

# NGSSS Science Standards

## Grade 5

### 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.5.N.1.1	Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.  <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.N.1.2	Explain the difference between an experiment and other types of scientific investigation.  <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.N.1.3	Recognize and explain the need for repeated experimental trials.  <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.N.1.4	Identify a control group and explain its importance in an experiment.  <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.N.1.5	Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."  <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.N.1.6	Recognize and explain the difference between personal opinion/interpretation and verified observation.  <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.5.N.2.1	Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.  <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.N.2.2	Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.  <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**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.5.E.5.1	Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.5.E.5.2	Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.E.5.3	Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids, comets -- and identify Earth's position in it. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

**Big Idea 7: Earth Systems and Patterns**

Humans continue to explore the interactions among water, air, and land. Air and water are in constant motion that results in changing conditions that can be observed over time.

BENCHMARK CODE	BENCHMARK
SC.5.E.7.1	Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.E.7.2	Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation processes. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.E.7.3	Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.E.7.4	Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.E.7.5	Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.E.7.6	Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.E.7.7	Design a family preparedness plan for natural disasters and identify the reasons for having such a plan. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

## 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.5.P.8.1	Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.P.8.2	Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.P.8.3	Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.P.8.4	Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.5.P.9.1	Investigate and describe that many physical and chemical changes are affected by temperature. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.5.P.10.1	Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.P.10.2	Investigate and explain that energy has the ability to cause motion or create change. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.P.10.3	Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.5.P.10.4	Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.5.P.11.1	Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop). <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.P.11.2	Identify and classify materials that conduct electricity and materials that do not. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**Big Idea 13: Forces and Changes in Motion****A. It takes energy to change the motion of objects.****B. Energy change is understood in terms of forces--pushes or pulls.****C. Some forces act through physical contact, while others act at a distance.**

BENCHMARK CODE	BENCHMARK
SC.5.P.13.1	Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.5.P.13.2	Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.P.13.3	Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.P.13.4	Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

**Big Idea 14: Organization and Development of Living Organisms****A. All plants and animals, including humans, are alike in some ways and different in others.****B. All plants and animals, including humans, have internal parts and external structures that function to keep them alive and help them grow and reproduce.****C. Humans can better understand the natural world through careful observation.**

BENCHMARK CODE	BENCHMARK
SC.5.L.14.1	Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.5.L.14.2	Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons -- while some plants have stems for support. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

**Big Idea 15: Diversity and Evolution of Living Organisms**

**A. Earth is home to a great diversity of living things, but changes in the environment can affect their survival.**

**B. Individuals of the same kind often differ in their characteristics and sometimes the differences give individuals an advantage in surviving and reproducing.**

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SC.5.L.15.1

Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

*Cognitive Complexity/Depth of Knowledge Rating: High*

**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.**

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SC.5.L.17.1

Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

*Cognitive Complexity/Depth of Knowledge Rating: Moderate*