Course – Grade 6 Science
Unit # 3 Earth and Space Science

Grade 6
Unit # 3 Earth and Space Science
Unit # 3 February 26, 2018 – June 15, 2018
*** Timeframe accounts for Spring Break and NYSED ELA and MATH Testing**

Chapters 9, 10, 11, and 12

- Section 1 Weather and Climate
- Section 2 Earth's Systems
- Section 3 Space Systems

Chapter 9 – 15 days
Chapter 10 – 24 days
Chapter 11– 28 days
Chapter 12 – 20 days

DBA # 3 – Earth and Space Science – 06.16.18-06.21.18

Unit Overview: Students will understand and apply scientific concepts, principles and theories pertaining to Earth and Space Science and recognize the historical development /multicultural involvement of the ideas in science. Main ideas include: How the Sun's energy affects Earth's atmosphere; Predicting weather; Earth, Moon, and Sun interactions; and the variety of objects in the solar system.

NYSSLS Performance Expectations MS

Section 1: Weather and Climate

MS-ESS2-5. **Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.** [Clarification Statement: Emphasis is on how air flows from regions of high pressure to low pressure, the complex interactions at air mass boundaries, and the movements of air masses affect weather (defined by temperature, pressure, humidity, precipitation, and wind at a fixed location and time). Emphasis is on how weather can be predicted within probabilistic ranges. Data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [Assessment Boundary: Assessment includes the application of weather data systems but does not include recalling the names of cloud types, weather symbols used on weather maps, the reported diagrams from weather stations, or the interrelationship of weather variables.]

MS-ESS2-6. **Develop and use a model to describe how unequal heating and rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.** [Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis is on the sunlight-driven latitudinal banding causing differences in density that create convection currents in the atmosphere, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the coastlines of continents. Examples of models could include diagrams, maps and globes, or digital representations.] [Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.]

Section 2: Earth's Systems

MS-ESS2-4. **Develop a model to describe the cycling of water through Earth's systems driven by energy from the Sun and the force of gravity.** [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models could include conceptual or physical models.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.]

Section 3: Space Systems

MS-ESS1-1. **Develop and use a model of the Earth-Sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and moon, and seasons.** [Clarification Statement: Examples of models could include physical, graphical, or conceptual models.]

MS-ESS1-2. **Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.** [Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models could include physical models (such as a model of the solar system scaled using various measures or computer visualizations of elliptical orbits) or conceptual models (such as mathematical proportions relative to the size of familiar objects such as students' school or state).] [Assessment Boundary: Assessment does not include Kepler's Laws of orbital motion or the apparent retrograde motion of the planets as viewed from Earth.]

MS-ESS1-3. **Analyze and interpret data to determine scale properties of objects in the solar system.** [Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of scale properties could include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), and orbital radius. Examples of data could include statistical information, drawings and photographs, and models.] [Assessment Boundary: Assessment does not include recalling facts about properties of the planets and other solar system bodies.]

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Section 1 Weather and Climate		

Grade 6 Unit 3 Earth and Space Science

Asking Questions and Defining Problems • Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5) Developing and Using Models • Develop and use a model to describe phenomena. (MS-ESS2-6) Planning and Carrying Out Investigations ● Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5)	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Variations in desnity due tovariations in temperture and salinity dirve a global pattern of ineronnected ocean currents. (MS-ESS2-6) **ESS2.D: Eather And Climate** • Weather and climate are influced by interactions involoving sunlight, the ocean, the atmopshere, ice, landorms, and living things. These interactions ary with latitude, altitude, and local and regional geogrpahy, all of which can affect oceanic and atmospheric flow patters. (MS-ESS2-6) ● Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)	Cause and Effect • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) Systems and System Models ● Models can be used to represent systems and their interactions-such as inputs, processes and outputs-and energy, matter, and information flows within systems. (MS-6
Section 2 Earth's Systems		
Developing and Using Models ● Develop a model to describe unobservable mechanisms (MS-ESS2-4)	**ESS2.C: The roles of water in earth's surface Processes** • Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation, and crystallization, and precipitations, as well as downhill lows on land. (MS-ESS2-4) ● Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)	Energy and Matter ● Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)
Section 3 Space Systems		
Developing and Using Models • Develop and use a model to describe phenomena. (MS-ESS1-1) (MS-ESS1-2) Analyzing and Interpreting Data ● Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3)	**ESS1.A: The Universe and Its Stars** • Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) • Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2) **ESS1.B: Earth and the Solar System** • The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-1) (MS-ESS1-3) • The model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. the seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1) ● The solar system appears to have formed form a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)	Patterns • Patterns can be used to identify cause and effect relationships. (MS-ESS1-1) Scale, Proportion, and Quantity • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3) Interdependence of Science, Engineering, and Technology ● Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. (MS-ESS1-3)

