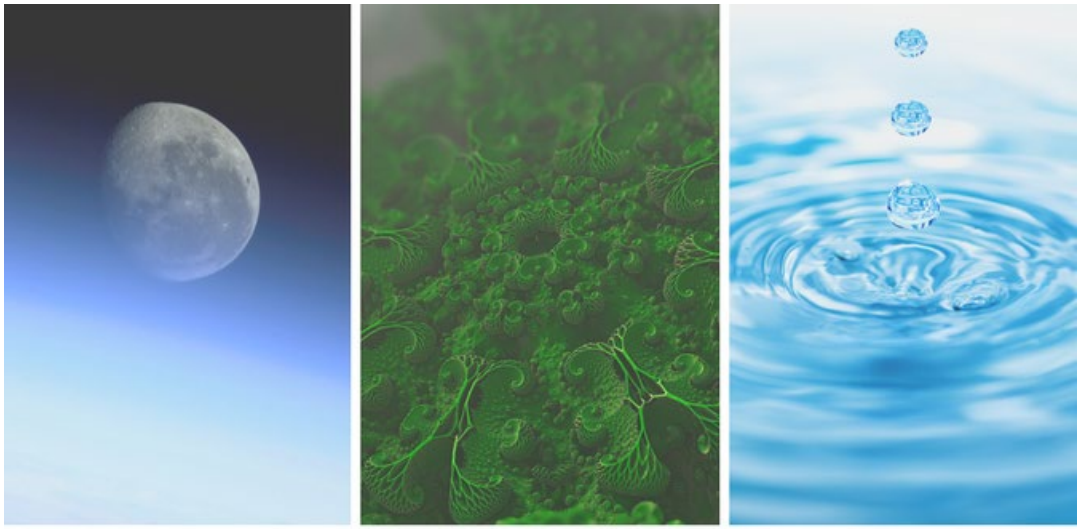

6th Grade Science

SANTA ROSA COUNTY

SCOPE & SEQUENCE CREATED BY TEACHERS FOR THE TEACHERS OF SRC

SANTA ROSA
COUNTY DISTRICT SCHOOLS

"Give the pupils something to do; not something to learn; and if the doing is of such a nature as to demand thinking; learning naturally results."
~John Dewey

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How to Use This Planning Tool

The Scope and Sequence has been created by the Math & Science Department and a team of SRC teachers to help planning meaningful instruction of science content. The progression of content, organized into units, is based upon the course description provided by the FLDOE and the team.

Format: Included is the **Benchmark**/standard from the FLDOE course description with the **Item Specifications**, which illustrate the fundamental knowledge and understanding needed for mastery, and the **Content Limits,** so that the teacher does not over-teach the standard. It is important to note that the Item Specifications are what the test writers of the SSA use when generating test questions, so while they are not meant to limit instruction, they should help guide the teachers use of time and instructional focus.

Resources are also provided and differ depending on the grade level, as the emphasis in some grades is on writing, while others may be on reading. All resources, including the text, are considered part of the teacher's toolbox, and should be used appropriately to provide a hands-on, questioning, and science rich learning environment for the students.

The essential nature of labs in the classroom: NSTA strongly believes that developmentally appropriate laboratory investigations are essential for students of all ages and ability levels. They should not be a rote exercise in which students are merely following directions, as though they were reading a cookbook, nor should they be a superfluous afterthought that is only tangentially related to the instructional sequence of content. Properly designed laboratory investigations should:

- have a definite purpose that is communicated clearly to students;
- focus on the processes of science to convey content;
- incorporate ongoing student reflection and discussion; and
- enable students to develop safe and conscientious lab habits and procedures (NRC 2006, p. 101–102).

The importance of Grade 6 Science instruction: Laboratory investigations that include the use of scientific inquiry, research, measurement, problem solving, laboratory apparatus and technologies, experimental procedures, and safety procedures are an integral part of this course. The National Science Teachers Association (NSTA) recommends that at the middle school level, all students should have multiple opportunities every week to explore science laboratory investigations (labs). School laboratory investigations are defined by the National Research Council (NRC) as an experience in the laboratory, classroom, or the field that provides students with opportunities to interact directly with natural phenomena or with data collected by others using tools, materials, data collection techniques, and models (NRC, 2006, p. 3). Laboratory investigations in the middle school classroom should help all students develop a growing understanding of the complexity and ambiguity of empirical work, as well as the skills to calibrate and troubleshoot equipment used to make observations. Learners should understand measurement error; and have the skills to aggregate, interpret, and present the resulting data (NRC 2006, p. 77; NSTA, 2007).

Integration of Nature of Science standards: The Big Ideas focusing on the Nature of Science should be consistently fused with content units as appropriate for your students throughout the year. It is covered alone in the first unit but needs to be continually reinforced throughout the year. Know your Nature of Science Standards!

Table of Contents

6th Grade Science (Earth Space)

1st Quarter	Week 1 - 2	Week 3 - 5	Week 6 – 9
	Introduction to Nature of Science (NOS) **Unit 1 in text**	**Weathering, Erosion, Deposition & Landforms**	**Earth's Structures**
	Nature of Science: Lab background and expectations, tools to be used and how to use them, how to think like a scientist. Lab Notebook introduced	**Unit 8 in text** **Big Idea: Earth Structures** *Standards:* SC.6.E.6.1 (physical & chemical weathering, erosion, and deposition); SC.6.E.6.2 (landforms) *NOS* – define a problem and models	**Unit 6 in text** **Big Idea: Earth Structures** *Standards:* SC.7.E.6.1 (layers of the Earth); SC.7.E.6.2 (rock cycle); SC.7.E.6.5 (plate tectonics); SC.7.E.6.7 (heat flow) *Advanced:* SC.912.E.6.2 (connect, identify and explain Earth's features); SC.912.E.6.1 (describe & differentiate the interactions of the Earth's layers, recognized the importance of seismic wave data); SC.912.E.6.3 (development of plate tectonic theory, origin of Earth's features from plate tectonics, use models) *NOS* – define a problem, identify variable, scientific methods

2nd Quarter	Week 10 – 11	Week 12 – 17	Week 18
	Earth's History	**Energy in the Earth System**	
	Unit 7 in text **Big Idea: Earth Structures** *Standards:* SC.7.E.6.3 (measure Earth's age); SC.7.E.6.4 (Earth's evolution due to natural processes) *NOS*- scientific methods	**Unit 10 in text** **Big Idea: Earth Systems & Patterns** *Standards:* SC.6.E.7.4 (Earth's spheres); SC.6.E.7.9 (atmosphere as a protector); SC.6.E.7.1 (heat transfer); SC.6.E.7.5 (sun's energy drives global patterns-air, water, land); SC.6.E.7.3 (weather driven by global patterns seen in measurable terms) *Advanced:* SC.912.E.7.3 (describe the interactions between the spheres); SC.912.P.10.4 (heat is the energy that drives state of matter changes); SC.912.E.7.5 (models used to predict weather); SC.912.E.7.6 (differentiate how severe weather forms) *NOS*- models, scientific theories	**Review & Semester Exam**

3rd Quarter	Week 19 – 22	Week 23 – 24	Week 25 – 27	Week 28
	Weather & Climate	**Human Impact**	**The Universe**	
	Unit 11 in text **Big Idea: Earth Systems & Patterns** *Standards:* SC.6.E.7.4 (Review-spheres); SC.6.E.7.2 (apply the water cycle); SC.6E.7.3 (Review-global patterns-connect to water cycle) **Lessons 4 and 5 are NOT ASSESSED** SC.6.E.7.5 (review sun but apply to weather & climate); SC.6.E.7.6 (differentiate weather & climate)	**Unit 9 in text** **Big Idea: Earth Structures** *Standard:* SC.7.E.6.6 (identify human impact and how it leads to weathering, erosion, & deposition)	**Unit 2 in text** **Big Idea: Earth in Space & Time** *Standards:* SC.8.E.5.1 (distance); SC.8.E.5.2 (contents of the Universe); SC.8.E.5.3 (distinguish the relationship between astronomical bodies); SC.8.E.5.5 (describe stars)	**Unit 3 in text** **Big Idea: Earth in Space & Time**

4th Quarter	Week 29 - 32	Week 33 - 35	Week 36 – 37	Week 38
	The Solar System	**Earth, Moon, & Sun**	**Space Exploration**	**EOC**
	Unit 3 in text cont. *Standards:* SC.8.E.5.8 (solar system models); SC.8.E.5.4 (gravity's role) (supplement with SC.8.P.8.2 -apply how gravity works); SC.8.E.5.6 (models of solar properties and describe); SC.8.E.5.3 (relationship between astronomical bodies - review); SC.8.E.5.7 (compare & contrast the properties of the objects in the solar system) *Advanced*: SC.912.E.5.4 (describe the impact of the Sun as the energy source of the Earth in relation to the physical properties of the Sun) *NOS*- models, change in scientific knowledge	**Unit 4 in text** **Big Idea: Earth in Space & Time** *Standard:* SC.8.E.5.9 (seasons, phases of the moon, tides, eclipse, position of moon, sun, earth)	**Unit 5 in text** **Big Idea: Earth in Space & Time** *Standards:* SC.8.E.5.11 (identify and compare the EM characteristics); SC.8.E.5.10 (assess technology in science/space) **LESSON 3 – NOT ASSESSED** (SC.8.E.5.12 – summarize economy effects from space travel to FL)	**EOC Review/Test**

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Nature of Science Unit of Study: The Practice of Science			
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Nature of Science (NOS) **This is embedded in text.** **NOS should be done as an introduction to skills needed in the science classroom and then repeated as skills/learning goals throughout the year.**	Students will: • **describe** science as the study of the natural world • **give** examples and non-examples of science • **describe** science as both long lasting and strongly supported by data through experimentation, yet open to change • **understand** scientists can have varied backgrounds, talents, interests, and goals	**SC.6.N.2.1** **SC.6.N.2.2** **SC.6.N.2.3**	**non-science** **pseudoscience** **science**
	Students will: • **plan and carry out** various types of scientific investigations • **differentiate** between an experiment (control group and variables) and other types of scientific investigations • **discuss** the importance of repeating experiments and multiple trials • **differentiate** the benefits and limitations of different types of science investigations • **make** predictions or **form** a hypothesis • **identify and distinguish** between test variables and outcome variables in an experiment • **identify** control groups for each experiment • **take** measurements • **collect and organize** data • **interpret and analyze** data • **draw and defend** conclusions	**SC.6.N.1.1** **Also** **SC.6.N.1.2** **SC.6.N.1.3** **SC.6.N.1.4** **SC.6.N.1.5**	analyze differentiate interpret conclusion control group data experiment investigation hypothesis prediction observation outcome variable (dependent) test variable (independent)
	Students will: • **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.	**SC.6.N.3.1**	

The Nature of Science Resources	
Textbook	Unit 1 Lessons 1-6 (pick and choose what to start with and then embed through the rest of the year)
Standard's Content Limits	SC.6.N.1.1 • Items addressing hypotheses will not assess whether the hypothesis is supported by data. • Items will not address or assess replication, repetition, or the difference between replication and repetition. • Items will not assess the reason for differences in data across groups that are investigating the same problem. SC.6.N.2.2 • Items will not require identification of the scientist(s) and/or details associated with a particular event/discovery. • Items will not use the term durable. SC.6.N.3.1 • Items addressing scientific theories and/or laws are limited to those found in the middle school science benchmarks, such as law of universal gravitation, law of superposition, theory of plate tectonics, atomic theory, law of conservation of mass, law of conservation of energy, cell theory, and the scientific theory of evolution.
Teacher Hints & Instruction Focus	▪ An interactive response notebook (IRN) is a compilation of student learning that provides a partial record of the instructional experiences for a student. Some teachers use spiral-bound notebooks, some use composition notebooks, while others use 3-ring binder to organize. Pages should not be taken out of the IRN so careful consideration should be given to the type of notebook that is used. • Develop a science notebook that will be used all year by students. • Develop a class list of lab safety procedures in the lab. • Identify the various tools used by scientists in various disciplines as they are relevant. • Vocabulary is used to assist students with understanding of terminology that may be assessed or used on assessments. These terms should be primarily used regularly throughout instruction. • Scientists learn from doing investigations AND from reading non-fiction reference materials, such as, journals, newspapers, etc.

Sample FOCUS Question	
	Dan tests the number of paperclips a small refrigerator magnet can pick up, using paperclips that are all the same size and material. He tests the refrigerator magnet four times and records his results. He then repeats this process for two other magnets, which are different sizes. His results are shown in the table below.

Magnet Size	Trial 1	Trial 2	Trial 3	Trial 4	**Mean Number of Paper Clips Picked Up**
Small	4	3	5	4	4
Medium	15	14	14	13	14
Large	30	29	30	31	30

What do the four trials with each magnet allow Dan to do, which he could not do with only a single trial?

