Middle School
6th grade Earth/Space Science

Instructional Plan

Seminole County Public Schools
Dept of Teaching and Learning

2012-2013

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Instructional Plan for Middle School
6th grade Earth/Space Science

This Instructional Plan has been designed to support a common scope and sequence of classroom instruction while allowing teachers to exercise their creativity when generating lessons.

Explanation of contents

NGSSS Standards: these are the Next Generation Sunshine State Standards as mandated by the Florida DOE to be covered during the course

Common Core Standards: these are the national standards that have been adopted by Florida for Math and Language Arts. Every science course has a few Common Core standards from both content areas embedded. These standards will not be assessed during the science course, but should be infused throughout as part of best practices.

Essential Questions: these questions were selected/created to address the core concepts of each unit; a student who is able to answer the essential questions with confidence and accuracy, will have mastered the benchmarks in the unit

Symbols:

This symbol links an Earth Science benchmark with a supporting Life Science or Physical Science benchmark. These supporting benchmarks are to be introduced and not assessed for mastery as they will be covered more thoroughly in future grades

This symbol indicates a benchmark which has a Common Lab associated with it. Common Labs were gathered/developed by the curriculum writing group and should be a part of every 6th grade science student's experience.

Concepts: shorthand reference to the content covered in the indicated benchmarks to help teachers understand the focus of the unit in a glance

DOE Vocabulary: these words are to be included in FCAT 2.0 items and will not be assessed directly but are assumed to be part of the students' working vocabulary.

Textbook references: relate to Pearson Interactive Science: Earth Science, Adopted 2010

Lab Component Definition from FLDOE:

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).

Instructional Practices suggested by FLDOE:

Teaching from a range of complex text is optimized when teachers in all subject areas implement the following strategies on a routine basis:

1. Ensuring wide reading from complex text that varies in length.
2. Making close reading and rereading of texts central to lessons.
3. Emphasizing text specific complex questions, and cognitively complex tasks, reinforce focus on the text and cultivate independence.
4. Emphasizing students supporting answers based upon evidence from the text.
5. Providing extensive research and writing opportunities (claims and evidence).

Common Core Math and Language Arts Standards for 6th Grade Earth/Space Science

(should be included throughout the year, infused in lessons, but not assessed separately)

LACC.68.RST.1.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

LACC.68.RST.2.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

LACC.68.RST.3.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

LACC.68.RST.4.10: By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

LACC.68.WHST.1.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

LACC.68.WHST.3.9: Draw evidence from informational texts to support analysis reflection, and research.

MACC.6.SP.2.4: Display numerical data in plots on a number line, including dot plots, histograms, and box plots

MACC.6.SP.2.5: Summarize numerical data sets in relation to their context, such as by:

a. Reporting the number of observations.
b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

6th grade Earth Science

Unit #1: Nature of Science	**1st Nine Weeks**	**Time Frame: 3-4 weeks**

Essential Questions
How do scientists investigate the natural world?
How does scientific knowledge change?

NGSSS Benchmarks (with Complexity Level)	**Concepts**	**DOE Vocabulary**
SC.6.N.1.1 Define a problem from the 6th grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observation or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (H)	Scientific Processes (formerly Scientific Method)	Analyze Conclusion Control group Controlled variable Data Empirical evidence Experiment Hypothesis Inference Investigation Observation Outcome variable Predict Repetition Replication Systematic observations Testable Test variable Trials Valid Variable ***Additional vocabulary within the chapter**
SC.6.N.1.2 Explain why scientific investigations should be replicable (H)	Experiments must be replicable	
SC.6.N.1.3 Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each (H)	Experiment vs Investigation	
SC.6.N.1.4 Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation (H) **Liquid Layers Lab**	Discuss and Compare results	
SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments but also in creating explanations that fit evidence (M)	Science involves creativity and evidence	
SC.6.N.2.1 Distinguish science from other activities involving thought (M)	Science vs other thought	

