



Grade 8 Science – Course 3
Unit 3 – Earth and Space Science
Topic 9 Earth-Sun-Moon System – 16 Days

Unit Overview – The Earth and Space Science unit consists of five topics. In Topic 6 students investigate the history of Earth, Earth’s geologic features, and Earth’s living organisms. Topic 7 focuses on energy flow through Earth’s atmosphere and oceans. Students focus on the impact of natural and human factors on Earth’s climate in Topic 8. Topic 9 explores the effect of the sun and moon on Earth. The formation of celestial bodies, discovery of other planetary systems, and the understanding of the universe is the context of Topic 10.

Topic Essential Question: How does the sun and moon affect Earth?

Lessons

- Topic Launch/Quest Kickoff
- Lesson 1 Movement in Space
- Lesson 2 Earth’s Movement in Space
- Lesson 3 Phases and Eclipses
- Topic Close – Assessment, Quest Findings

NYSSLS Performance Expectations

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.]

Topic Opener

PE: MS-ESS1-1

SEP: Developing and Using Models

DCI

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)

ESS1.B – Earth and the Solar System

- This 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)

CCC: Patterns; Systems, and System Models

Savvas

Highlighted labs are important to the understanding of the instructional concepts in this lesson and must be completed during Science instructional time.

- Topic Readiness Test
- **uConnect Lab – What is at the Center?**
- Quest Kickoff Video – How are tides related to our place in space?

Lesson 1 – Movement in Space

PE:MS-ESS1-1

SEP: Developing and Using Models

DCI:

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)

CCC: Patterns

zSpace Activities (code)**Geocentric vs. Heliocentric Solar System (A014)**

[Geocentric vs. Heliocentric Solar System - Teacher Activity Plan](#)

In this activity, students will learn about two different conceptions of the solar system: the geocentric model developed by the Greek scientist and philosopher Claudius Ptolemy, and the heliocentric model developed by the astronomer Nicolaus Copernicus. Students will build scale models of both systems and give presentations explaining their similarities and differences. Students will recognize these models as a perfect historical example of the nature of science, specifically that scientific knowledge is tentative.,

[Geocentric vs. Heliocentric Solar System - Student Worksheet](#)

[Geocentric vs. Heliocentric Solar System - Student Worksheet GoogleDoc](#)

Savvas**Guiding Objectives:**

- Students will identify objects and constellations visible without a telescope in the night sky.
- Students will develop models to explain the apparent motions of stars and planets throughout the year.
- Students will use models to explain the motion of Earth, other planets, and the sun through space.

Literacy Connection

- Integrate With Visuals

Vocabulary

- | | |
|-------------|-----------------|
| ● satellite | ● constellation |
| ● star | ● geocentric |
| ● planet | ● heliocentric |
| ● meteor | ● ellipse |
| ● comet | |

Academic Vocabulary

- observations

Connect - TE/SB p.428

- Connect It!
- Quest Connection
- Poll – Observation of the Night Sky

Investigate - TE/SB pp.429-435

- **uInvestigate Lab – Watching the Skies***

- Video – Movement in Space
- Interactivity – Evidence in Observations
- Literacy Connection (p.434)
- Reading Check (pp.431; 433)
- Math Toolbox (p.430)

Synthesize - TE/SB pp. 436-437

- Interactivity – Interpreting the Night Sky
- Quest Check-In Interactivity – Tides and Earth's Motion
- Quest Check-In
- Reading Check (p.436)
- Model It! (p.436)

Demonstrate – TE/SB p.437

- Lesson 1 Check
- Lesson Quiz 1

***Denotes accompanying lab video**

Lesson 2 – Earth’s Movement in Space

PE: MS-ESS1-1

SEP: Developing and Using Models

DCI:

ESS1.B – Earth and the Solar System

- This 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)

CCC: Patterns

Lesson 1 – Movement in Space

PE:MS-ESS1-1

SEP: Developing and Using Models

DCI:

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)

CCC: Patterns

Savvas

Guiding Objectives:

- Students will use patterns observed from their model to: Explain what causes the cycle of seasons on Earth; describe how the moon affects the amount of daylight.
- Students will use their model to describe factors that keep the moon and Earth in orbit.

Literacy Connection

- Cite Textual Evidence

Vocabulary

- axis
- rotation
- revolution
- orbit
- solstice
- equinox
- gravity
- law of universal gravitation
- inertia

Academic Vocabulary

- hypothesize

Connect - TE/SB p. 440

- Connect It!
- Quest Connection
- Inquiry Warm-Up Lab – Patterns: Day and Night

Investigate - TE/SB pp. 441-446

- Video – Earth’s Movement in Space
- ***uInvestigate Lab – Lighten Up!***

- Interactivity – Patterns in Earth’s Rotation and Revolution
- Interactivity - What Keeps Objects in Motion?
- Design It! (p. 442)
- Math Toolbox (p.446)
- Literacy Connection (p.443)

Synthesize - TE/SB pp. 447-448

- Interactivity – Seasons on Earth
- Quest Check-In Interactivity – Tides and the Moon’s Gravity
- Reading Check (p.447)
- Quest Check-In

Demonstrate – TE/SB p. 448

- Lesson 2 Check
- Lesson 2 Quiz

CLRI Connections:

- PBS Video: [The Secret Life of Scientists & Engineers | Mae Jemison](#)

Meet astronaut Mae Jemison in this video profile from NOVA’s “The Secret Life of Scientists & Engineers.” As a child growing up in Chicago, Mae dreamed of traveling to outer space. Years later, while in medical school, she decided to follow that dream and applied to become a NASA astronaut. Mae eventually became the first African American woman to go into space. On her voyage, she brought a number of artifacts onboard that symbolized underrepresented figures in African American history.