- draw conclusions
- B. prove whether a magnet's strength can change
- obtain more reliable data
- D. choose the data that best supports his hypothesis

Prefix / Suffix	*No/Non – not* *Sciencia- wisdom* *Pre-* before *Dici- to say*

Sixth Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Earth/Space Science Unit of Study: The Practice of Science			August 12 – August 23 (2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Get READY!!!	Students will: • **get to know YOU** as a scientist and WHY you LOVE science • **set up a science notebook** to be used all year long • **develop** a class list of lab safety procedures in the lab • **practice** classroom and laboratory routines and procedures		lab safety science notebook scientist
Get SET!!!	Students will: • **describe** science as the study of the natural world • **site examples** of science and pseudoscience (can it be tested?) • **understand** the need for a common system of measurement, metric system, among scientists	**SC.6.N.2.1** **SC.6.N.1.3**	science pseudoscience non-science metric system mass volume length

GO DO SCIENCE!!!	• **practice** using measurement techniques • **discuss** the VARIOUS methods used by scientists to answer questions or solve problems (controlled experiments, observational studies, engineering by design, trial and error, simulations, modeling, etc.) *****Work to break the misconception that there is only 1 method used by scientists***** • <u>NOS Focus: Making observations.</u> Students will: ○ **engage** in 1 OR MORE labs where students: ▪ make a prediction/inference ▪ use proper measuring techniques ▪ design a procedure using repeated trials ▪ control variables ▪ collect data ▪ draw a conclusion based on evidence ▪ conduct research before or after experimentation <u>NOS Focus: Predicting outcomes, controlling variables, collecting data, and analyzing data.</u>	**SC.6.N.1.1**	gram (g) liter (l) meter (m) degrees Celsius (^{0}C) Prediction inference repetition data evidence conclusion

Science Processes Resources	
Textbook and NOS Focus	<u>NOS Focus: Making observations. Predicting outcomes, controlling variables, collecting data, and analyzing data. SC.6.N.1.1</u>
Sample Literacy Strategies	● Complete a Concept of Definition Map for the term “science.” ● Complete a Venn Diagram for the terms “test variable (independent variable)” and “outcome variable (dependent variable).” ● Complete a Frayer Model for the term “hypothesis.” ● Complete a Venn Diagram for the terms “replication” and “repetition.”
Common Misconceptions	● The scientific method is a universal set of steps that occur in the same order that all scientists use at all times. ● Experimentation is the only type of scientific investigation. ● Data shows a hypothesis to be correct or incorrect. ● Published results indicate true findings, never shown to be false. ● An observation is the same as an inference.

Page Keeley Probes	Volume 3 #5 (Hot and Cold Balloons) Volume 3 #13 (Hypothesis)
Benchmark Clarifications	Students will evaluate a scientific investigation using evidence of scientific thinking and/or problem solving. Students will identify test variables (independent variables) and/or outcome variables (dependent variables) in a given scientific investigation. Students will interpret and/or analyze data to make predictions and/or defend conclusions. Students will distinguish between an experiment and other types of scientific investigations where variables cannot be controlled. Students will explain how hypotheses are valuable.
Standard Content Limits	Items addressing hypotheses will not assess whether the hypothesis is supported by data. Items will not address or assess replication, repetition, or the difference between replication and repetition. Items will not assess the reason for differences in data across groups that are investigating the same problem.
Teacher Hints & Instruction Focus	• An interactive science notebook (ISN) is a compilation of student learning that provides a partial record of the instructional experiences for a student. Some teachers use spiral-bound notebooks, some use composition notebooks, while others use 3-ring binder to organize. Pages should not be taken out of the ISN so careful consideration should be given to the type of notebook that is used. • Develop a science notebook that will be used all year by students. • Develop a class list of lab safety procedures in the lab. • Identify the various tools used by scientists in various disciplines as they are relevant. • Vocabulary is used to assist students with understanding of terminology that may be assessed or used on assessments. These terms should be primarily used regularly throughout instruction. • Scientists learn from doing investigations AND from reading non-fiction reference materials, such as, journals, newspapers, etc.

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Prefix / Suffix	*No/Non – not* *Sciencia- wisdom* *Pre-* before *Dici- to say*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Weathering & Erosion			(3 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Weathering, Erosion, Deposition & Landforms (Earth's Structures and Changes)	Students will: • **identify** there are different types of landforms found on Earth's surface, including: ○ *Coastlines, Dunes, Rivers, Mountains, Glaciers, Deltas, Lakes* • **differentiate** landforms found in Florida (*such as aquifers, caverns, and sinkholes, etc.*) from those found outside Florida (*such as mountains, glaciers, etc.*) Students will: • **describe and cite examples** of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition • **explain and differentiate** the processes of physical weathering, chemical weathering, erosion, and deposition • **create a model** to investigate ways to prevent the erosion of Florida's landforms <u>NOS Focus: Benefits and limitations of models.</u> Students will: • **investigate** the effects of physical weathering on the Earth's Surface • **investigate** the effects of chemical weathering on the Earth's Surface • **investigate** the effects of erosion and deposition on the Earth's surface <u>NOS Focus: Identify and understand the purpose of a control group in an experiment.</u>	**SC.6.E.6.2** **SC.6.E.6.1** **SC.6.N.3.4** **SC.6.N.1.1**	aquifer coastlines deltas dunes glaciers lakes landforms model mountains rivers sinkhole surface agents chemical weathering deposition erosion physical weathering weathering Control group

Weathering and Erosion	
Textbook and NOS Focus	Unit 8 Lesson 1, 2, 3 and 4 **NOS Focus:** Benefits and limitations of models. Identify and understand the purpose of a control group in an experiment.
Videos	Study Jams – Weathering and Erosion Safari Montage - The Magic School Bus Rocks and Rolls
Websites	Shape It Up Virtual Game Here Today Gone Tomorrow Virtual Game Erosion Virtual Lab Weathering Virtual Lab
Benchmark Clarifications	Students will identify and/or describe steps of the rock cycle and relate them to surface and subsurface events. Students will describe and/or explain how Earth's surface is built up and torn down through the processes of physical and chemical weathering, erosion, and deposition. Students will identify different types of landforms commonly found on Earth. Students will describe similarities and/or differences among landforms found in Florida and those found outside of Florida. Students will identify and/or describe the impact that humans have had on Earth.
Content Limits	Items may use the context of plate tectonics to assess the rock cycle but will not directly assess plate tectonics. Items will not assess the role of plate tectonics in landform formation. Items may assess the features of karst topography, such as aquifers, caverns, and/or sinkholes but will not use the term *karst topography*.
Keeley Probes	Volume 1 #22 (Where Sand Comes From) Volume 4 #10 (Is it a Model)
Teacher Hints & Instruction Focus	• Focus on the building up and tearing down of landforms. • Plate tectonics is NOT taught in sixth grade. • Physical and chemical weathering were covered in fifth grade. Review these topics to ensure mastery. • Scientific laws predict an outcome – theories explain the process to the outcome.

Sample FOCUS Question

Many people often confuse the terms "weathering" and "erosion." Which of the following events is the best example of erosion?

A. **The rolling of a pebble along the bottom of a streambed**
B. The splitting of sedimentary rock because water has frozen in a crack
C. The dissolving of rock by rainwater
D. The crumbling of bedrock to form soil

Prefix / Suffix	*Forma-* *shape*	*Deposit-* *leave*	*e/ex- away*	*rodere – to gnaw*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Earth's Structures – PART 1			(2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary

Rock Cycle
(1 week)
	Students will:
	• **describe** the processes resulting in the formation of the different rock types:
	  • Igneous
	  • Sedimentary
	  • Metamorphic
	• **describe** the process of the rock cycle in terms of the different rock types
	• **identify patterns** within the rock cycle and relate them to surface events, including:
	  • *weathering, erosion, and deposition*
	• **identify patterns** within the rock cycle and relate them to subsurface events, including:
	  • *plate tectonics and mountain building*
	• **identify** the beneficial and negative impacts humans have had on Earth in terms of weathering, erosion, and deposition
	  • *example: deforestation leads to erosion*
	  • *example: protecting sea oats from sand dunes prevents wind erosion*
		SC.7.E.6.2	Cementation
			crystals
			deposition
			erosion
			weathering
			fragments
			Rock Cycle
			igneous
			sedimentary
			metamorphic
			minerals
			melting/cooling
			particles
			pressure/heat
			sand
			subsurface
			surface events

	<u>NOS Focus: Recognize that science involves creativity</u>	**SC.6.N.1.5**	
	Advanced: • **connect** surface features to surface processes that are responsible for their formation • **identify** various landforms (dunes, lakes, sinkholes,	**Advanced** SC.912.E.6.2	

	aquifers) and describe how they form • **explain** how sea level changes over time have exposed and inundated continental shelves, created and destroyed inland seas, and shaped the surface of the Earth		
Earth's Layers (1 week)	Students will: • **identify and describe** the layers of the Earth, including: o *crust, lithosphere, hot convecting mantle, the outer liquid core, and high- pressure inner solid core* • **identify** the layer of the Earth that has convection currents resulting in plate tectonics • **differentiate** the density differences between the layers of the Earth • **build a model** of the Earth's Layers based on characteristics of the layers <u>NOS Focus: Identify the role of models</u>	**SC.7.E.6.1** **SC.6.N.3.4**	convection currents crust density inner core lithosphere mantle outer core plate tectonics pressure scientific models
	Advanced: • describe and differentiate the layers of Earth and the interactions among them • recognize the importance of the study of seismic wave data and how it can be used to determine the internal structure, density variations, and dynamic processes between Earth's Layers.	**Advanced** SC.912.E.6.1	

Minerals, Rocks and Layers (2 weeks)		
HMH Textbook	Unit 6 Lesson 1, 2, 3 **NOS Focus:** Benefits and limitations of models. Identify and understand the purpose of a control group in an experiment.	
Videos	Layers of The Earth – YouTube Fast and Slow Change Video VCS STEM Presents Earth Layers	
Websites	Shape It Up Virtual Game Here Today Gone Tomorrow Virtual Game Erosion Virtual Lab Weathering Virtual Lab	
Benchmark Clarifications	Students will describe the scientific theory of plate tectonics and/or how the movement of Earth's crustal plates and the flow of heat and material cause various geologic events to occur. Students will identify and/or describe the layers of Earth.	
Content Limits	Items will not assess types of volcanoes but may assess different causes of volcano formation.	
Keeley Probes	Volume 2 #21 (Is it a Rock 2)	
Teacher Hints & Instruction Focus	• This is the first and last time this concept is taught in middle school. • Items may assess the density of the layers of the Earth. Students need to be able to explain why theories may be modified but are rarely discarded.	• Students will need to identify scientific laws: the Law of Universal Gravitation, the Law of Superposition, the Law of Conservation of Mass, and Law of Conservation of Mass. • Students will need to identify scientific theories and know why they are theories and not laws. Students will build models of the layers of the Earth. The evaluation of their models should include how their model is like and unlike the real Earth and how the model may help or cause misconceptions

Sample FOCUS Question

Which of the following layers of the Earth are in order from least to most dense?