Common Core State Standards Connections:

ELA/Literacy –

Section 1 – Weather and Climate

Common Core State Standards Connections:

ELA/Literacy –

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5),(MS-ESS3-5)
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-5)
WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. *(MS-ESS2-5)*
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS2-6)*
Mathematics –	
MP.2	Reason abstractly and quantitatively. (MS-ESS2-5),*(MS-ESS3-5)*
6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5)
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. *(MS-ESS3-5)*
7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS3-5)*

Section 2 – Earth's System

Common Core State Standards Connections:

ELA/Literacy –

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS3-1)
WHST.6-8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS3-1)
WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research. (MS-ESS3-1)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS2-1)*
Mathematics –	
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. *(MS-ESS3-1)*
7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS3-1)*

Section 3 – Space System

Common Core State Standards Connections:

ELA/Literacy –

RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3)
RST.6-8.7	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). (MS-ESS1-3)
SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-ESS1-1),(MS-ESS1-2)*
Mathematics –	
MP.2	Reason abstractly and quantitatively. (MS-ESS1-3)
MP.4	Model with mathematics. *(MS-ESS1-1),(MS-ESS1-2)*
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *(MS-ESS1-1),(MS-ESS1-2).*(MS-ESS1-3)
7.RP.A.2	Recognize and represent proportional relationships between quantities. *(MS-ESS1-1),(MS-ESS1-2).*(MS-ESS1-3)
6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. *(MS-ESS1-2)*
7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS1-2)*

Essential Questions/Big Questions

1. How does the sun's energy affect Earth's atmosphere?
2. How does meteorologist predict the weather?
3. Why are objects in the solar system different from each other?

Resources

Pearson Interactive Science Book Chapters 9-12

PearsonRealize.com

Possible team kit use

Pearson Lab materials

http://ngss.nsta.org/Classroom-Resources.aspx

http://newyorkscienceteacher.com/sci/

Chapter 9 The Atmosphere

Content Vocabulary

Lesson 4: electromagnetic waves, radiation, infrared radiation, ultraviolet radiation, scattering, greenhouse effect

Lesson 5: temperature, thermal energy, thermometer, heat, convection, conduction, convection currents

Lesson 6: wind, anemometer, wind chill factor, local winds, sea breeze, land breeze, global winds, Coriolis effect, latitude

Scenario Investigation
- Mile High Baseball

Lesson 1 SKIP
Lesson 2 SKIP
Lesson 3 SKIP

Lesson 4
Skills
- Reading: Ask Questions
- Inquiry: Graph

Lab Zone
- Inquiry Warm up – Does a Plastic Bag Trap Heat?
- Quick Lab – How Does the Sun's Energy Reach Earth?
- Teacher Demo – Absorption of Heat
- Quick Investigation – Heating Earth's Surface

Assess Your Understanding
- Pages 395, 399

Lesson 5
Skills
- Reading: Identify the Main Idea
- Inquiry: Infer

Lab Zone
- Inquiry Warm up – What Happens When Air is Heated?
- Quick Lab – Measuring Temperature
- Quick Lab – Temperature and Height

Assess Your Understanding
- Pages 401, 403

Lesson 6
Skills
- Reading: Identify Supporting Evidence
- Inquiry: Draw Conclusions

Lab Zone
- Inquiry Warm up – Does the Wind Turn?
- Quick Lab –Build a Wind Vane
- Quick Lab – Modeling Global Wind Belts

Assess Your Understanding
- Pages 406, 411

Chapter 10 Weather

Content Vocabulary
Lesson 1: water cycle, evaporation, condensations, humidity, relative humidity, psychomotor
Lesson 2: dew point, cirrus, cumulus, stratus
Lesson 3: precipitation, rain gauge, flood, drought
Lesson 4: air mass, tropical, polar, maritime, continental, jet stream, front, occluded, cyclone, anticyclone
Lesson 5: storm, thunderstorm, lightning, hurricane, storm surge, tornado, evacuate
Lesson 6: meteorologist, isobar, isotherm

Scenario Investigation
- Predicting the Weather is no Sport

Grade 6 Unit 3 Earth and Space Science

Lesson 1

Skills

- Reading: Sequence
- Inquiry: Interpreting Data

Lab Zone

- Inquiry Warm up – Where did the Water Go?
- Quick Lab – Water in the Air
- Quick Lab – Measuring to Find the Dew Point