Textbook references	Chapters 1 and 2
Ancillary Materials	Changing Pitch (pp. 14-22, Labs), Planning an Experiment (pg. 12, Labs), Graphs and Predictions (pg. 11, Labs), Practicing Scientific Inquiry (pg 13, Labs), Scientific Discovery (pg. 27, Labs)
Optional Extensions	Significant figures, percent error

Science Projects	**Each Nine Weeks**	**Time Frame: 1wk**
(this Unit can be used as needed for Science Fair or other projects)		

Essential Questions
How do scientists investigate the natural world?
How does scientific knowledge change?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.6.N.1.1 Define a problem from the 6th grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observation or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions. (H)	Scientific Processes (formerly Scientific Method)	Analyze Conclusion Control group Controlled variable Data Empirical evidence Experiment Hypothesis Inference Investigation Observation Outcome variable Predict Repetition Replication Systematic observations Testable Test variable Trials Valid Variable
SC.6.N.1.3 Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each (H)	Experiment vs Investigation	
SC.6.N.1.4 Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation (H)	Discuss and Compare results	
SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments but also in creating explanations that fit evidence (M)	Science involves creativity and evidence	

Unit #2: Geologic Time	**1st Nine Weeks**	**Time Frame: 1-2 weeks**

Essential Questions

How do scientists study Earth's past?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.7.E.6.3 Identify current methods for measuring the age of Earth and its parts, including the Law of Superposition and radioactive dating (M)	Measuring the Age of the Earth	Empirical Evidence Law Model Theory
SC.7.E.6.4 Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes (H)	Physical Evidence of Earth's Evolution	
SC.7.L.15.1 Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species (M)	Fossil Evidence (Physical Evidence)	
SC.7.L.15.2 Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms (H)	Natural Selection (Physical Evidence)	
SC.7.L.15.3 Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species (H)	Species Adaptation (Physical Evidence)	
SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered (M)	Science is durable and changeable	
SC.6.N.3.2 Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus scientific laws are different from societal laws (M)	Law describes a relationship (Law of Superposition)	
SC.6.N.3.3 Give several examples of scientific laws (L)	Examples of Laws (Law of Superposition)	
SC.6.N.3.4 Identify the role of models in the context of the 6th grade science benchmarks (M)	Role of models	***Additional vocabulary within the chapter**

Textbook references	Chapter 8
Ancillary Materials	Its the Law (pg 34, Labs), How Long Till Its Gone (pg 188, Labs), How Old is It (pg. 191, Labs), Going Back in Time (pg. 193, Labs), A Journey Back in Time (pp 255-259, Projects)
Optional Extensions	Radioactive decay and half-life (will be covered in 8th grade)

Unit #3: Earth's Layers and Landforms	**1st Nine Weeks**	**Time Frame: 2 weeks**
Essential Questions What is the structure of the Earth?		

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.7.E.6.1 Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores (M)	Layers of the Earth	Infiltration Model Percolation Temperature
SC.7.P.11.1 Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state (L)	Heat changes state (Layers)	
SC.6.E.6.2 Recognize that there are a variety of landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida (M)	Landform variety (esp as related to FL)	
SC.6.N.3.4 Identify the role of models in the context of the 6th grade science benchmarks (M)	Role of Models	***Additional vocabulary within the chapter**

Textbook references	Chap 7 (Section 1 and 2 only), Chapter 13 (Section 2 only)
Ancillary Materials	
****Key Changes****	This unit is new for the 2012-2013 school year (these benchmarks were previously taught within larger units)

Unit #4: Rock Cycle and Erosion	**2nd Nine Weeks**	**Time Frame: 2 wks**

Essential Questions
What processes break down rock?
What processes shape the surface of the land?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.7.E.6.2 Identify the patterns within the Rock Cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building) (H)	Rock cycle	Erosion Fault Fold Igneous rock Metamorphic rock Model Physical change Sedimentary rock Temperature Weathering
SC.8.P.9.2 Differentiate between physical changes and chemical changes (M)	Physical and Chemical Changes	
SC.8.P.8.3 Explore and describe the densities of various materials through measurement of their masses and volumes (M)	Density (Rock cycle)	
SC.8.P.8.4 Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample (M)	Physical Properties (Rock Cycle)	
SC.6.E.6.1 Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition (M) **Weathering Rocks Lab**	Weathering, Erosion, Deposition	
SC.8.P.9.2 Differentiate between physical changes and chemical changes (M)	Physical and Chemical Changes (Weathering/Erosion)	
SC.8.P.8.4 Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample (M)	Physical Properties (Weathering)	
SC.6.N.3.4 Identify the role of models in the context of the 6th grade science benchmarks (M)	Role of Models	***Additional vocabulary within the chapter**