E. **crust, mantle, outer core, inner core**
F. mantle, inner core, outer core, crust
G. outer core, mantle, crust, inner core
H. inner core, outer core, mantle, crust

Prefix / Suffix	*Ignis- fire Meta- changed Morphic- shape Sed- to sit Sub- under/ below De- from/away Lithos- rock Con- with Veh(ct)-to carry Dens- thick Pan- across Gaea- earth*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Earth's Structures – PART 2			(2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary

Plate Tectonics
(2 weeks)
	Students will:
	• **describe** the Theory of Plate Tectonics
	  ○ **cite examples** of physical evidence that supports the Theory of Plate Tectonics
	
	<u>NOS Focus: Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.</u>
	
	• **explain** how convection currents (heat flow) cause Earth's crustal plates to move, including:
	  ○ *convergent, divergent, and transform boundaries*
	
	• **describe** how the movement of crustal plates can cause changes to Earth's surface
	  ○ earthquakes, volcanic eruptions, ocean basins, and mountain building
	
	• **explain** the role of subduction in plate movement
	
	• **differentiate** slow and rapid changes to the Earth's surface, such as:
	  ○ *mountain building vs. earthquakes*
	
	• **explain** and give **examples** of how scientific knowledge has changed when new evidence or new interpretations are encountered
	  ○ *examples: continental drift, Theory of Plate Tectonics, and Pangaea*
	
	• **describe** the benefits and limits of scientific models
	for example, Wegener's model of continental drift
		SC.7.E.6.5
		
		SC.6.N 2.2
		
		SC.7.E.6.7
			Theory of Continental Drift
			Theory of Plate Tectonics
			Pangaea
			sea floor spreading
			convergent
			divergent
			transform
			subduction
			crustal plates
			earthquakes
			volcanoes
			mountains
			mid-ocean ridge
			ocean basins
			ocean trench
			rift valley
			scientific theory
			scientific law

	Advanced: • discuss the development of plate tectonic theory, which is derived from the combination of two theories: continental drift and seafloor spreading • explain the origin of geologic features and processes that result from plate tectonics (e.g. earthquakes, volcanoes, trenches, mid-ocean ridges, island arcs and chains, hot spots, earthquake distribution, tsunamis, mountain ranges) • investigate plate tectonics using models	**Advanced** **SC.912.E.6.3**	

Plate Tectonics and the Results of it… (2 weeks)	
HMH Textbook	Unit 6 Lessons 4, 5, 6, and 7
Videos	Plate Tectonics Explained- YouTube Video StudyJams Scientific Theories
Websites	Study Jams http://science4inquiry.com/
Sample Literacy Strategies	● Art in Science: layers of the Earth (with descriptions) ● Triple Venn Diagram: earthquakes, volcanoes, mountains
Benchmark Clarifications	Students will describe the scientific theory of plate tectonics and/or how the movement of Earth's crustal plates and the flow of heat and material cause various geologic events to occur. Students will identify and/or describe the layers of Earth.
Content Limits	Items will not assess types of volcanoes but may assess different causes of volcano formation.
Common Misconceptions	● All volcanic eruptions are violent. ● Earthquakes (including small ones) happen very seldom and they are very strong. ● The Earth's surface has been the same for millions of years. ● The Earth's core is hollow, or that a large hollow space occurs deep within the Earth. ● Only continents move. ● The edge of a continent is the same thing as a plate boundary. ● Volcanic eruptions and earthquakes are rare events. ● Continents sit on top of a layer of water.
Keeley Probes	Volume 3 #11 (Is it a Theory)

Teacher Hints & Instruction Focus	• Students should have an opportunity to design or evaluate a model of plate tectonics and be able to distinguish the benefits and limitations of the model. • This is the first time this concept is taught in middle school. • Discuss why Plate Tectonics is a theory. • Items will not assess types of volcanoes but may assess different causes of volcanic formation. • Items will not assess types of earthquake waves.	• Students have difficulty understanding that theories do not become laws. A theory is the explanation of why something happens in nature, while a law predicts what will happen in nature.

Sample FOCUS Question

Which of the following correctly describes the effects of tectonic plate movement on Earth's crust?

I. **The amount of crust on the surface of Earth is fairly stable**.
J. The amount of crust on the surface of Earth is slowly shrinking.
K. The total amount of Earth's crust will eventually be pulled into the mantle.
L. The total amount of Earth's crust is steadily increasing due to volcanic activity.

Prefix / Suffix	*Tecktonos- build Verge- to bend Con- with di- away from trans- across forma- shape*

Sixth Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Earth's History			(2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Change Over Time	Students will: • **give examples of** physical evidence that supports scientific theories that Earth has evolved over geological time due to natural processes, such as: ○ *index fossils, rock layers, and radioactive dating*	**SC.7.E.6.4**	fossil evidence geological time index fossils physical evidence

Dating	Students will:
	• **identify and describe** current methods for measuring the age of the Earth, including:
	  ○ *relative dating: Law of Superposition*
	  ○ *absolute dating: radioactive dating, carbon dating*
	• **explain** how folding and faulting may affect the accuracy of Law of Superposition to date the age of the Earth
	
	NOS Focus: discuss scientific methods used
		SC.7.E.6.3
		
		SC.6.N.1.4
			absolute dating
			carbon dating
			faulting
			folding
			Law of Superposition
			radioactive dating
			relative dating

Earth's History Resources	
HMH Textbook	Unit 7 Lessons 1, 2, and 3
Videos	4 ways to understand the age of the earth – YouTube How Old Is The Earth - YouTube
Websites	http://science4inquiry.com/
Sample Literacy Strategies	● Flow Chart: geologic time ● Compare Contrast Chart: theory vs. law ● Venn Diagram: absolute dating vs. relative dating
Common Misconceptions	● Radioactive dating provides you with an exact age. ● All fossils are pieces of dead animals and plants. ● Fossils are all bones and shells of extinct animals and soft tissues can never be fossilized. ● Radioactivity is always dangerous. ● Exposure to radioactive material will give you superhuman powers.
Benchmark Clarifications	Students will identify examples of and/or explain physical evidence that supports scientific theories that Earth has evolved over geologic time due to natural processes. Students will identify and/or describe current scientific methods for measuring the age of Earth and its parts.
Content Limits	Items may address fossil records but should not require knowledge or recognition of specific organisms. Items may address folding and faulting as related to the law of superposition. Items assessing radioactive dating will be limited to a conceptual level. Items will not require calculations or address half-life. Items addressing geologic time will not require specific knowledge of eras, periods, or epochs.
Keeley Probes	Volume 1 #23 (Age of Two Mountains)

Teacher Hints & Instruction Focus	• Students will not have to calculate the age of the Earth. • Items assessing radioactive dating will be limited to a conceptual level. Students will not have to calculate half-life.	• Students do not need to know the different types of folding and faulting. Students only need to know how this affects Law of Superstition.

Sample FOCUS Question

Sample FLDOE Question SC.7.N.3.1

In what way is a scientific law different from a scientific theory?

A. A law is true in all situations and all circumstances, while a theory is only true in certain instances.
B. A law describes the major ideas of the universe, while theories are based on the smaller ideas of the universe.
C. A law is based on testable facts and data, while a theory is just a combination of one or more hypotheses that have not been tested.
D. A law expresses a relationship between two or more variables, while a theory explains the causal mechanism of how something happens.

M. Correct Answer: D

Prefix / Suffix	*Tecktonos- build Verge- to bend Con- with di- away from trans- across forma- shape*

Sixth Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Energy in the Earth System – Part 1			(2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary

Earth's Spheres (1 week)	Students will:
	• **differentiate** among the Earth's
	  ○ *Geosphere*
	  ○ *Hydrosphere*
	  ○ *Cryosphere*
	  ○ *Atmosphere*
	  ○ *Biosphere*
	• **describe** the interactions between the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere
	
	Advanced:
	• interactions include transfer of energy (biogeochemical cycles, water cycle, ground and surface waters,
		SC.6.E.7.4
		
		Advanced SC.912.E.7.3
			atmosphere
			biosphere
			cryosphere
			geosphere
			hydrosphere interactions

	photosynthesis, radiation, plate tectonics, conduction, and convection), storms, winds, waves, erosion, currents, deforestation and wildfires, hurricanes, tsunamis, volcanoes		
The Atmosphere (1 week)	Students will: • **describe** the composition and structure of the Earth's atmosphere • **describe** the functions of the four main layers of Earth's atmosphere: o *Thermosphere, Mesosphere, Stratosphere, Troposphere* • **explain** how Earth's atmosphere protects life and insulates the planet including the ozone layer • **discuss** the impacts to life if Earth's atmosphere is compromised, such as: o *climate change and ozone depletion* NOS Focus: **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. Students will: **identify** how air and water quality (and other environmental factors) affect personal health	**SC.6.E.7.9** **SC.6.N.3.1** **HE.6.C.1.3**	climate change composition mesosphere ozone layer stratosphere thermosphere troposphere

Energy in the Earth System – Part 1 Resources	
HMH Textbook	Unit 10 Lessons 1 and 2 ****Teaching idea Unit 10 Lesson 1 and Unit 11 Lesson 1 in conjunction. The water cycle is not taught as an independent item, but rather as part of the interaction between the spheres. Adjust as you go for the next section if you do this**
Videos	Learn About Planet Earth - Earth's Atmosphere - https://youtu.be/fyfN9t_E0w8 Four Spheres Part 2: Crash Course Kids – YouTube Four Spheres Part 1: Crash Course Kids - YouTube
Sample Literacy Strategies	• Complete a Concept of Definition Map for the term "atmosphere." • Create a concept map for the interactions among spheres.

	● Complete a Triple Venn Diagram for conduction, convection, and radiation. ● Complete a Cause and Effect chart to describe how temperature and pressure affect air flow.
Common Misconceptions	● The ozone layer is a layer of the atmosphere. ● Interactions among the spheres are limited to one-on-one interactions. ● The layers of the atmosphere have distinct, visible lines that separate layers. ● The Moon and other planets have atmospheres similar to that of Earth. ● Air and oxygen are the same thing. ● Global warming and the greenhouse effect are the same thing. ● The ozone hole is a hole in the sky.
Benchmark Clarifications	Students will differentiate and/or explain interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. Students will describe and/or explain how the cycling of water and global patterns influence local weather and climate. Students will differentiate between weather and climate. Students will describe the composition and structure of the atmosphere and/or how the atmosphere protects life and insulates the planet.
Content Limits	Items will not assess atmospheres of planets other than Earth. Items may assess atmospheric conditions and their resulting weather phenomena, such as hurricanes, tornadoes, lightning, fronts, and precipitation. Items will not address auroras. Items will not assess the causes of global warming or the ozone hole but may assess their effects. Items may assess the layers of the atmosphere and/or the function of each. Items should not assess the water cycle in isolation.
Keeley Probes	Volume 3 #22 (Rainfall)
Teacher Hints & Instruction Focus	• Students should know the layers of the atmosphere and their functions. • Focus on the effects if the atmosphere were compromised, not the causes. Climate change may include global warming; it is a long-term change in the Earth's climate, or of a region on Earth. Global warming: the increase in Earth's average surface temperature due to rising levels of greenhouse gases.

Sample FOCUS Question

The interaction between the cryosphere and the hydrosphere has the ability to dramatically change our global climate. Which of the following events shows an interaction between the cryosphere and the hydrosphere?

N. **A large iceberg melting in the ocean**.
O. Evaporated water condensing to form clouds.
P. Trees releasing oxygen into the environment.
Q. The Himalayan Mountains being pushed upward.

Prefix / Suffix	*Inter- between Atmos- vapor Bio- life Cryo- cold Geo- earth Hydro- water Tropo- change Strato- spreading Meso- middle Thermo- heat*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Energy in the Earth System – Part 2			(4 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
The Sun's Energy **(1 week)**	Students will: • **differentiate** the three mechanisms by which thermal energy is transferred through the Earth's systems: ○ *Radiation* ○ *Conduction* ○ *Convection* • **investigate** radiation, conduction, and convection in terms of their influence on Earth's systems (geosphere, hydrosphere, and atmosphere) ○ *thermal energy is transferred on Earth from a warmer substance to a cooler substance from direct contact through conduction* ○ *thermal energy is transferred in the Earth's atmosphere and hydrosphere through convection currents* ○ *the transfer of energy in the form of radiation from the Sun to the Earth through the atmosphere*	**SC.6.E.7.1**	conduction convection convection currents energy transfer heat radiation thermal energy
	Advanced: • describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter	**Advanced** **SC.912.P.10.4**	
	Students will: • **explain** how energy provided by the sun influences global patterns, including: ○ *atmospheric movement (wind)* ○ *temperature differences between air (atmosphere,) land (geosphere,) and water (hydrosphere)* • **create a model to investigate** how the sun's energy causes changes in temperature of air, land, and water,	**SC.6.E.7.5** **SC.6.N.3.4**	energy scientific model temperature thermometer wind

	such as: ○ *a diagram showing how different surfaces reflect or absorb heat (i.e. snow vs. ocean)* ○ *a 3D representation of uneven heating because of the Earth's tilt (i.e. using a globe)*		
	Students will: • **explain** how global patterns such as the jet stream and ocean currents influence local weather in measurable terms, such as: ○ *air temperature and pressure* ○ *wind direction and speed* ○ *humidity and precipitation* ○ *fronts*	**SC.6.E.7.3**	front Gulf stream Humidity jet stream ocean currents temperature wind wind direction wind speed
	Advanced: 1. use models, weather maps and other tools to predict weather conditions and differentiate between accuracy of short-range and long-range weather forecasts 2. differentiate the physical factors that affect the formation of severe weather events (e.g. hurricanes, tornados, flash floods, thunderstorms, and drought)	**Advanced** **SC.912.E.7.5** **SC.912.E.7.6**	

Energy in the Earth System – Part 2 Resources	
HMH Textbook	Unit 10 Lessons 3, 4, and 5
Videos	Cloud In a Jar Demonstration Land and Sea Breeze Earth: Climate and Weather
Websites	The difference between weather and climate - http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html
Sample Literacy Strategies	● Complete a Concept of Definition Map for the term "atmosphere." ● Create a concept map for the interactions among spheres. ● Complete a Triple Venn Diagram for conduction, convection, and radiation. ● Complete a Cause and Effect chart to describe how temperature and pressure affect air flow.
Common Misconceptions	● The ozone layer is a layer of the atmosphere. ● Interactions among the spheres are limited to one-on-one interactions. ● The layers of the atmosphere have distinct, visible lines that separate layers. ● The Moon and other planets have atmospheres similar to that of Earth. ● Air and oxygen are the same thing.

