



Science Standards

GRADE: K

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.K.N.1.1	Collaborate with a partner to collect information. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.K.N.1.2	Make observations of the natural world and know that they are descriptors collected using the five senses. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.K.N.1.3	Keep records as appropriate -- such as pictorial records -- of investigations conducted. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.K.N.1.4	Observe and create a visual representation of an object which includes its major features. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.K.N.1.5	Recognize that learning can come from careful observation. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.K.P.10.1	Observe that things that make sound vibrate. <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.K.P.12.1	Investigate that things move in different ways, such as fast, slow, etc. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.K.P.13.1	Observe that a push or a pull can change the way an object is moving. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.K.L.14.1	Recognize the five senses and related body parts. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.K.L.14.2	Recognize that some books and other media portray animals and plants with

	characteristics and behaviors they do not have in real life. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.K.L.14.3	Observe plants and animals, describe how they are alike and how they are different in the way they look and in the things they do. <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.K.E.5.1	Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.K.E.5.2	Recognize the repeating pattern of day and night. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.K.E.5.3	Recognize that the Sun can only be seen in the daytime. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.K.E.5.4	Observe that sometimes the Moon can be seen at night and sometimes during the day. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.K.E.5.5	Observe that things can be big and things can be small as seen from Earth. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.K.E.5.6	Observe that some objects are far away and some are nearby as seen from Earth. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.K.P.8.1	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.K.P.9.1	Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>

GRADE: 1

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.1.N.1.1	Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.1.N.1.2	Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.1.N.1.3	Keep records as appropriate - such as pictorial and written records - of investigations

	conducted. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.1.N.1.4	Ask "how do you know?" in appropriate situations. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.1.P.12.1	Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow. <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.1.P.13.1	Demonstrate that the way to change the motion of an object is by applying a push or a pull. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.1.L.14.1	Make observations of living things and their environment using the five senses. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.1.L.14.2	Identify the major parts of plants, including stem, roots, leaves, and flowers.

	<i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.1.L.14.3	Differentiate between living and nonliving things.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</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.1.L.16.1	Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.1.L.17.1	Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.1.E.5.1	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.1.E.5.2	Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.1.E.5.3	Investigate how magnifiers make things appear bigger and help people see things they could not see without them.

	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.1.E.5.4	Identify the beneficial and harmful properties of the Sun. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

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.1.E.6.1	Recognize that water, rocks, soil, and living organisms are found on Earth's surface. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.1.E.6.2	Describe the need for water and how to be safe around water. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.1.E.6.3	Recognize that some things in the world around us happen fast and some happen slowly. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.1.P.8.1	Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

GRADE: 2

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.2.N.1.1	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.N.1.2	Compare the observations made by different groups using the same tools. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.2.N.1.3	Ask "how do you know?" in appropriate situations and attempt reasonable answers when asked the same question by others. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.N.1.4	Explain how particular scientific investigations should yield similar conclusions when repeated. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.N.1.5	Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think). <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.2.N.1.6	Explain how scientists alone or in groups are always investigating new ways to solve problems. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.2.P.10.1	Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.

Cognitive Complexity/Depth of Knowledge Rating: Low

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.2.P.13.1	Investigate the effect of applying various pushes and pulls on different objects. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.P.13.2	Demonstrate that magnets can be used to make some things move without touching them. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.2.P.13.3	Recognize that objects are pulled toward the ground unless something holds them up. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.2.P.13.4	Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.2.L.14.1	Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions. <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.2.L.16.1	Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies. <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.2.L.17.1	Compare and contrast the basic needs that all living things, including humans, have for survival. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.2.L.17.2	Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 6: Earth Structures

Humans continue to explore the composition and structure of the surface of 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.2.E.6.1	Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.2.E.6.2	Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.E.6.3	Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants. <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.2.E.7.1	Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.2.E.7.2	Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.E.7.3	Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate). <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.E.7.4	Investigate that air is all around us and that moving air is wind. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.2.E.7.5	State the importance of preparing for severe weather, lightning, and other weather related events. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>

Big Idea 8: Properties of Matter

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

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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.2.P.8.1	Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.2.P.8.2	Identify objects and materials as solid, liquid, or gas. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.2.P.8.3	Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

	<i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.2.P.8.4	Observe and describe water in its solid, liquid, and gaseous states. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.2.P.8.5	Measure and compare temperatures taken every day at the same time. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.2.P.8.6	Measure and compare the volume of liquids using containers of various shapes and sizes. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.2.P.9.1	Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

GRADE: 3

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.3.N.1.1	Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.N.1.2	Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.N.1.3	Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.N.1.4	Recognize the importance of communication among scientists. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.N.1.5	Recognize that scientists question, discuss, and check each others' evidence and explanations. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.N.1.6	Infer based on observation. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.N.1.7	Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena. <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.3.P.10.1	Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.3.P.10.2	Recognize that energy has the ability to cause motion or create change. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.3.P.10.3	Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.P.10.4	Demonstrate that light can be reflected, refracted, and absorbed. <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.3.P.11.1	Investigate, observe, and explain that things that give off light often also give off heat. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.P.11.2	Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together. <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.3.L.14.1	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.L.14.2	Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.

BENCHMARK CODE	BENCHMARK
SC.3.L.15.1	Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

SC.3.L.15.2	Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
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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.3.L.17.1	Describe how animals and plants respond to changing seasons. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.L.17.2	Recognize that plants use energy from the Sun, air, and water to make their own food. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.3.N.3.1	Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.N.3.2	Recognize that scientists use models to help understand and explain how things work. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.3.N.3.3	Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations. <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.3.E.5.1	Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light.

	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.E.5.2	Identify the Sun as a star that emits energy; some of it in the form of light.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.E.5.3	Recognize that the Sun appears large and bright because it is the closest star to Earth.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.E.5.4	Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.3.E.5.5	Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 6: Earth Structures

Humans continue to explore the composition and structure of the surface of 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.3.E.6.1	Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</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.3.P.8.1	Measure and compare temperatures of various samples of solids and liquids.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.P.8.2	Measure and compare the mass and volume of solids and liquids.

	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.3.P.8.3	Compare materials and objects according to properties such as size, shape, color, texture, and hardness.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.3.P.9.1	Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

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 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>
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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>

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	Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model. <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.4.E.5.1	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. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.E.5.2	Describe the changes in the observable shape of the moon over the course of about a month. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.E.5.3	Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.E.5.4	Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.E.5.5	Investigate and report the effects of space research and exploration on the economy and culture of Florida. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

Big Idea 6: Earth Structures

Humans continue to explore the composition and structure of the surface of 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	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).

	<i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.4.E.6.2	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. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.E.6.3	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.E.6.4	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). <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.4.E.6.5	Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.4.E.6.6	Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy). <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.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>

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 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>
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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.

BENCHMARK CODE	BENCHMARK
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. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.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. <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>
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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>

GRADE: 6

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.6.N.1.1	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.N.1.2	Explain why scientific investigations should be replicable. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.N.1.3	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.N.1.4	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.N.1.5	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence. <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.

D. The Law of Conservation of Energy: Energy is conserved as it transfers from one object to another and from one form to another.

BENCHMARK CODE	BENCHMARK
SC.6.P.11.1	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.6.P.12.1	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.6.P.13.1	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.P.13.2	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.6.P.13.3	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.

Big Idea 14: Organization and Development of Living Organisms

A. All living things share certain characteristics.

B. The scientific theory of cells, also called cell theory, is a fundamental organizing principle of life on Earth.

C. Life can be organized in a functional and structural hierarchy.

D. Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.

BENCHMARK CODE	BENCHMARK
SC.6.L.14.1	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.6.L.14.2	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.L.14.3	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.L.14.4	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.L.14.5	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.L.14.6	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 15: Diversity and Evolution of Living Organisms

A. The scientific theory of evolution is the organizing principle of life science.

B. The scientific theory of evolution is supported by multiple forms of evidence.

C. Natural Selection is a primary mechanism leading to change over time in organisms.

BENCHMARK CODE	BENCHMARK
SC.6.L.15.1	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.6.N.2.1	Distinguish science from other activities involving thought. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.N.2.2	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.N.2.3	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.6.N.3.1	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.N.3.2	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

SC.6.N.3.3	Give several examples of scientific laws. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.6.N.3.4	Identify the role of models in the context of the sixth grade science benchmarks. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 6: Earth Structures

Over geologic time, internal and 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 internal and external energy and material resources.

BENCHMARK CODE	BENCHMARK
SC.6.E.6.1	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.E.6.2	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 7: Earth Systems and Patterns

The scientific theory of the evolution of Earth states that changes in our planet are driven by the flow of energy and the cycling of matter through dynamic interactions among the atmosphere, hydrosphere, cryosphere, geosphere, and biosphere, and the resources used to sustain human civilization on Earth.

BENCHMARK CODE	BENCHMARK
SC.6.E.7.1	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.6.E.7.2	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.E.7.3	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.E.7.4	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.6.E.7.5	Explain how energy provided by the sun influences global patterns of atmospheric

	<p>movement and the temperature differences between air, water, and land.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.6.E.7.6	<p>Differentiate between weather and climate.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.6.E.7.7	<p>Investigate how natural disasters have affected human life in Florida.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.6.E.7.8	<p>Describe ways human beings protect themselves from hazardous weather and sun exposure.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.6.E.7.9	<p>Describe how the composition and structure of the atmosphere protects life and insulates the planet.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>

GRADE: 7

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.7.N.1.1	<p>Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.7.N.1.2	<p>Differentiate replication (by others) from repetition (multiple trials).</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.7.N.1.3	<p>Distinguish between an experiment (which must involve the identification and control of</p>

	variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.N.1.4	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.7.N.1.5	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.N.1.6	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.N.1.7	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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.7.P.10.1	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.7.P.10.2	Observe and explain that light can be reflected, refracted, and/or absorbed. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.P.10.3	Recognize that light waves, sound waves, and other waves move at different speeds in different materials. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.

D. The Law of Conservation of Energy: Energy is conserved as it transfers from one object to another and from one form to another.