Textbook references	Chapter 7 (Sect 6), Chapters 13 (Sect 1 only) and 14
Ancillary Materials	
****Key Changes****	This unit will be taught before Plate Tectonics for 2012-2013
Optional Extensions	Rock identification (Chap 7 Sect 3-5),

Unit #5: Plate Tectonics	**2nd Nine Weeks**	**Time Frame: 2-3 wks**

Essential Questions

How do moving plates change Earth's crust?

How does a volcano erupt?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.7.E.6.5 Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building (M) **Snack Tectonics Lab**	Plate tectonics cause slow and rapid changes Earthquakes and Volcanoes	Fault Fold Model Theory
SC.7.E.6.7 Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins (M)	Heat flow within the Earth Earthquakes and Volcanoes	
SC.6.E.7.1 Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system (M)	Conduction, Convection	
SC.7.P.11.4 Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature (M)	Predictable Heat flow (Conduction, Convection)	
SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments but also in creating explanations that fit evidence (M)	Science involves creativity and evidence	
SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered (M)	Science is durable and changeable	
SC.6.N.2.3 Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals (L)	Scientists are diverse	
SC.6.N.3.1 Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life. (M)	Theories are supported (Plate tectonics)	***Additional vocabulary within the chapter**

Textbook references	Chapter 9 (all), 10 (Sect 1 & 2 only)
Ancillary Materials	
****Key Changes****	This unit will be taught after Rocks and Erosion for 2012-2013
Optional Extensions	Volcano types (Chap 10, Sect 3), Earthquake types and locations (Chap 11)

Unit #6: Hydrosphere and Interactions	**2nd- 3rd Nine Weeks**	**Time Frame: 2-3 wks**
(Water Cycle should be taught the first few days of 3rd nine weeks)		

Essential Questions

How do the spheres interact with and affect each other?

How does the water cycle affect weather?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.6.E.7.4 Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere. (H)	Earth's Interactions	Evaporation Humidity Infiltration Law Model Percolation Precipitation Temperature Water Cycle Water vapor
SC.6.E.7.1 Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system (M) **Popcorn Lab**	Radiation, Convection	
SC.7.P.11.4 Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature (M)	Predictable heat flow (Radiation, Convection)	
SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate (H)	Water Cycle	
SC.7.P.11.1 Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state (L)	Heat changes state (Water Cycle)	
SC.7.P.11.3 Cite evidence that energy cannot be created nor destroyed, only changed from one form to another (H)	Law of Conservation of Energy (Water Cycle)	
SC.6.N.3.2 Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus scientific laws are different from societal laws (M)	Law describes relationship (Law of Conservation of Energy)	
SC.6.N.3.3 Give several examples of scientific laws (L)	Examples of Laws (Law of Conservation of Energy)	
SC.6.N.3.4 Identify the role of models in the context of the 6th grade science benchmarks (M)	Role of Models	***Additional vocabulary within the chapter**

Textbook references	Chapter 15 (Sect 1 & 2 only), Chapter 17 (Sect 1 only)
Ancillary Materials	
****Key Changes****	The interactions between spheres has been added to this unit to allow for more indepth discussions
Optional Extensions	N/A

Unit #7: Weather and Atmosphere — 3rd Nine Weeks — Time Frame: 6-7 wks

Essential Questions

What is the composition of Earth's atmosphere?
What are the 4 main layers of the atmosphere?
What factors affect the weather?
What factors affect Earth's climate?