	● Global warming and the greenhouse effect are the same thing. ● The ozone hole is a hole in the sky.
Benchmark Clarifications	Students will explain how energy provided by the Sun influences global patterns of atmospheric movement and/or the temperature differences among air, water, and land. Students will differentiate among radiation, conduction, and convection in Earth's systems.
Content Limits	Items may assess causes of wind and wind patterns but will not assess knowledge of the Coriolis effect. Items assessing radiation, conduction, and/or convection should be in the context of the atmosphere, geosphere, and hydrosphere on Earth.
Keeley Probes	Volume 3 #21 (Where did water come from?) Volume 4 #19 (Camping)
Teacher Hints & Instruction Focus	• Temperature will be shown in degrees Celsius with Fahrenheit in parenthesis. • Items assessing radiation, conduction and convection should be done in the context of the atmosphere, geosphere and hydrosphere on Earth. Students need to identify convection, radiation and conduction on a diagram or picture.

Sample FOCUS Question

The sun's energy causes water to evaporate from Earth's surface and become water vapor. What is the most likely result when water vapor condenses into clouds?

R. Heat from the water is released, causing the clouds to produce snow.
S. Heat from the water retained, causing the surrounding air to deflate.
T. **Heat from the water is released, causing the surrounding air to expand.**
U. Heat from the water is retained, causing the clouds to move higher in the atmosphere.

Sample FLDOE Question SC.6.N.2.2
Scientific knowledge may change as new evidence or information is discovered. Which of the following would not be a result of new scientific research and information?
A. Binomial nomenclature is assigned to a recently identified plant species.
B. An endangered monkey species is put in a reserve for protection from extinction.
C. A newly discovered chemical element will be added to the periodic table of the elements.
D. A nonnative plant species will begin to reproduce rapidly after being introduced into a swamp ecosystem.

Sample FCAT Explorer Question SC.6.E.7.1
If you walk barefoot on hot asphalt, energy is transferred by which process?
A. Convection
B. Radiation
C. Conduction
D. Reflection

Prefix / Suffix	*Radi- to shine* *Duct- to lead* *Trans- across* thermo – heat, hot hydro –water equi – equal geo – earth bio – life, living cryo – icy, frost atmo – air, vapor inter – between

Review and Semester Exams

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Weather & Climate			(4 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Weather & Climate	Students will: • **differentiate** between weather and climate • **describe** the four atmospheric factors that make up weather, including: o *thermal energy, air pressure, winds, and moisture*	**SC.6.E.7.6**	air pressure climate moisture thermal energy weather
Water Cycle	Students will: • **explain** how the cycling of water between the atmosphere and hydrosphere affects weather patterns and climate • **Investigate** how the water cycle affects local climate and weather	**SC.6.E.7.2**	condensation evaporation precipitation transpiration water cycle
Enrichment	*Students will:* • ***investigate*** *how natural disasters have affected human life in Florida* • ***describe*** *ways human beings protect themselves from hazardous weather and sun exposure*	*SC.6.E.7.7* *SC.6.E.7.8* *Not Assessed*	

Weather & Climate Resources	
HMH Textbook	Unit 11 Lessons 1, 2 and 3 Teach Lesson 6 Lesson 4 and 5 are taught as enrichment
Videos	Weather vs Climate – YouTube Weather and Climate Analogies Weather vs Climate Earth: Climate and Weather Cloud In a Jar Demonstration Land and Sea Breeze
Websites	The Weather Channel Website Study Jams – Weather and Climate NASA- What's the Difference Between Weather and Climate?

Sample Literacy Strategies	● Create a concept map for “weather.” ● Engage students in a Philosophical Chair regarding global climate change. ● Complete a Venn diagram for weather and climate.
Common Misconceptions	● The water cycle always happens in a specific order, beginning and ending with the same processes. ● The water cycle occurs just one process at a time. ● Meteorologists’ tools and technology are always accurate. ● Tornadoes only occur in the mid-west. ● Precipitation only includes rain. ● Humidity is how wet the air is. ● Condensation appears through osmosis (movement of water through a membrane). ● Weather and climate both refer to the daily condition of the atmosphere. ● The seasons cause the weather to change. ● Rain falls when clouds become too heavy.
Benchmark Clarifications	Students will differentiate and/or explain interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. Students will describe and/or explain how the cycling of water and global patterns influence local weather and climate. Students will differentiate between weather and climate. Students will describe the composition and structure of the atmosphere and/or how the atmosphere protects life and insulates the planet
Content Limits	Items will not assess atmospheres of planets other than Earth. Items may assess atmospheric conditions and their resulting weather phenomena, such as hurricanes, tornadoes, lightning, fronts, and precipitation. Items will not address auroras. Items will not assess the causes of global warming or the ozone hole but may assess their effects. Items may assess the layers of the atmosphere and/or the function of each. Items should not assess the water cycle in isolation.
Keeley Probes	Volume 1 #21 (Wet Jeans) Volume 3 #20 (What are Clouds)
Teacher Hints & Instruction Focus	• The water cycle shouldn’t be taught or assessed in isolation but through application. • Students will describe and or explain how the cycling of water and global patterns influence local weather and climate. • The climate of an area is determined by a minimum of 30 years of average weather data. • Students will be assessed on atmospheric conditions and their resulting weather phenomena such as hurricanes, tornadoes, lightning, fronts and precipitation.

Sample FOCUS Question

El Niño is a weather pattern in which the normally cool ocean currents of the tropical Pacific Ocean become warmer. How does this most likely affect weather along the West Coast of the United States?

- It does not affect weather in West Coast states
- It makes summers colder
- **It makes winters warmer**
- It makes storms more predictable

Prefix / Suffix	*Cyclus- a circle Precipit- to fall Trans- across Spirare- to breath*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Human Impact			(2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary

Human Impact	Students will:
	• **identify** the beneficial and negative impacts humans have had on Earth in terms of weathering, erosion, and deposition
	  • *example: deforestation leads to erosion*
	  • *example: protecting sea oats from sand dunes prevents wind erosion*
		SC.7.E.6.6	erosion

Human Impact Resources	
HMH Textbook	Unit 9 (this unit covers 1 standard…pick and choose wisely what will cover your student learning targets/skills)
Sample Literacy Strategies	● Concept Map: land, air, and water resources ● RAFT: land, air, and water resources
Common Misconceptions	● Humans are the only cause of global warming. ● Catastrophic events like earthquakes and volcanic eruptions only affect the lithosphere. ● Earth is too big for us to change, thus the impact of our activities is inconsequential. ● Green energy leaves no carbon footprint. ● Renewable resources can never be used up. ● We will never run out of resources such as coal, oil, and other minerals. ● The ozone layer is bad. ● Global warming is caused by the hole in the ozone layer.
Benchmark Clarifications	Students will identify and/or describe steps of the rock cycle and relate them to surface and subsurface events. Students will describe and/or explain how Earth's surface is built up and torn down through the processes of physical and chemical weathering, erosion, and deposition. Students will identify different types of landforms commonly found on Earth. Students will describe similarities and/or differences among landforms found in Florida and those found outside of Florida. Students will identify and/or describe the impact that humans have had on Earth.
Content Limits	Items may use the context of plate tectonics to assess the rock cycle but will not directly assess plate tectonics. Items will not assess the role of plate tectonics in landform formation. Items may assess the features of karst topography, such as aquifers, caverns, and/or sinkholes but will not use the term *karst topography*.

Teacher Hints & Instruction Focus	● There are many misconceptions about the greenhouse effect because of everyday conversations; it is important for students to understand what the greenhouse effect is and how not only humans, but also other organisms play a role. ● Students may not know what a greenhouse is or what purpose it serves. It may be beneficial to explain this to students so that they understand the analogy that is made. ● This unit is very broad and covers many different ideas, thus it is important to focus on the impact that humans have on the environment with respect to urbanization, deforestation, desertification, erosion, air and water quality, and changing the flow of water. ● Students often confuse the ozone layer to be a named layer of the atmosphere. Ensure that they understand the ozone "layer" is a misnomer as it does not fit the characteristics that define the other layers of the atmosphere (temperature and altitude). ● This is a great opportunity to construct and analyze data tables and graphs. ● This is a good time to revisit the interactions among the spheres of Earth (SC.6.E.7.4) and the characteristics of the atmosphere (SC.6.E.7.9).
Sample FOCUS Question	
El Niño is a weather pattern in which the normally cool ocean currents of the tropical Pacific Ocean become warmer. How does this most likely affect weather along the West Coast of the United States? • It does not affect weather in West Coast states • It makes summers colder • **It makes winters warmer** • It makes storms more predictable	
Prefix / Suffix	*de- removal, separation* *eco- nature, natural habitat*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: The Universe			(3 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
The Scale of the Universe	Students will: • **distinguish** the hierarchical relationships between planets, stars, moons, asteroids, nebulae, galaxies, dwarf planets and comets in the universe by comparing distance, relative size, and general composition Students will: • **describe** the distances (*in astronomical units and light years*) between objects in space in the context of light and space travel	**SC.8.E.5.3** **SC.8.E.5.1**	relative size relative distance composition astronomical bodies light years astronomical units (AU)

	Students will: • **recognize** that the universe contains billions of galaxies and stars	**SC.8.E.5.2**	universe space
Stars	Students will: • **describe** the physical properties of main sequence stars, including: ○ *apparent magnitude (brightness), temperature (color), size, and absolute magnitude (brightness)*	**SC.8.E.5.5**	Star Luminosity Apparent magnitude Absolute magnitude

Universe Resources	
HMH Textbook	Unit 2 **Lesson 1 covers all 3 scale of the universe standards. More exploration than the text is expected for the students full understanding of these standards.
Videos	The Most Astounding Fact: https://www.youtube.com/watch?v=9D05ej8u-gU
Sample Literacy Strategies	● Concept of Definition Map: star ● Frayer Model: galaxy
Common Misconceptions	● The larger a star is, the brighter it is (from Earth). ● The brighter a star is, the hotter it is. ● The hotter a star is, the brighter it is. ● Red stars are the hottest and blue stars are the coolest. ● Stars of equal temperature all have equal brightness. ● Stars only give off visible light. ● Stars emit only one color of light. ● All stars are the same size. ● All the stars are the same distance from the Earth. ● The Universe is static, not expanding. ● The Solar System, the Milky Way galaxy, and the Universe are the same things.
Benchmark Clarifications	Students will compare and/or contrast the relative distance, relative size, and general composition of astronomical bodies in the universe. Students will describe distances between objects in space in the context of light and space travel. Students will describe that the universe contains billions of galaxies and stars.
Content Limits	Items assessing astronomical bodies are limited to planets, stars, moons, asteroids, nebulae, galaxies, dwarf planets, and comets. Items will not assess the order of the planets from the Sun in our Solar System in isolation. Items will not require memorization of quantitative astronomical data. Items will not assess the specific chemical composition of astronomical bodies.
Keeley Probes	Volume 1 #3 (Birthday Candles), Volume 1 #13 (Gravity) Volume 4 #8 (Standing on a Foot)

Teacher Hints & Instruction Focus	• Items will not address hazards of electromagnetic radiation. • Energy and the electromagnetic spectrum are conceptual only. • The formula for the Law of Universal Gravitation or the gravitational constant is not required. • Students should not memorize quantitative astronomical data. • Items will not assess the relative distance of objects in our solar system from the Sun.	• Students do not need to know chemical composition of solar bodies. • Items assessing astronomical bodies are limited to planets, stars, moons, asteroids, nebulae, galaxies, dwarf planets, and comets. • Items will not require calculations but may require comparison or use of quantitative data including tables. • Items addressing mass or weight will not assess units of measure of mass and weight.

Sample FOCUS Question

One type of light that comes from the Sun is called infrared. Human eyes can't see this type of light, but specially built cameras can. Why can't human eyes detect infrared light?

A. The energy of infrared light is too high for our eyes to detect.
B. **The wavelength of infrared light is too long for our eyes to detect.**
C. Infrared light is too fast for our eyes to detect.
D. The Sun does not give off enough infrared light for our eyes to detect.

Which of the following correctly describes the relationship between astronomical bodies in outer space?

A. Mars is larger than Earth.
B. The Milky Way is much larger than our Solar System.
C. The Moon is further away from the Sun than the asteroid belt.
D. The orbits of planets are greater than the orbits of the satellites.