Assess Your Understanding

- Pages 425, 427

Lesson 2

Skills

- Reading: Summarize
- Inquiry: Predict

Lab Zone

- Inquiry Warm up – How Does Fog Form?
- Quick Lab – How Clouds Form
- Quick Lab – Identifying Clouds

Assess Your Understanding

- Pages 429, 431

Lesson 3

Skills

- Reading: Relate Cause and Effect
- Inquiry: Calculate

Lab Zone

- Inquiry Warm up – How Can We Make Hall?
- Quick Lab – Types of Precipitation
- Quick Lab – Floods and Droughts

Assess Your Understanding

- Pages 435,437

Lesson 4

Skills

- Reading: Relate Text and Visuals
- Inquiry: Classify

Lab Zone

- Inquiry Warm up – How Do Fluids of Different Densities Move?
- Quick Lab – Tracking Air Masses
- Teacher Demo – Modeling Front Formation
- Quick Lab – Water Fronts
- Quick Lab – Cyclones and Anticyclones

Assess Your Understanding

- Pages 441, 443,445

Lesson 5

Skills

- Reading: Outline
- Inquiry: Infer

Lab Zone

- Inquiry Warm up – Can you Make a tornado?

- Teacher Demo – Thunder and Lightning
- Quick Lab – Where do Hurricanes Come from?
- Quick Lab – Storm Safety

Assess Your Understanding
- Pages 453,455

Lesson 6

Skills
- Reading: Compare and Contrast
- Inquiry: Predict

Lab Zone
- Inquiry Warm up – Predicting Weather
- Quick Lab – Modeling Weather Satellites
- Lab Investigation – Reading a Weather Map
- Assess Your Understanding
  - Pages 458, 461

Chapter 11 Earth, Moon, and Sun

Content Vocabulary

Lesson 1: Satellite, planet, meteor, comet, star, constellation
Lesson 2: axis, rotation, revolution, orbit, calendar, solstice, equinox
Lesson 4: phase, eclipse, solar eclipse, umbra, penumbra, lunar eclipse
Lesson 6: Maria, crater, meteoroid

Scenario Investigation
- Smearing Causes Seasons

Lesson 1

Skills
- Reading: Identify the Main Idea
- Inquiry: Predict

Lab Zone
- Inquiry Warm up – Earth's Sky
- Quick Lab – Observing the Night Sky
- Quick Lab – Watching the Skies

Assess Your Understanding
- Pages 477, 479

Lesson 2

Skills
- Reading: Sequence
- Inquiry: Infer

Lab Zone
- Inquiry Warm up – What Causes Day and Night?
- Teacher Demo – Model Rotation
- Quick Lab – Sun Shadows
- Build Inquiry – Compare and contrast Angles of Sunlight
- Lab Investigation – Reasons for the Seasons

Assess Your Understanding
- Pages 483, 485, 487

Lesson 3 SKIP

Lesson 4
Skills
- Reading: Relate Text and Visuals
- Inquiry: Make Models

Lab Zone
- Inquiry Warm up – How Does the Moon Move?
- Quick Lab – Moon Phases
- Quick Lab – Eclipses

Assess Your Understanding
- Pages 494, 497

Lesson 5 SKIP

Lesson 6
Skills
- Reading: Compare and Contrast
- Inquiry: Develop Hypothesis

Lab Zone
- Inquiry Warm up – Why do Crates Look Different from Each Other?
- Quick Lab – Moon watching

Assess Your Understanding
Page 505

Chapter 12 The Solar System

Content Vocabulary
Lesson 1: geocentric, heliocentric, ellipse
Lesson 2: solar system, astronomical unit, planet, dwarf planet, planetesimal
Lesson 3: core, nuclear fusion, radiation zone, convection zone, photosphere, chromosphere, corona, solar wind, sunspot, prominence, solar flare
Lesson 6: asteroid belt, Kuiper belt, Oort cloud, comet, coma, nucleus, asteroid, meteoroid, meteor, meteorite

STEM Activity
- Life on Mars

Lesson 1
Skills
- Reading: Sequence
- Inquiry: Make Models

Lab Zone
- Inquiry Warm up – What is at the Center?
- Quick Lab – Going Around in Circles
- Build Inquiry – Model the Movements of the Inner Planets
- Teacher Demo – Elliptical Orbits
- Quick Lab – A Loopy Ellipse

Assess Your Understanding
- Pages 521, 523,

Lesson 2
Skills
- Reading: Identify Supporting Evidence
- Inquiry: Calculate

Lab Zone

- Inquiry Warm up – How Big is Earth
- Lab Investigation – Speeding Around the Sun
- Quick Lab – Clumping Planets

Assess Your Understanding
- Pages 527, 529

Lesson 3

Skills
- Reading: Relate Cause and Effect
- Inquiry: Interpret Data

Lab Zone
- Inquiry Warm up – How Can You Safely Observe the Sun
- Teacher Demo – Energy from the Sun
- Quick Lab – Assess Your Understanding
- Quick Lab – Viewing Sunspots

Assess Your Understanding
- Pages 533, 535

Lesson 4 SKIP

Lesson 5 SKIP

Lesson 6

Skills
- Reading: Summarize
- Inquiry: Classify

Lab Zone
- Inquiry Warm up – Collecting Micrometeorites
- Quick Lab – Changing Orbits

Assess Your Understanding
- Pages 557

Higher Level Questions

Chapter 9
- What happens to the sun's energy when it reaches earth?
- Explain how energy is transferred?
- Explain how local winds and global winds differ?

Chapter 10
- Explain Relative humidity and how it is measured.
- Describe the three main types of clouds.
- Explain the cause and effects of floods and droughts.
- Explain what happens when a mass of dense, cold air hits a slower-moving warm air mass.
- Explain how the different types of storm form.
- If you were a meteorologist which part of the job would you enjoy the most and why?

Chapter 11
- Explain why the moon to disappear and then reappear bit by bit.
- Explain how objects in the sky appear to move?
- In which season is there the least daylight? Suppose you lived at the equator, what season would you experience and why?
- As the moon revolves, what happens to the relative positions of the moon, earth, and the sun?
- Explain what the moon is like. (use details)
- How did the Heliocentric model develop?
- What makes up the solar system and how was it formed?

- Explain what happens to the temperature
- of gases s they reach the top of the convection zone?
- How do scientists classify small objects in the solar system?
- How are Earth's rotation and revolution related to the passage of time and change of seasons?
- How would you compare the size the Earth to the size of the Sun?
  How would you describe the appearance of the moon as it changes throughout the month?

Step Up to Writing

SUTW Strategy

Explore Activities

Easy 2-Column Notes

SUTW 4th Edition p. 31
SUTW Tools S1-17a-c

Content Vocabulary

Breaking Down Definitions

SUTW 5th Edition p. 212
SUTW Tools S3-2a-b, S3-1a

STEM Activity

IVF Summary Sentences

SUTW 4th Edition p. 43
SUTW Tools S1-23b

STEM Activity

Four Step Summary Paragraph

SUTW 4th Edition p. 44
SUTW Tools S1-24a-b

Investigate it! and Inquiry:

Color-Coding the Elements of Informative

SUTW 4th Edition p. 268
SUTW Tools S4-1a-b

Elaborate: Science Notebook

Explanatory Writing Informal Outlines

SUTW 4th Edition p. 272
SUTW Tools S4-3a-b, S4-4a,b

Measurement of Student Learning

- Lesson Quiz
- Exam view Assessments
- Performance expectation activities
- Performance assessment
- Review and Assessment
- Assess your Understanding

ELL Enhancements

Grade 6 Unit 3 Earth and Space Science

Listening	**Speaking**	**Reading**	**Writing**	**Accommodations**
Build Background Knowledge Audio	Sentence Frames Academic conversation Starters	Supplementary Texts Visual Aids Video Standards-based questions	Sentence Frames Graphic Organizers Standards-based sentence stems	Extended time Directions read 3x Oral interpretation Translated version of test (may have both English and other) Responses in home language

Special Education Modifications

Instructional	**Assistive technology**	**Assessment:**	
Pre-teach vocabulary Use picture vocabulary Picture examples of safety measures posted Pictures for each category of science Scaffold Depth of Knowledge questions Provide copy of notes/notes in" cloze" form Peer partner Extended time for written tasks/verbal response Break long tasks over multiple days Allow for multiple ways to respond (verbal, written, response board, scribe) Provide mock/model of performance task Model use of graphic organizers (fade until mastery) Modify informational text to shorter passages Provide model of exemplar lab write-up Provide interactive notebook Present complex tasks in multiple ways Model steps to read, interpret, and construct graphs Multiple opportunities to perform to repeat labs Provide advance organizer of class tasks	Computer for lengthy writing tasks Audio textbook Videos to clarify concepts Recording device to record class lecture/discussions **Other** Arrange seating for maximum engagement and minimum distraction Accessible lab space (counter level)	Scaffold written assignments Individual criteria for success Provide with review packet Modify the number of questions Provide model of the task Provide multiple options for project Practice calculating density with sample problem before assessing student.	

Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom
• Materials, resources, and/or discussions address diverse cultural backgrounds and real world applications
• Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population
• All students are given an opportunity to engage in science discourse
• Teacher demonstrates high expectations for all students