4	<p>Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.4.E.5.5	<p>Investigate and report the effects of space research and exploration on the economy and culture of Florida.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>

**Big Idea 6: Earth Structures**

Humans continue to explore the composition and structure of the surface of the Earth. External sources of energy have continuously altered the features of Earth by means of both constructive and destructive forces. All life, including human civilization, is dependent on Earth's water and natural resources.

BENCHMARK CODE	BENCHMARK
SC.4.E.6.1	<p>Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Low</i></p>
SC.4.E.6.2	<p>Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.4.E.6.3	<p>Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.4.E.6.4	<p>Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.4.E.6.5	<p>Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.4.E.6.6	<p>Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Low</i></p>

### Big Idea 8: Properties of Matter

A. All objects and substances in the world are made of matter. Matter has two fundamental properties: matter takes up space and matter has mass.

B. Objects and substances can be classified by their physical and chemical properties.

Mass is the amount of matter (or "stuff") in an object. Weight, on the other hand, is the measure of force of attraction (gravitational force) between an object and Earth.

The concepts of mass and weight are complicated and potentially confusing to elementary students. Hence, the more familiar term of "weight" is recommended for use to stand for both mass and weight in grades K-5. By grades 6-8, students are expected to understand the distinction between mass and weight, and use them appropriately.

BENCHMARK CODE	BENCHMARK
SC.4.P.8.1	Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.P.8.2	Identify properties and common uses of water in each of its states. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.4.P.8.3	Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.P.8.4	Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

### Big Idea 9: Changes in Matter

A. Matter can undergo a variety of changes.

B. Matter can be changed physically or chemically.

BENCHMARK CODE	BENCHMARK
SC.4.P.9.1	Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>

### Big Idea 10: Forms of Energy

A. Energy is involved in all physical processes and is a unifying concept in many areas of science.

B. Energy exists in many forms and has the ability to do work or cause a change.

BENCHMARK CODE	BENCHMARK
SC.4.P.10.1	Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.P.10.2	Investigate and describe that energy has the ability to cause motion or create change. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.P.10.3	Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.P.10.4	Describe how moving water and air are sources of energy and can be used to move things. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**Big Idea 11: Energy Transfer and Transformations****A. Waves involve a transfer of energy without a transfer of matter.****B. Water and sound waves transfer energy through a material.****C. Light waves can travel through a vacuum and through matter.**

BENCHMARK CODE	BENCHMARK
SC.4.P.11.1	Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.4.P.11.2	Identify common materials that conduct heat well or poorly. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>

**Big Idea 12: Motion of Objects****A. Motion is a key characteristic of all matter that can be observed, described, and measured.****B. The motion of objects can be changed by forces.**

BENCHMARK CODE	BENCHMARK
SC.4.P.12.1	Recognize that an object in motion always changes its position and may change its direction. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.4.P.12.2	Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**Big Idea 16: Heredity and Reproduction****A. Offspring of plants and animals are similar to, but not exactly like, their parents or each other.****B. Life cycles vary among organisms, but reproduction is a major stage in the life cycle of all organisms.**

BENCHMARK CODE	BENCHMARK
SC.4.L.16.1	Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.L.16.2	Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.L.16.3	Recognize that animal behaviors may be shaped by heredity and learning. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.L.16.4	Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**Big Idea 17: Interdependence**

**A. Plants and animals, including humans, interact with and depend upon each other and their environment to satisfy their basic needs.**

**B. Both human activities and natural events can have major impacts on the environment.**

**C. Energy flows from the sun through producers to consumers.**

BENCHMARK CODE	BENCHMARK
SC.4.L.17.1	Compare the seasonal changes in Florida plants and animals to those in other regions of the country. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.L.17.2	Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.L.17.3	Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.L.17.4	Recognize ways plants and animals, including humans, can impact the environment. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>