NGSSS Benchmarks (with Complexity Level)	Concepts	DOE Vocabulary
SC.6.E.7.9 Describe how the composition and structure of the atmosphere protects life and insulates the planet. (M)	Composition and Structure of the Atmosphere (intro)	Climate Condensation Ecosystem Empirical evidence Environment Evaporation Hemisphere Humidity Model Polar zone Precipitation Temperate zone Temperature Tropical zone Weather ***Additional vocabulary within the chapter**
SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment. (H)	Carbon Cycle (Composition of Atmosphere)	
SC.7.P.10.2 Observe and explain that light can be reflected, refracted, and/or absorbed. (H)	Movement of Light (Structure of atmosphere)	
SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate. (H)	Water cycle's effect on weather and climate	
SC.6.E.7.3 Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation. (H)	Global weather patterns	
SC.6.E.7.5 Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land(H)	Solar energy	
SC.7.P.10.1 Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors. (L)	Solar radiation	
SC.6.E.7.6 Differentiate between weather and climate. (M)	Weather vs climate	
SC.6.E.7.7 Investigate how natural disasters have affected human life in Florida. (H)	Natural Disasters	
SC.6.N.1.3 Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each. ((H)	Experiment vs investigation	
SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence. (M)	Science involves creativity and evidence	
SC.6.N.3.4 Identify the role of models in the context of the sixth grade science benchmarks. (M)	Role of Models	

Textbook references	Chapter 15 (Sect 3-6), Chapter 16 (Sect 3 & 4 only), Chapter 17 (sect 2, 4, and 5 only)
Ancillary Materials	Pg 313, 314, 316, 362 Labs
****Key Changes****	This unit combines the Weather and Upper Atmosphere units for 2012-2013
Optional Extension	Clouds and Weather forecasting (Chapter 16, Sect 1,2,5), details about Climate types (Chapter 17, Sect 3)

Unit #8: Human Impact	**3rd Nine Weeks**	**Time Frame: 1-2 wks**

Essential Questions
How do people use Earth's resources?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. (M)	Human Impact	Behavior Climate Ecosystem Empirical evidence Endangered species Environment Erosion Extinct species Soil Technology Weathering ***Additional vocabulary within the chapter**
SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites. (H)	Limiting Factors (Human Impact)	
SC.8.L.18.3 Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment. (H)	Carbon Cycle (Human Impact)	
SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence. (M)	Science involves creativity and evidence	
SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered (M)	Science is durable and changeable	
SC.6.N.2.3 Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals(L)	Scientists are diverse	

Textbook references	Chapter 17 Section 6, Chapter 12 (except Sect 6)
Ancillary Materials	pg 247, 250-251 Labs
Optional Extensions	N/A

Unit #9: Human Technology	**3rd Nine Weeks**	**Time Frame: 1 wk**

Essential Questions

How does exploring space benefit people on Earth?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.8.E.5.10 Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information. (H)	Technology is used for data collection	Astronomical Unit Data Inference Light-year Model Observation Technology *__Additional vocabulary within the chapter__
SC.8.E.5.12 Summarize the effects of space exploration on the economy and culture of Florida. (M)	Effects of space exploration on FL	
SC.6.N.2.1 Distinguish science from other activities involving thought (M)	Science vs other thought	
SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered (M)	Science is durable and changeable	
SC.6.N.2.3 Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals (L)	Scientists are diverse	
SC.6.N.3.4 Identify the role of models in the context of the sixth grade science benchmarks. (M)	Role of models	

Textbook references	Chapter 6 (except Sect 4)
Ancillary Materials	Which tool would you use in space? (pg 218, Labs), What do you need to survive in space? (pg 223, Labs)
****Key Changes****	This unit has been moved to the 3rd nine weeks for 2012-2013, technology discussion does not have to be exclusively space related
Optional Extensions	Sect 4 will be covered in 8th grade, teachers can include in 6th grade if desired

Unit #10: Solar System	**4th Nine Weeks**	**Time Frame: 2 wks**

Essential Questions

Why are objects in the solar system different from each other?