Prefix / Suffix	*Infra- below* *Ultra- beyond* *Astro- star* *Nomos- arrange* *Planetia- wonderer* *-oid- "-like"* *Uni- one* *Verse- voice* *Gravis- heavy*

Sixth Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Earth/Space Science Unit of Study: The Solar System			(5 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
The Models	Students will: • **differentiate** between the various historical models of the solar system, including geocentric and heliocentric <u>NOS Focus- theories may be modified but are rarely discarded</u> <u>NOS Focus- scientific knowledge changes with new evidence</u>	**SC.8.E.5.8** **SC.6.N.3.1** **SC.6.N.2.2**	geocentric heliocentric

Gravity	Students will: • **describe** the role gravity plays in the formation of planets, stars, and the solar system (Law of Universal Gravitation) • **differentiate** between weight and mass, such as: o *weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass* • **apply** the Law of Universal Gravitation to objects in space in terms of orbital path, weight, speed, etc. <u>NOS Focus- Scientific Processes with observations and inferences</u>	**SC.8.E.5.4** **SC.8.P.8.2** **SC.6.N.1.1**	Gravity Weight Mass Gravitational pull force
The Sun	Students will: • **describe** the properties and characteristics of the Sun, including: o *rotation, structure, convection, sunspots, solar flares, and prominences* • **create** models of various solar phenomena <u>NOS Focus- identify the benefits and limitations of the use of scientific models</u>	**SC.8.E.5.6** **SC.6.N.1.4**	convection rotation solar flares solar prominences solar properties sun sunspots
	Advanced: 1. Describe the physical properties of the Sun (sunspot cycles, solar flares, prominences, layers of the Sun, coronal mass ejections, and nuclear reactions) and the impact of the Sun as the main source of external energy for the Earth	**Advanced**: **SC.912.E.5.4**	
The Bodies of the Solar System	Students will: • **differentiate** between characteristics of objects in the solar system (including the sun, planets and their moons) with Earth in terms of: o *gravitational force, distance from the Sun, speed, movement, orbital path, temperature, and atmospheric conditions*	**SC.8.E.5.7**	Atmospheric conditions Earth gravitational force moon motion orbital path planets solar system speed

	• **explain** how the length of year of a planet is related to the distance from the sun • **compare** the atmospheres of the planets to the atmosphere of Earth in terms of surface temperature, including: • *presence, absence, or relative thickness*		

The Solar System Resources	
HMH Textbook	Unit 3
Websites	www.nasa.gov Gravity Force Lab - https://phet.colorado.edu/en/simulation/gravity-force-lab
Sample Literacy Strategies	● Semantic Feature Analysis: objects in the solar system ● Concept of Definition Map: the Sun ● Venn Diagram: geocentric vs. heliocentric
Common Misconceptions	● Planetary orbits are circles. ● All the planets move in their orbits with the same speed. ● The Sun is not a star because it doesn't shine at night. ● The Sun is on fire or burning. ● The Sun does not move. ● The Sun is in the center of the solar system. ● The planets are evenly spaced between the Sun and Neptune. ● The solar system is made up of only the Sun, planets, and our Moon. ● Saturn is the only planet with rings. ● Mercury, the closest planet to the Sun, is the hottest planet. ● Mercury is always hot. ● There are stars in our solar system other than the Sun. ● There is no gravity in space. ● All planets have moons. ● The asteroid belt is crowded and dangerous. ● Pluto is the most distant and last object in the solar system.
Benchmark Clarifications	Students will compare and/or contrast the characteristics of objects in the Solar System. Students will identify and/or explain the role that gravity plays in the formation and motion of planets, stars, and solar systems. Students will compare and/or contrast various historical models of the Solar System.
Content Limits	Items will not require the use of the formula for the law of universal gravitation or the gravitational constant. Items may assess the presence, absence, and/or relative thickness of planetary atmospheres but not the chemical composition of the atmosphere. Items may assess the relationship between distance from the Sun and the length of year and/or the relationship between distance from the Sun and average surface temperature. Items will not require memorization of quantitative astronomical data.

	Items may refer to, but will not assess, the relative size of the Sun. Items will not assess the relative distance of objects in our Solar System from the Sun. Items will not assess the change in velocity dependent upon distance from the Sun for a single planet. Items will not assess characteristics of the Sun in isolation. Items may assess the concept of eccentricity of orbital paths of astronomical bodies in terms of the differing shapes of orbits but not specific values of eccentricity or the term *eccentricity*. Items may assess the general properties of specific planets but will not assess characteristics of inner and outer planets as groups.	
Keeley Probes	Volume 4 #22 (Where would it Fall)	
Teacher Hints & Instruction Focus	• Make sure students understand that distances in space are measured in astronomical units (AU) or light-years. • While students must understand the effect gravity has on the formation and movement of astronomical bodies in space, it is not necessary for students to use the formula for the law of universal gravitation. • While it is not necessary for students to memorize quantitative astronomical data, it would be a good time to practice comparing quantitative data in tables and graphs. • When teaching the characteristics of planets it is important to discuss the presence, absence, and/or relative thickness of their atmospheres, in order understand how an atmosphere or lack thereof affects the planet. However, students shouldn't take time memorizing the specific chemical compositions of each planet's atmosphere.	• Items will not assess the chemical composition of the atmospheres. • Items will not assess the order of the planets in the Solar System in isolation but that knowledge may help them answer a conceptual question about how their characteristics are different from Earth. • The formula for the Law of Universal Gravitation or the gravitational constant is not required.

Sample FOCUS Question

Saturn is 9.5 astronomical units (AU) from the Sun and Mars is only 1.5 AU from the Sun. Saturn is also much larger than Mars. Based on this information, how does the average surface temperature on Mars compare to the average surface temperature on Saturn?

A. Since Mars is closer to the Sun than Saturn, it has a higher average surface temperature.
B. Saturn is larger than Mars and absorbs more light, so it has a higher average surface temperature.
C. Since both planets are more than 1 AU from the Sun, their average surface temperatures are equal.
D. Even though Saturn is further away, Saturn's rings cause it to have a lower average surface temperature

Prefix / Suffix	*Ab- from/not Solvere- dissolve Sol- sun Rota- turn Vect- to carry Orb- sphere Atmos- gas Geo- earth Helio- sun Centric- centered*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: The Earth, Moon and Sun			(3 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Earth/Moon/Sun	Students will: • **demonstrate** the effects of Earth's rotation and revolution in relationship to the sun, such as: ○ *day and night vs. length of a year* • **diagram to explain** how Earth's tilted axis and its revolution around the Sun produces seasons • **explain** how the Earth stays in orbit because of its inertia and the gravitational pull of the sun Students will: • **demonstrate to explain** how the phases of the moon are created • **explain** how the tides are the result of the pull of gravity by the Sun and Moon. • **differentiate** between solar and lunar eclipses	**SC.8.E.5.9**	rotation revolution day / night year axis seasons gravitational attraction inertia moon phases tides solar eclipses lunar eclipses

The Earth, Moon and Sun Resources	
HMH Textbook	Unit 4
Sample Literacy Strategies	● Concept of Definition Map: The Moon ● Venn Diagram: lunar eclipse vs. solar eclipse, spring tide vs. neap tide
Common Misconceptions	● The Earth is a perfect sphere. ● Seasons are caused by the Earth's distance from the Sun. ● Everyone on the Earth shares the same seasons on the same dates. ● The Moon can only be seen at night. ● The Moon does not rotate. ● The Moon's phases are caused by the shadow of the Earth on the Moon. ● The Moon produces light the same way the Sun does, just at night. ● The Moon goes around the Earth in a single day.
Benchmark Clarifications	Students will explain the effect of astronomical bodies on each other, including the Sun's and/or the Moon's effects on Earth.

Content Limits	Items addressing eclipses should be assessed at the conceptual level and will not assess specific vocabulary associated with eclipses, such as *umbra* and *penumbra*.
Keeley Probes	Volume 1 #25 (Going through a Phase) Volume 3 #23 (Summer Talk) Volume 4 #24 (Lunar Eclipse) Volume 4 #25 (Solar Eclipse)
Teacher Hints & Instruction Focus	• Items on eclipses will not assess umbra or penumbra. • These concepts are often very challenging for students, who struggle with spatial relationships. Therefore, it is really important to engage students in activities where they can manipulate the Earth, the Moon, and the Sun, in order to see their positions and the impact they have on each other. • This is a perfect opportunity to also teach students how to read a diagram or labeled illustration.

Sample FOCUS Question

Which of the following statements correctly explains why we experience seasons?

E. As the Earth moves away from the Sun, we change from summer to fall to winter. As the Earth moves closer to the Sun, we change from winter to spring to summer.

F. As the Earth spins on its axis, we experience seasons. Each 1/4 spin of the Earth on its axis represents a change in season.

G. Earth's tilt on its axis means one hemisphere leans toward the Sun, causing it to experience warmer temperatures. As Earth revolves around the Sun, a different hemisphere leans toward the Sun, causes warmer temperatures in that hemisphere.

H. The Moon moving in front of the Sun causes temperatures on Earth to drop, which causes winter. When it moves behind the Sun, a rise in temperature causes summer.

What causes the phases of the Moon?

A. the tilt of Earth on its axis

B. Earth's shadow being cast on the Moon

C. the relative positions of the Sun, Moon, and Earth

D. the elliptical orbit that Earth travels around the Sun

Prefix / Suffix	*Rota- turn in place* *Rev- turn around* *Gravis- heavy* *Ad/at- towards* *Tract- to pull* *Sol-sun* *Luna- moon*

Sixth Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Earth/Space Science Unit of Study: Space Exploration			(2 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
The EM Spectrum	Students will: • **identify** the electromagnetic waves from the Sun, such as: ○ *infrared, visible light and ultraviolet* • **sequence** the order of frequencies and wavelengths in the electromagnetic spectrum *(radio to gamma)* • **identify** common uses and applications of electromagnetic waves*, such as:* ○ *Satellite photographs, microscopes, laser devices, etc.* • **discuss** the importance of technology in studying various aspects of space	**SC.8.E.5.11** **SC.8.E.5.10**	Electromagnetic spectrum Electromagnetic waves/radiation Visible light Frequency Infrared light Ultraviolet light Satellite photographs Wavelengths
Enrichment	Students will: ○ **discuss** the effects of space exploration on the economy and culture of Florida	**SC.8.E.5.12** **Not Assessed**	

Space Exploration Resources	
HMH Textbook	Unit 5 Lessons 1 and 2 3 is taught for enrichment
Websites	www.nasa.gov EM Spectrum – YouTube
Sample Literacy Strategies	● T-Chart: electromagnetic waves ● Concept of Definition Map: technology
Common Misconceptions	● The electromagnetic spectrum consists of only visible light. ● All electromagnetic radiation is visible. ● All radiation is harmful. ● Radio waves are sound waves and they travel at the speed of sound. ● Different colors of light are different types of waves. ● Different kinds of electromagnetic radiation travel at different speeds. ● Radio waves travel at the speed of sound. ● Visible light is fundamentally different from other types of electromagnetic radiation.

	● Visible light is the only kind of light. ● Infrared radiation is “heat radiation”, not light.
Benchmark Clarifications	Students will identify, compare, and/or contrast the variety of types of radiation present in radiation from the Sun. Students will identify and/or compare characteristics of the electromagnetic spectrum. Students will identify common uses and/or applications of electromagnetic waves.
Content Limits	Items may assess relative order of frequencies and wavelengths in the electromagnetic spectrum but will not require memorization of specific frequencies and wavelengths of electromagnetic radiation. Items will not address hazards of electromagnetic radiation. Items will address only electromagnetic waves and the electromagnetic spectrum. Items will not require calculations.
Keeley Probes	Volume 4 #23 (Moonlight)
Teacher Hints & Instruction Focus	● It is more important that students focus on the role of technology in science as opposed to specific technologies. ● While students must understand the relative order of frequencies and wavelengths in the electromagnetic spectrum, it is not necessary for students to memorize specific frequencies and wavelengths of electromagnetic radiation. ● It is not necessary for students to memorize the hazards of electromagnetic radiation. ● Make sure to focus on the purpose of using technology in the exploration of space, rather than memorizing the specific technologies (i.e., the names of different telescopes).

Sample FOCUS Question

Francesca is drawing a picture of the electromagnetic spectrum. She needs to order the types of electromagnetic radiation from the lowest to highest frequency.
Which of the following shows the correct order of the electromagnetic spectrum, from lowest to highest frequency?
A. visible, UV, infrared, X-ray, microwave, radio, gamma
B. radio, visible, microwave, infrared, UV, X-ray, gamma
C. gamma, UV, microwave, infrared, radio, X-ray, visible
D. radio, microwave, infrared, visible, UV, X-ray, gamma

Prefix / Suffix	*infra- below; beneath* *micro- small* *-scope device for seeing* *tele- far off; distant* *ultra- beyond*

Review and Semester Exams

Science Process Skills: Basic and Integrated

Observing: using your senses to gather information about an object or event; a description of what is actually perceived; information that is considered to be qualitative data

Measuring: using standard measures or estimations to describe specific dimensions of an object or event; information considered to be quantitative data

Inferring: formulating assumptions or possible explanations based upon observations

Classifying: grouping or ordering objects or events into categories based upon characteristics or defined criteria

Predicting: guessing the most likely outcome of a future event based upon a pattern of evidence

Communicating: using words, symbols, or graphics to describe an object, action, or event

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Formulating Hypotheses: stating the proposed solutions or expected outcomes for experiments; proposed solutions to a problem must be testable

Identifying Variables: stating the changeable factors that can affect an experiment; important to change only the variable being tested and keep the rest constant

Defining Variables: explaining how to measure a variable in an experiment

Designing Investigations: designing an experiment by identifying materials and describing appropriate steps in a procedure to test a hypothesis

Experimenting: carrying out an experiment by carefully following directions of the procedure so the results can be verified by repeating the procedure several times

Acquiring Data: collecting qualitative and quantitative data as observations and measurements

Organizing Data: making data tables and graphs for data collected

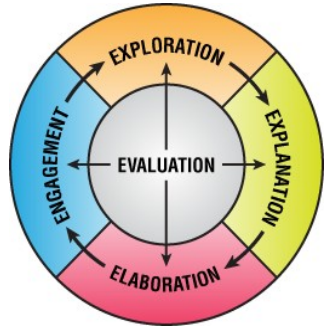
Analyzing Investigations: interpreting data, identifying errors, evaluating the hypothesis, formulating conclusions, and recommending further testing when necessary

5E Learning Cycle: An Instructional Model

ENGAGEMENT	EXPLORATION	EXPLANATION	ELABORATION	EVALUATION
The engagement phase of the model is intended to capture students' interest and focus their thinking on the concept, process, or skill that is to be learned. During this engagement phase, the teacher is on center stage.	The exploration phase of the model is intended to provide students with a common set of experiences from which to make sense of the concept, process or skill that is to be learned. During the exploration phase, the students come to center stage.	The explanation phase of the model is intended to grow students' understanding of the concept, process, or skill and its associated academic language. During the explanation phase, the teacher and students share center stage.	The elaboration phase of the model is intended to construct a deeper understanding of the concept, process, or skill through the exploration of related ideas. During the elaboration phase, the teacher and students share center stage.	The evaluation phase of the model is intended to be used during all phases of the learning cycle driving the decision-making process and informing next steps. During the evaluation phase, the teacher and students share center stage.

What does the teacher do?
• **create** interest/curiosity
• **raise** questions
• **elicit** responses that uncover student thinking/prior knowledge (preview/process)
• **remind** students of previously taught concepts that will play a role in new learning
• **familiarize** students with the unit
	What does the teacher do?
	• **provide** necessary materials/tools
	• **pose** a hands-on/minds-on problem for students to explore
	• **provide** time for students to "puzzle" through the problem
	• **encourage** students to work together
	• **observe** students while working
	• **ask** probing questions to redirect student thinking as needed
		What does the teacher do?
		• **ask** for justification/clarification of newly acquired understanding
		• **use** a variety of instructional strategies
		• **use** common student experiences to:
		  ○ develop academic language
		  ○ explain the concept
		• **use** a variety of instructional strategies to grow understanding
		• **use** a variety of assessment strategies to gauge understanding
			What does the teacher do?
			• **provide** new information that extends what has been learned
			• **provide** related ideas to explore
			• **pose** opportunities (examples and non-examples) to apply the concept in unique situations
			• **remind** students of alternate ways to solve problems
			• **encourage** students to persevere in solving problems
				What does the teacher do?
				• **observe** students during all phases of the learning cycle
				• **assess** students' knowledge and skills
				• **look** for evidence that students are challenging their own thinking
				• **present** opportunities for students to assess their learning
				• **ask** open-ended questions:
				  ○ What do you think?
				  ○ What evidence do you have?
				  ○ How would you explain it?

What does the student do?
• **show** interest in the topic
• **reflect and respond** to questions
• **ask** self-reflection questions:
  ○ What do I already know?
  ○ What do I want to know?
  ○ How will I know I have learned the concept, process, or skill?
• **make** connections to past learning experiences
	What does the student do?
	• **manipulate** materials/tools to explore a problem
	• **work** with peers to make sense of the problem
	• **articulate** understanding of the problem to peers
	• **discuss** procedures for finding a solution to the problem
	• **listen** to the viewpoint of others
		What does the student do?
		• **record** procedures taken towards the solution to the problem
		• **explain** the solution to a problem
		• **communicate** understanding of a concept orally and in writing
		• **critique** the solution of others
		• **comprehend** academic language and explanations of the concept provided by the teacher
		• **assess** own understanding through the practice of self-reflection
			What does the student do?
			• **generate** interest in new learning
			• **explore** related concepts
			• **apply** thinking from previous learning and experiences
			• **interact** with peers to broaden one's thinking
			• **explain** using information and experiences accumulated so far
				What does the student do?
				• **participate** actively in all phases of the learning cycle
				• **demonstrate** an understanding of the concept
				• **solve** problems
				• **evaluate** own progress
				• **answer** open-ended questions with precision
				• **ask** questions

<u>Evaluation of Engagement</u> The role of evaluation during the engagement phase is to gain access to students' thinking during the pre-assessment event/activity. Conceptions and misconceptions currently held by students are uncovered during this phase. These outcomes determine the concept, process, or skill to be explored in the next phase of the learning cycle.	**<u>Evaluation of Exploration</u>** The role of evaluation during the exploration phase is to gather an understanding of how students are progressing towards making sense of a problem and finding a solution. Strategies and procedures used by students during this phase are highlighted during explicit instruction in the next phase. The concept, process, or skill is formally explained in the next phase of the learning cycle.	**<u>Evaluation of Explanation</u>** The role of evaluation during the explanation phase is to determine the students' degree of fluency (accuracy and efficiency) when solving problems. Conceptual understanding, skill refinement, and vocabulary acquisition during this phase are enhanced through new explorations. The concept, process, or skill is elaborated in the next phase of the learning cycle.	**<u>Evaluation of Elaboration</u>** The role of evaluation during the elaboration phase is to determine the degree of learning that occurs following a differentiated approach to meeting the needs of all learners. Application of new knowledge in unique problem solving situations during this phase constructs a deeper and broader understanding. The concept, process, or skill has been and will be evaluated as part of all phases of the learning cycle.	

Webb's Depth of Knowledge (DOK) Model of Cognitive Complexity

LOW COMPLEXITY Level 1 (Recall)	MODERATE COMPLEXITY Level 2 (Basic Application of Concepts and Skills)	HIGH COMPLEXITY Level 3 (Strategic Thinking & Complex Reasoning)	HIGH COMPLEXITY Level 4 (Extended Thinking & Complex Reasoning)
This level is the recall of information such as a fact, definition, or term, as well as performing a simple science process or procedure. Level 1 only requires students to demonstrate a rote response; use a well-known formula; follow a set, well-defined procedure (like a recipe); or perform a clearly defined series of steps. **Some examples are:** • Recall or recognize a fact, term, or property. • Represent in words or diagrams a scientific concept or relationship. • Provide or recognize a standard scientific representation for simple phenomena. • Perform a routine procedure, such as measuring length. • Identify familiar forces (e.g., pushes, pulls, gravitation, friction, etc.). • Identify objects and materials as solids, liquids, and gases.	This level includes the engagement of some mental processing beyond recalling or reproducing a response. The content knowledge or process involved is more complex than in Level 1. Level 2 requires that students make some decisions as to how to approach the question or problem. Level 2 activities include making observations, and collecting data; classifying, organizing, and comparing data; and representing and displaying data in tables, graphs, and charts. **Some examples are:** • Specify and explain the relationships among facts, terms, properties, and variables. • Identify variables, including controls, in simple experiments. • Distinguish between experiments and systematic observations. • Describe and explain examples and non-examples of science concepts. • Select a procedure according to specified criteria, and perform it. • Formulate a routine problem given data and conditions. • Organize and represent data.	This level requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands at Level 3 are complex and abstract because the multi-step task requires more demanding reasoning than Level 2. Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve non-routine problems. **Some examples are:** • Identify research questions and design investigations for a scientific problem. • Design and execute an experiment or systematic observation to test a hypothesis or research question. • Develop a scientific model for a complex situation. • Form conclusions from experimental data. • Cite evidence that living systems follow the laws of conservation of mass and energy. • Explain the physical properties of the sun and its dynamic nature and connect them to conditions and events on Earth.	This level has the same high cognitive demands as Level 3 with the additional requirement that students work over an extended period of time or with extended effort. Students are required to make several connections—relating ideas within the content area or among content areas—and have to select or devise one approach among many alternatives for how the situation or problem can be solved. It is important to note that the extended time period is not a distinguishing factor if the required work is only repetitive and does not require the application of significant conceptual understanding and higher-order thinking. **Some examples are:** • Based on provided data from a complex experiment that is novel to the student, deduce the fundamental relationship among several variables. • Conduct an investigation, from specifying a problem to designing and carrying out an experiment and analyzing data and forming conclusions. • Produce a detailed report of a scientific experiment or systematic observation, and infer conclusions based upon evidence obtained.

More detailed information about Florida's DOK levels is available online at http://www.cpalms.org/cpalms/dok.aspx.

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 1
Recall or Reproduction…

is the recall of information such as a fact, definition, or term as well as performing a simple science process or procedure. Level 1 only requires students to demonstrate a rote response, restate information in their own words, and/or follow or perform a well-defined procedure.

Some Examples of Level 1 Performance

- Recall or recognize a fact, term, or property (e.g., how speed is determined).
- Represent a scientific concept or relationship in words or diagrams.
- Retrieve information from a chart, table, diagram, or graph.
- Recognize a standard scientific representation of a simple phenomenon (e.g., water cycle model).
- Identify common examples of topics, objects, and materials (e.g., familiar forces and invertebrates).
- Perform a routine procedure such as measuring length.

Question Stems

What is (was) _____?
What_____did you use?
What are some examples of_____?
How many _____?
Identify the _____?
Make a listing of_____?
Why did you choose_____?
How would you describe_____?
How can you recognize_____?
When did_____happen?
Recall what happened.
What happened when _____?
Retell.
Draw.
Select or retrieve _____?
What data represents _____?
Which_____has the most? Least?
Read your data table, chart, or graph.
Is_____ on the graph?
What pattern is seen when_____?

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 2
Basic Application…

is engaging in a mental process that goes beyond basic recall or reproduction, requiring two or more steps before giving a response. Students are asked to apply their knowledge of content on a simple level. Level 2 requires student to make some decisions as to how to approach a question or problem such as to classify, organize, and compare data.

Some Examples of Level 2 Performance

- Read and interpret information from a simple graph.
- Designate and explain the relationships among facts, terms, properties, and variables (e.g., compare physical properties of solids, liquids, and gases).
- Identify variable and controls in simple experiments.
- Distinguish between experiments and systematic observations.
- Describe and explain examples and non-examples of science concepts (e.g., flowering and non-flowering plants).
- Select a procedure according to specified criteria, and perform it.
- Formulate a routine problem given data and conditions.

Question Stems

Explain how_____affected_____.
Apply what you have learned to_____.
Compare/contrast.
How would you classify_____?
What could you use to classify?
How are_____alike? Different?
Summarize.
What do you notice about _____?
What do you observe? Infer?
What are some examples of_____?
What are some non-examples of_____?
Given the data, what was the testable question?
What variable is being tested?
What is the control group?
What procedure would you use?

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 3
Strategic Thinking…

requires reasoning, planning, using evidence, and complex and abstract thinking. The complexity results from there being multiple correct responses in which student justification is necessary and thorough. Level 3 asks students to cite evidence when developing a logical argument and to explain scientific phenomena in terms of concepts.

Some Examples of Level 3 Performance

- Design and execute an experiment or systematic observation to test a hypothesis or research question.
- Design and develop a scientific model to explain a scientific concept or theory.
- Form conclusions from experimental data.
- Cite evidence for scientific theory (e.g., energy is neither lost nor created within food chains and electrical circuits).
- Compare information within or across data sets (several monthly temperature graphs of the same city).
- Explain how political, social, and economic concerns can affect science, and vice versa.
- Explain the properties of the sun and its position within the solar system and then connect this knowledge to the condition and events occurring on Earth.

Question Stems

What conclusions can you draw?
How would you test_____?
What would the outcome be if_____?
What features of the graph should be considered when_____?
What question could we ask now?
What evidence should be considered?
Explain your thinking when there is more than one answer. Elaborate.
Formulate a reason as to why_____?
Which facts support _____?
What is the best answer? Why?
How would you adapt _____ to create a different _____?
How is_____related to_____?

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 4
Extended Thinking…

requires the same high cognitive demands as Level 3 with the additional requirement that students work over an extended period of time and/or with extended effort. Level 4 assessment items require significant thought.

Some Examples of Level 4 Performance

- Relate scientific concepts to other content areas (e.g., impact of environment changes).
- Develop generalizations of the results obtained and apply them to new situations (e.g., predict the weather in a particular place and time).
- Select or devise an approach among many alternatives for how a situation or problem is to be solved.
- Analyze multiple sources of evidence.
- Apply understanding in a new way, provide argument or justification for the application (e.g., using inertia).
- Conduct an investigation, from specifying a problem to designing and carrying out an experiment and analyzing data and forming conclusions.

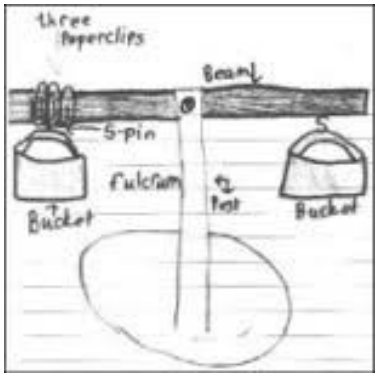
Question Stems/Tasks

What information can you gather to support your idea about_____?
Apply information from one text to another text to develop a persuasive argument.
Write a research paper/thesis on a topic from multiple sources.
Judge the value of material for a given purpose.
Consider multiple lines of inquiry to explain a particular scientific theory (e.g., conservation of mass and inertia).
Produce a detailed report of a scientific experiment or systematic observation, and infer conclusions based upon evidence obtained.
Provide time for extended thinking.
Assess through performance and open-ended activities.

Formative Assessment Strategies
Science

APPENDIX A

Adapted from Page Keeley's *Science Formative Assessment: 75 Practical Strategies for Linking Assessment, Instruction, and Learning*

Strategy Name	Description	Additional Information
A & D Statements	*A & D Statements* analyze a set of "fact or fiction" statements. First, students may choose to agree or disagree with a statement or identify whether they need more information. Students are asked to describe their thinking about why they agree, disagree, or are unsure. In the second part, students describe what they can do to investigate the statement by testing their ideas, researching what is already known, or using other means of inquiry.	
Agreement Circles	*Agreement Circles* provide a kinesthetic way to activate thinking and engage students in scientific argumentation. Students stand in a circle as the teacher reads a statement. While standing, they face their peers and match themselves up in small groups of opposing beliefs. Students discuss and defend their positions. After some students defend their answers, the teacher can ask if others have been swayed. If so, stand up. If not, what are your thoughts? Why did you disagree? After hearing those who disagree, does anyone who has agreed want to change their minds? This should be used when students have had some exposure to the content.	**Energy** **1.** Energy is a material that is stored in an object. **2.** When energy changes from one form to another, heat is usually given off. **3.** Energy can never be created or destroyed. **4.** Something has to move in order to have energy.
Annotated Student Drawings	*Annotated Student Drawings* are student-made, labeled illustrations that visually represent and describe students' thinking about scientific concepts. Younger students may verbally describe and name parts of their drawings while the teacher annotates them.	

Strategy Name	Description	Additional Information
Card Sorts	*Card Sorts* is a sorting activity in which students group a set of cards with pictures or words according to certain characteristics or category. Students sort the cards based on their preexisting ideas about the concepts, objects, or processes on the cards. As students sort the cards, they discuss their reasons for placing each card into a designated group. This activity promotes discussion and active thinking.	
Chain Notes	*Chain Notes* is a strategy that begins with a question printed at the top of a paper. The paper is then circulated from student to student. Each student responds with one to two sentences related to the question and passes it on to the next student. A student can add a new thought or build on a previous statement.	**What is Matter?** Matter is all around us. Matter makes up everything. Matter has volume and takes up space. You can feel and see matter.
Commit and Toss	*Commit and Toss* is a technique used to anonymously and quickly assess student understanding on a topic. Students are given a question. They are asked to answer it and explain their thinking. They write this on a piece of paper. The paper is crumpled into a ball. Once the teacher gives the signal, they toss, pass, or place the ball in a basket. Students take turns reading their "caught" response. Once all ideas have been made public and discussed, engage students in a class discussion to decide which ideas they believe are the most plausible and to provide justification for the thinking.	**Solids and Holes** Lance has a thin, solid piece of material. He places it in water. It floats. He takes the material out and punches holes all the way through it. What do you think Lance will observe when he puts the material with holes back in the water? A. It will sink. B. It will barely float. C. It will float the same as it did before the holes were punched. D. It will neither sink nor float. It will bob up and down in the water. Explain your thinking. Describe the reason for the answer you selected.
Concept Card Mapping	*Concept Card Mapping* is a variation on concept mapping. Students are given cards with the concepts written on them. They move the cards around and arrange them as a connected web of knowledge. This strategy visually displays relationships between concepts.	

<table>
<tr><th>Strategy Name</th><th>Description</th><th>Additional Information</th></tr>
<tr><td>Concept Cartoons</td><td>Concept Cartoons are cartoon drawings that visually depict children or adults sharing their ideas about common everyday science.
Students decide which character in the cartoon they agree with most and why. This formative assessment is designed to engage and motivate students to uncover their own ideas and encourage scientific argumentation.
Concept Cartoons are most often used at the beginning of a new concept or skill. These are designed to probe students' thinking about everyday situations they encounter that involve the use of science.
Not all cartoons have one "right answer." Students should be given ample time for ideas to simmer and stew to increase cognitive engagement.</td><td> 
www.pixton.com</td></tr>
<tr><td>Data Match</td><td>Data Match provides students with a data set from a familiar investigation and several statements about data. Students use evidence from the data to determine which statements are accurate. This strategy provides students with an opportunity to consider what constitutes evidence, practice interpreting data, and consider how confident they are in interpreting results of an inquiry.</td><td><table><tr><th>Where We Put the Ice Cube</th><th>How Many Minutes It Took to Melt</th></tr><tr><td>On the blacktop in the sun</td><td>3</td></tr><tr><td>On the blacktop in the shade</td><td>7</td></tr><tr><td>On the grass</td><td>10</td></tr><tr><td>On the metal side</td><td>2</td></tr><tr><td>On the dirt underneath the slide</td><td>5</td></tr></table>Which of these statements match your results?
The ice cube on the grass took longest to melt.
The metal slide was hotter than the dirt underneath the slide.
The ice cube melted faster on the blacktop in the sun than on the shaded blacktop.
Ice placed on dark things melts faster than ice placed on light things.
Ice melts faster on some surfaces than on others.</td></tr>
<tr><td>Fact First Questioning</td><td>Fact First Questioning is a higher-order questioning technique used to draw out students' knowledge. It takes a factual "what" question and turns it into a deeper "how" or "why" question. Teachers state the fact first and then ask students to elaborate, enabling deeper thinking processes that lead to a more enduring understanding of science concepts.</td><td>Examples of Fact First Questions
Glucose is a form of food for plants.
Why is glucose considered a food for plants?
A cell is called the basic unit of life.
Why is the cell called the basic unit of life?
The patterns of stars in the night sky stay the same.
Why do the patterns of stars in the night sky stay the same?
Sandstone is a sedimentary rock.
Why is sandstone considered a sedimentary rock?</td></tr>
</table>

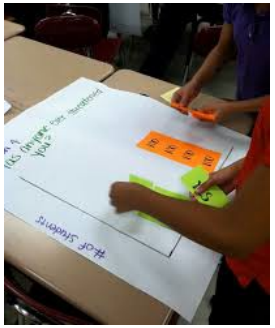
<table>
<tr><th>Strategy Name</th><th>Description</th><th>Additional Information</th></tr>
<tr><td>Familiar Phenomenon Probes</td><td>Familiar Phenomenon Probes is a strategy involving two-tiered questions consisting of a selected response section and a justification for the selected response. They engage students in thinking about scientific ideas related to the phenomenon and committing to a response that matches their thinking. The distracters (wrong choices) include commonly held misconceptions that children have in science.</td><td>What's in the Bubbles?
Hannah is boiling water in a glass tea kettle. She notices large bubbles forming on the bottom of the kettle that rise to the top and wonders what is in the bubbles. She asks her family what they think, and this is what they may say:
Dad: They are bubble of heat.
Calvin: The bubbles are filled with air.
Grandma: The bubbles are an invisible form of water.
Mom: The bubbles are empty. There is nothing inside them.
Lucy: The bubbles contain oxygen and hydrogen that separated from the water.
Which person do you most agree with and why? Explain your thinking.</td></tr>
<tr><td>First Word-Last Word</td><td>First Word-Last Word is a variation of acrostic poetry. Students construct statements about a concept or topic before and after instruction that begins with the designated letter of the alphabet. The acrostic format provides a structure for them to build their idea statements off different letters that make up the topic word.</td><td>
<table>
<tr><th>First Word-Photosynthesis</th><th>Last Word-Photosynthesis</th></tr>
<tr><td>Plants make their own food.</td><td>Producers such as plants use energy from the sun to make their food.</td></tr>
<tr><td>Happens in cells</td><td>Happens in cells that have structures called chloroplasts</td></tr>
<tr><td>Other animals eat plants.</td><td>Organisms that eat plants are using energy from the plant.</td></tr>
<tr><td>The roots take up food and water.</td><td>The roots take water up to the leaves where it reacts with sunlight and carbon dioxide.</td></tr>
<tr><td>Oxygen is breathed in through leaves.</td><td>Oxygen is given off during photosynthesis and is used by plants and animals for respiration.</td></tr>
<tr><td>Sunlight makes food for plants.</td><td>Sunlight provides the energy so plants can make food.</td></tr>
<tr><td>You can't make your own food.</td><td>You need to have cells with chloroplast and chlorophyll to make food.</td></tr>
<tr><td>Needs water, sunlight, oxygen, and minerals</td><td>Needs water, carbon dioxide and sunlight to make food</td></tr>
<tr><td>The leaves, roots, and stems are all parts that make food.</td><td>The leaf is the food making part.</td></tr>
<tr><td>Have to have sun and water</td><td>Have to have sunlight, water, and carbon dioxide</td></tr>
<tr><td>Energy comes from the sun.</td><td>Energy comes from sunlight.</td></tr>
<tr><td>Sunlight turns plants green.</td><td>Sunlight is trapped in the chlorophyll.</td></tr>
<tr><td>It happens in all plants.</td><td>It is necessary life process for all plants.</td></tr>
<tr><td>Soil is used by plants to make food.</td><td>Soil holds the water for plants and gives some minerals.</td></tr>
</table>
</td></tr>
</table>

Strategy Name	Description	Additional Information
Fist to Five	*Fist to Five* asks students to indicate the extent of their understanding of a scientific concept by holding up a closed fist (no understanding), one finger (very little understanding), and a range up to five fingers (understand completely and can easily explain it to someone else). Fist to Five provides a simple feedback opportunity for all students in a class to indicate when they do not understand a concept or skill and need additional support for their learning.	 I do not understand it. I understand some of it. I understand most of it. I understand it completely. I understand it and can explain it.
Four Corners	*Four Corners* is a kinesthetic strategy. The four corners of the classroom are labeled: Strongly Agree, Agree, Disagree and Strongly Disagree. Initially, the teacher presents a science statement to students and asks them to go to the corner that best aligns with their thinking. Students then pair up to defend their thinking with evidence. The teacher circulates and records student comments. Next, the teacher facilitates a whole group discussion. Students defend their thinking and listen to others' thinking before returning to their desks to record their new understanding.	Agree Strongly Agree Strongly Disagree Disagree
Frayer Model	*Frayer Model* is a strategy that graphically organizes prior knowledge about a concept into an operational definition, characteristics, examples, and non-examples. It provides students with the opportunity to clarify what they are thinking about the concept and to communicate their understanding.	Definition Characteristics **Living Things** Examples Non-examples
Friendly Talk Probes	*Friendly Talk Probes* is a strategy that involves a selected response section followed by justification. The probe is set in a real-life scenario in which friends talk about a science-related concept or phenomenon. Students are asked to pick the person they most agree with and explain why. This can be used to engage students at any point during a unit. It can be used to access prior knowledge before the unit begins, or assess learning throughout and at the close of a unit.	**Talking about Gravity** Two friends are talking about gravity. Ben says, "Gravity needs atmosphere or air. If there is no air or atmosphere, there will be no gravity." Kelly says, "Gravity doesn't need an atmosphere or air. If there is no air or atmosphere, there will still be gravity." Which friend do you agree with?_____ Describe your thinking. Explain why you agree with one friend and disagree with the other.