Lesson 3 – Phases and Eclipses**PE:** MS-ESS1-1**SEP:** Developing and Using Models**DCI:****ESS1.B** – Earth and the Solar System

- This 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)

CCC: Patterns**zSpace Activities (code)****Orbits (A121)**[Orbits - Teacher Activity Plan](#)

In this activity, students will describe the orbital motion of objects in the solar system, and identify how gravity is a pulling force that works with mass and distance to keep celestial bodies in orbit.

[Orbits - Student Worksheet 1](#)[Orbits - Student Worksheet 2](#)[Comparing Objects in our Solar System - Worksheet 4](#)[Orbits - Student Worksheet GoogleDoc](#)**Patterns of the Sun, Earth, & Moon (A043)**[Patterns of the Sun, Earth, & Moon - Teacher Activity Plan](#)

In this activity, students will go on an exploration to discover how the Sun, Earth, and Moon interact to create events such as eclipses, Moon phases, and seasons.

[Patterns of the Sun, Earth, & Moon - Student Wkst 1](#)[Patterns of the Sun, Earth, & Moon - Student Wkst 2](#)[Comparing Objects in our Solar System - Worksheet 4](#)[Patterns of the Sun, Earth, & Moon - Student Worksheet GoogleDoc](#)**Lunar & Solar Eclipse (A023)**[Lunar & Solar Eclipse - Teacher Activity Plan](#)

Students will use models of the Sun, Moon, and Earth to set up a lunar and solar eclipse as they are seen from space.

[Lunar & Solar Eclipse - Student Wkst 1](#)[Solar & Lunar Eclipse - Student Wkst 2](#)[Comparing Objects in our Solar System - Worksheet 4](#)[Solar & Lunar Eclipse - Student Worksheet GoogleDoc](#)**Savvas****Guiding Objectives:**

- Students will use patterns observed from their models to explain why the moon appears to change shape.
- Students will use patterns observed from their models to describe what causes solar and lunar eclipses.
- Students will use their models to: Predict the position of the Earth, sun, and moon during a given type of eclipse; describe how the sun and moon affect tides.

Literacy Connection

- Summarize Text

Vocabulary

- phase
- eclipse
- umbra
- penumbra
- tide
- spring tide
- neap tide

Academic Vocabulary

- significant

Connect - TE/SB p. 450

- Connect It!
- Quest Connection
- Write – Why Can You See the Moon During the Day?

Investigate - TE/SB pp. 451-453; 455

- Investigate Lab – How Does the Moon Move?***

- Video – Phases and Eclipses
- Interactivity – Our View of the Moon
- Interactivity – Eclipses
- Virtual Lab – Shadows in Space
- Literacy Connection (p.452)
- Reading Check (pp. 453; 455)
- Math Toolbox (p.409)
- Model It! (p.455)

Synthesize - TE/SB pp. 454; 456-458

- Interactivity – Moon Phases and Eclipses
- Quest Check-In Lab – The Moon’s Revolution/ Tides
- Math Toolbox (p.456)
- Reading Check (p.457)
- Quest Check-In

Demonstrate – TE/SB p.458

- Lesson 3 Check
- Lesson 3 Quiz

*Denotes accompanying lab video

<p><u>Topic Close</u></p> <ul style="list-style-type: none"> ● Topic 9 Assessment and Remediation TE/SB pp. 460 - 463 ● Quest Finding and Reflection TE/SB p. 463 	<p><u>Topic 9 Enrichment</u></p> <p>Topic 9 - Lesson 1 Enrichment</p> <ul style="list-style-type: none"> ● Enrichment – Models of the Universe ● Case Study – The Ptolemaic Model: Explaining the Unexplained (pp.438-439) <p>Topic 9 - Lesson 2 Enrichment</p> <ul style="list-style-type: none"> ● Enrichment – Glaciation and Earth’s Movement ● It’s All Connected – Tracking Time in the Sky (p.449) <p>Topic 9 - Lesson 3 Enrichment</p> <ul style="list-style-type: none"> ● Enrichment – How Long is a Day? ● <i>u</i>Engineer It – Power from the Tides (pp.459) <p>Topic 9 Close</p> <ul style="list-style-type: none"> ● <i>u</i>Demonstrate Lab – Modeling Lunar Phases (pp.464-467)
<p>English Language Learners (ELL) