

## NATURE OF SCIENCE GRADE: 8

### Big Idea 1:

**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	<p>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.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.6.N.1.2	<p>Explain why scientific investigations should be replicable.</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.8.N.1.2	<p>Design and conduct a study using repeated trials and replication.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.6.N.1.3	<p>Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: High</i></p>
SC.7.N.1.3	<p>Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>
SC.8.N.1.3	<p>Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.</p> <p><i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</i></p>

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.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.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.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>
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.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.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.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>
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 2:

**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.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>
SC.8.N.2.1	Distinguish between scientific and pseudoscientific ideas. <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.8.N.2.2	Discuss what characterizes science and its methods. <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 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.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.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.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.7.N.3.2	Identify the benefits and limitations of the use of scientific models. <i>Cognitive Complexity/Depth of Knowledge Rating: Moderate</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>
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 4:

**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>

## EARTH AND SPACE SCIENCE

**Big Idea 5: 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"> <li>1. the Sun on the Earth including seasons and gravitational attraction</li> <li>2. the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.</li> </ul> <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 6: 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>
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>

**Big Idea 7: 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.**

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