Strategy Name	Description	Additional Information
Give Me Five	*Give Me Five* is a simple, quick technique for inviting and valuing public reflection and welcoming feedback from the students. Students should be given time to quietly reflect, perhaps through a quick write. Teacher selects five "volunteers" to share their reflection. NOTE: Deliberately select students for the purpose of reinforcing correct understanding and addressing misconceptions.	1. What was the most significant learning you had during today's lesson? 2. How "in the zone" do you feel right now as far as understanding the concept? 3. How did today's lesson help you better understand the concept? 4. What was the high point of this week's activities on the concept? 5. How well do you think today's science discussion worked in improving your understanding of the concept?
Human Scatterplot	*Human Scatterplot* is a quick, visual way for teacher and students to get an immediate classroom snapshot of students' thinking and the level of confidence students have in their ideas. Teachers develop a selective response question with up to four answer choices. Label one side of the room with the answer choices. Label the adjacent wall with a range of low confidence to high confidence. Students read the question and position themselves in the room according to their answer choice and degree of confidence in their answer.	
I Used to Think… But Now I Know…	*I Used to Think…But Now I Know* is a self-assessment and reflection exercise that helps students recognize if and how their thinking has changed at the end of a sequence of instruction. An additional column can be added to include…*And This Is How I Learned It* to help students reflect on what part of their learning experiences helped them change or further develop their ideas.	
Justified List	*Justified List* begins with a statement about an object, process, concept or skill. Examples that fit or do not fit the statement are listed. Students check off the items on the list that fit the statement and provide a justification explaining their rule or reasons for their selections. This can be done individually or in small group. Small groups can share their lists with the whole class for discussion and feedback. Pictures or manipulatives can be used for English-language learners.	**Making Sound** All of the objects listed below make sounds. Put an X next to the objects you think involve vibration in producing sound. ____guitar strings ____drum ____piano ____dripping faucet_____flute ____wind ____hammer ____crumpled paper ____thunderstorm ____barking dog ____screeching brakes Explain your thinking. What "rule" or reasoning did you use to decide which objects involve vibration?

Strategy Name	Description	Additional Information
K-W-L Variations	*K-W-L* is a general technique in which students describe what they **K**now about a topic, what they **W**ant to know about a topic, and what they have **L**earned about the topic. It provides an opportunity for students to become engaged with a topic, particularly when asked what they want to know. *K-W-L* provides a self-assessment and reflection at the end, when students are asked to think about what they have learned. The three phrases of *K-W-L* help students see the connections between what they already know, what they would like to find out, and what they learned as a result.	
Learning Goals Inventory (LGI)	*Learning Goals Inventory (LGI)* is a set of questions that relate to an identified learning goal in a unit of instruction. Students are asked to "inventory" the learning goal by accessing prior knowledge. This requires them to think about what they already know in relation to the learning goal statement as well as when and how they may have learned about it. The *LGI* can be given back to students at the end of the instructional unit as a self-assessment and reflection of their learning.	
Look Back	*Look Back* is a recount of what students learned over a given instructional period of time. It provides students with an opportunity to look back and summarize their learning. Asking the students "how they learned it" helps them think about their own learning. The information can be used to differentiate instruction for individual learners, based on their descriptions of what helped them learn.	
Muddiest Point	*Muddiest Point* is a quick-monitoring technique in which students are asked to take a few minutes to jot down what the most difficult or confusing part of a lesson was for them. The information gathered is then to be used for instructional feedback to address student difficulties.	**Scenario:** Students have been using a hand lens to make observations of the details on a penny. *Teacher states, "I want you to think about the muddiest point for you so far when it comes to using a hand lens. Jot it down. I will use the information you give me to think about ways to help you better use the hand lens in tomorrow's lesson."*

Strategy Name	Description	Additional Information
Odd One Out	*Odd One Out* combines similar items/terminology and challenges students to choose which item/term in the group does not belong. Students are asked to justify their reasoning for selecting the item that does not fit with the others. Odd One Out provides an opportunity for students to access scientific knowledge while analyzing relationships between items in a group.	Properties of Matter: In each set, circle the ***Odd One Out*** and describe why it does not fit with the others.
Paint The Picture	*Paint the Picture* visually depicts students' thinking about an idea in science without using any annotations. This involves giving the students a question and asking them to design a visual representation that reveals their thinking and answers the question. *Paint the Picture* provides an opportunity for students to organize their thinking and represent their thinking in a creative, unique visual format.	What role do minerals play in the formation of a rock? minerals rock
Partner Speaks	*Partner Speaks* provides students with an opportunity to talk through an idea or question with another student before sharing with a larger group. When ideas are shared with the larger group, pairs speak from the perspective of their partner's ideas. This encourages careful listening and consideration of another's ideas.	**Today we are going to investigate how objects float and sink in water.** - *What do you think affects whether an object floats or sinks in water?* - *What can you do to change how an object floats or sinks?* **Turn to your partner and take turns discussing ideas.**
Pass the Question	*Pass the Question* provides an opportunity for students to collaborate in activating their own ideas and examining other students' thinking. Students begin by working together in pairs to respond to a question. Time is allotted for partial completion of their responses. When the time is up, they exchange their partially completed response with another pair. Students are provided time to finish, modify, add to, or change it as they deem necessary. Pairs then group to give feedback to each other on the modifications.	What are the phases of the moon? Can sound travel through a solid? What is the difference between temperature and humidity? Are science tools helpful? How can you measure matter?
A Picture Tells a Thousand Words	*A Picture Tells a Thousand Words* is a technique where students are digitally photographed during an inquiry-based activity or investigation. They are given the photograph and asked to describe and annotate what they were doing and learning in the photo. Images can be used to spark student discussions, explore new directions in inquiry, and probe their thinking as it relates to the moment the photograph was taken.	

Strategy Name	Description	Additional Information
Question Generating	*Question Generating* is a technique that switches roles from the teacher as the question generator to the student as the question generator. The ability to formulate good questions about a topic can indicate the extent to which a student understands ideas that underlie the topic. This technique can be used any time during instruction. Students can exchange or answer their own questions, revealing further information about the students' ideas related to the topic.	**Question Generating Stems:** • Why does_ _? • How does_ _? • What if___? • What could be the reason for___? • What would happen if _? • How does _compare to _? • How could we find out if___?
Sticky Bars	*Sticky Bars* is a technique that helps students recognize the range of ideas that students have about a topic. Students are presented with a short answer or multiple-choice question. The answer is anonymously recorded on a Post-it note and given to the teacher. The notes are arranged on the wall or whiteboard as a bar graph representing the different student responses. Students then discuss the data and what they think the class needs to do in order to come to a common understanding.	
Thinking Logs	*Thinking Logs* is a strategy that informs the teacher of the learning successes and challenges of individual students. Students choose the thinking stem that would best describe their thinking at that moment. Provide a few minutes for students to write down their thoughts using the stem. The information can be used to provide interventions for individuals or groups of students as well as match students with peers who may be able to provide learning support.	• I was successful in… • I got stuck… • I figured out… • I got confused when…so I… • I think I need to redo… • I need to rethink… • I first thought…but now I realize… • I will understand this better if I… • The hardest part of this was… • I figured it out because… • I really feel good about the way…
Think-Pair-Share	*Think-Pair-Share* is a technique that combines thinking with communication. The teacher poses a question and gives individual students time to think about the question. Students then pair up with a partner to discuss their ideas. After pairs discuss, students share their ideas in a small-group or whole-class discussion. (Kagan) NOTE: Varying student pairs ensures diverse peer interactions.	

Strategy Name	Description	Additional Information
Traffic Light Cups	*Traffic Light Cups* is a monitoring strategy that can be used at any time during instruction to help teachers gauge student understanding. The colors indicate whether students have full, partial, or minimal understanding. Students are given three different-colored cups, asked to self-assess their understanding about the concept or skill they are learning, and display the cup that best matches their understanding.	
Two-Minute Paper	*Two-Minute Paper* is a quick way to collect feedback from students about their learning at the end of an activity, field trip, lecture, video, or other type of learning experience. Teacher writes two questions on the board or on a chart to which students respond in two minutes. Responses are analyzed and results are shared with students the following day.	• What was the most important thing you learned today? • What did you learn today that you didn't know before? • What important question remains unanswered for you? • What would help you learn better tomorrow?
Two Stars and a Wish	*Two Stars and a Wish* is a way to balance positive and corrective feedback. The first sentence describes two positive commendations for the student's work. The second sentence provides one recommendation for revision. This strategy could be used teacher-to-student or student-to-student.	
3-2-1	*3-2-1* is a technique that provides a structured way for students to reflect upon their learning. Students respond in writing to three reflective prompts. This technique allows students to identify and share their successes, challenges, and questions for future learning. Teachers have the flexibility to select reflective prompts that will provide them with the most relevant information for data-driven decision making.	**Sample 1** • **3 – Three** key ideas I will remember • **2 – Two** things I am still struggling with • **1 – One** thing that will help me tomorrow **Sample 2**

Florida Statewide Science Assessment (SSA) Information

Content Breakdown by Benchmark							
Nature of Science		Earth and Space Science		Physical Science		Life Science	
19% of SSA		27% of SSA		27% of SSA		27% of SSA	
8.N.1.1	**7.N.1.5**	**8.E.5.3**	**7.E.6.4**	**8.N.1.1**	**7.N.1.5**	**8.E.5.3**	**7.E.6.4**
6.N.1.1	7.N.3.2	8.E.5.1	7.E.6.3	6.N.1.1	7.N.3.2	8.E.5.1	7.E.6.3
6.N.1.3	8.N.1.5	8.E.5.2	**7.E.6.5**	6.N.1.3	8.N.1.5	8.E.5.2	**7.E.6.5**
7.N.1.1	E.5.10	**8.E.5.5**	7.E.6.1	7.N.1.1	E.5.10	**8.E.5.5**	7.E.6.1
7.N.1.3	**6.N.2.2**	8.E.5.6	7.E.6.7	7.N.1.3	**6.N.2.2**	8.E.5.6	7.E.6.7
7.N.1.4	7.N.1.6	**8.E.5.7**	**6.E.7.4**	7.N.1.4	7.N.1.6	**8.E.5.7**	**6.E.7.4**
8.N.1.3	7.N.1.7	8.E.5.4	6.E.7.2	8.N.1.3	7.N.1.7	8.E.5.4	6.E.7.2
8.N.1.4	7.N.2.1	8.3.5.8	6.E.7.3	8.N.1.4	7.N.2.1	8.3.5.8	6.E.7.3
7.N.1.2	8.N.1.6	**8.E.5.9**	6.E.7.6	**7.N.1.2**	8.N.1.6	**8.E.5.9**	6.E.7.6
6.N.1.2	**7.N.3.1**	**7.E.6.2**	6.E.7.9	6.N.1.2	**7.N.3.1**	**7.E.6.2**	6.E.7.9
6.N.1.4	6.N3.1	6.E.6.1	**6.E.7.5**	6.N.1.4	6.N3.1	6.E.6.1	**6.E.7.5**
8.N.1.2	8.N.3.2	6.E.6.2	6.E.7.1	8.N.1.2	8.N.3.2	6.E.6.2	6.E.7.1
		7.E.6.6				7.E.6.6	

Item Cognitive Complexity		
Low	Moderate	High
10-20%	60-80%	10-20%
Duration and Length		
Sessions	Total Time	Total Items
2	160 minutes	60-66

Recommendations for success on the Statewide Science Assessment:

1. **Use frequent formative assessment of measurement topics**
2. **Instruction should be at the same level of rigor as the learning targets in the curriculum map.**

Glossary of Terms

This Scope & Sequence has been developed by teachers for ease of use during instructional planning.

Terminology found within the framework of the curriculum map is defined below.

Next Generation Sunshine State Standards (NGSSS): a set of content and process science standards that define with specificity what teachers should teach and students should know and be able to do; adopted by the Florida State Board of Education in 2008

NGSSS Body of Knowledge: the broadest organizational structure used to group content and concepts within the curriculum map and include the following: Nature of Science, Earth Science, Physical Science and Life Science (also known as *Reporting Category*)

Standard/Big Idea: an overarching organizational structure used to describe the scope of a selected group of benchmarks; *for example, The Characteristics of Science Knowledge, Earth Systems and Patterns, Forms of Energy, and Interdependence*

Unit of Study: an overarching organizational sub-structure comprised of a collection of topics used to group content and concepts for a narrower focus

Topics: a grouping of benchmarks and skills that form a subset of scientific concepts covered in each unit of study

Benchmarks: the required NGSSS expectations presented in the course descriptions posted on CPALMS by FLDOE

Learning Targets/Skills: the content knowledge, processes, and enabling skills that will ensure successful mastery of the benchmarks

Vocabulary: the content terminology and other academic language and phrases that support mastery of the learning targets and skills; for teacher- and student-use alike

Prerequisite Learning: the benchmarks assigned to previous grade levels that support learning within the current grade level

Pacing: a recommendation of time frames for initial delivery of instruction and assessment

Teacher Hints: a listing of considerations when planning for instruction; may include suggestions or ideas for review

Resource Alignment: a listing of available, high quality and benchmark-aligned materials including labs, strategies, lessons, and videos from textbook and other media sources

Formative Assessment Strategies: techniques that can be used before, during, and after instruction to evaluate student learning

The District Math & Science Dept. recommends that ALL students engage in hands-on science experiences DAILY.