How do Earth, the moon, and the Sun interact?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.8.E.5.8 Compare various historical models of the Solar System, including geocentric and heliocentric. (M)	Models of the Solar System	Asteroid Astronomical unit Comet Dwarf planet Mass Model Moon Planet Revolution Rotation Solar system Weight *__Additional vocabulary within the chapter__
SC.8.E.5.3 Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, incl distance, size, and composition. (H)	Relationships between objects	
SC.8.E.5.7 Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions. (M)	Properties of objects in solar system	
SC.8.P.8.2 Differentiate between weight and mass recognizing that weight is the Amount of gravitational pull on an object and is distinct from, though proportional to, mass. (M)	Weight vs mass (Properties of objects)	
SC.8.E.5.9 Explain the impact of objects in space on each other including: the Sun on the Earth including seasons and gravitational attraction and the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body. (H) **Moon Phases Lab**	Sun-Earth-Moon system	
SC.6.N.2.1 Distinguish science from other activities involving thought (M)	Science vs other thought	
SC.6.N.2.2 Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered (M)	Science is durable and changeable	
SC.6.N.3.4 Identify the role of models in the context of the 6th grade science benchmarks (M)	Role of models	

Textbook references	Chapter 4 and Chapter 5
Ancillary Materials	pg 53, 54, 55, 98 Labs
Optional Extensions	Detailed characteristics of the planets (Sections 3 and 4), Kepler's Law (pg 171)

Unit #11: Sun and Stars	**4th Nine Weeks**	**Time Frame: 2-3 wks**

Essential Questions

What astronomical objects exist in the universe?

NGSSS Benchmarks **(with Complexity Level)**	**Concepts**	**DOE Vocabulary**
SC.8.E.5.4 Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions. (H)	Gravity's role	Astronomical Unit Law Light-year Mass Model Nebula Temperature Star Technology
SC.6.P.13.2 Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are. (L)	Law of Universal Gravitation (Gravity's role – no equation)	
SC.8.E.5.1 Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance. (M)	Distances in universe	
SC.8.E.5.2 Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars. (L)	Galaxies and stars	
SC.8.E.5.5 Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absol. bright.). (M)	Properties of stars	
SC.7.P.10.3 Recognize that light waves, sound waves, and other waves move at different speeds in different materials. (L)	Waves in media (Properties of stars)	
SC.8.E.5.6 Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences. (L)	Sun's properties	
SC.7.P.10.1 Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors. (L)	Sun's radiation (Sun's properties)	
SC.6.N.3.2 Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus scientific laws are different from societal laws (M)	Law describes relationship (Universal Gravitation)	
SC.6.N.3.3 Give several examples of scientific laws (L)	Examples of Laws (Universal Gravitation)	***Additional vocabulary within the chapter**
SC.6.N.3.4 Identify the role of models in the context of the 6th grade science benchmarks (M)	Role of models	

Textbook references	Chapter 3
Ancillary Materials	Planets and Other Stars (pg 51, Labs), How far is that star? (pg 48-50, Labs), Interpreting the HR Diagram (pg. 67, Labs)
Optional Extensions	Types of galaxies (pg 100-101), Newton's first law (pg 104), details of Lives of Stars (Sect 5)

6th Grade Earth/Space Science Advanced (should be included if course is coded as Advanced, they should extend existing required content)	
Additional Benchmark	**Related Std Level Benchmark**
SC.912.E.5.4: Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.	SC.8.E.5.6 (Unit 11)
SC.912.E.6.1: Describe and differentiate the layers of Earth and the interactions among them.	SC.7.E.6.1 (Unit 3)
SC.912.E.6.2: Connect surface features to surface processes that are responsible for their formation.	SC.6.E.6.1 (Unit 3)
SC.912.E.6.3: Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.	SC.7.E.6.5 (Unit 5)
SC.912.E.7.3: Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.	SC.6.E.7.4 (Unit 6)
SC.912.E.7.5: Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.	SC.6.E.7.3 (Unit 7)
SC.912.E.7.6: Relate the formation of severe weather to the various physical factors.	SC.6.E.7.7 (Unit 7)