BENCHMARK CODE	BENCHMARK
SC.7.P.11.1	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.7.P.11.2	Investigate and describe the transformation of energy from one form to another. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.P.11.3	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.P.11.4	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 15: Diversity and Evolution of Living Organisms

A. The scientific theory of evolution is the organizing principle of life science.

B. The scientific theory of evolution is supported by multiple forms of evidence.

C. Natural Selection is a primary mechanism leading to change over time in organisms.

BENCHMARK CODE	BENCHMARK
SC.7.L.15.1	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.L.15.2	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.L.15.3	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

Big Idea 16: Heredity and Reproduction

A. Reproduction is characteristic of living things and is essential for the survival of species.

B. Genetic information is passed from generation to generation by DNA; DNA controls

the traits of an organism.

C. Changes in the DNA of an organism can cause changes in traits, and manipulation of DNA in organisms has led to genetically modified organisms.

BENCHMARK CODE	BENCHMARK
SC.7.L.16.1	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.L.16.2	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.L.16.3	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.L.16.4	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.7.L.17.1	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.L.17.2	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.L.17.3	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites. <i>Cognitive Complexity/Depth of Knowledge Rating: High</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.7.N.2.1	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</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.7.N.3.1	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.N.3.2	Identify the benefits and limitations of the use of scientific models. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 6: Earth Structures

Over geologic time, internal and 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 internal and external energy and material resources.

BENCHMARK CODE	BENCHMARK
SC.7.E.6.1	Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.E.6.2	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building). <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.E.6.3	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.E.6.4	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.7.E.6.5	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.E.6.6	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.7.E.6.7	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

GRADE: 8

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.8.N.1.1	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.N.1.2	Design and conduct a study using repeated trials and replication. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.N.1.3	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.

	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.N.1.4	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.N.1.5	Analyze the methods used to develop a scientific explanation as seen in different fields of science.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.N.1.6	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 18: Matter and Energy Transformations

A. Living things all share basic needs for life.

B. Living organisms acquire the energy they need for life processes through various metabolic pathways (photosynthesis and cellular respiration).

C. Matter and energy are recycled through cycles such as the carbon cycle.

BENCHMARK CODE	BENCHMARK
SC.8.L.18.1	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.L.18.2	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.L.18.3	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.L.18.4	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
	<i>Cognitive Complexity/Depth of Knowledge Rating: High</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.8.N.2.1	Distinguish between scientific and pseudoscientific ideas. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.N.2.2	Discuss what characterizes science and its methods. <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.8.N.3.1	Select models useful in relating the results of their own investigations. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.N.3.2	Explain why theories may be modified but are rarely discarded. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

Big Idea 4: Science and Society

As tomorrow's citizens, students should be able to identify issues about which society could provide input, formulate scientifically investigable questions about those issues, construct investigations of their questions, collect and evaluate data from their investigations, and develop scientific recommendations based upon their findings.

BENCHMARK CODE	BENCHMARK
SC.8.N.4.1	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.N.4.2	Explain how political, social, and economic concerns can affect science, and vice versa. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>

Big Idea 5: Earth in Space and Time

The origin and eventual fate of the Universe still remains one of the greatest questions in science. Gravity and energy influence the formation of galaxies, including our own Milky Way Galaxy, stars, the planetary systems, and Earth. Humankind's need to explore continues to lead to the development of knowledge and understanding of the nature of the Universe.

BENCHMARK CODE	BENCHMARK
SC.8.E.5.1	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.

	<i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.E.5.2	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.8.E.5.3	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.E.5.4	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.E.5.5	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness). <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.E.5.6	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.8.E.5.7	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.E.5.8	Compare various historical models of the Solar System, including geocentric and heliocentric. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.E.5.9	Explain the impact of objects in space on each other including: <ul style="list-style-type: none"> 1. the Sun on the Earth including seasons and gravitational attraction 2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.E.5.10	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.E.5.11	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.

	<i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.E.5.12	Summarize the effects of space exploration on the economy and culture of Florida.
	<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 which gives it inertia.

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.8.P.8.1	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.P.8.2	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.P.8.3	Explore and describe the densities of various materials through measurement of their masses and volumes. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.P.8.4	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.P.8.5	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.8.P.8.6	Recognize that elements are grouped in the periodic table according to similarities of their properties. <i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.8.P.8.7	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).

	<i>Cognitive Complexity/Depth of Knowledge Rating: Low</i>
SC.8.P.8.8	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.P.8.9	Distinguish among mixtures (including solutions) and pure substances. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>

Big Idea 9: Changes in Matter

A. Matter can undergo a variety of changes.

B. When matter is changed physically, generally no changes occur in the structure of the atoms or molecules composing the matter.

C. When matter changes chemically, a rearrangement of bonds between the atoms occurs. This results in new substances with new properties.

BENCHMARK CODE	BENCHMARK
SC.8.P.9.1	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>
SC.8.P.9.2	Differentiate between physical changes and chemical changes. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i>
SC.8.P.9.3	Investigate and describe how temperature influences chemical changes. <i>Cognitive Complexity/Depth of Knowledge Rating: High</i>



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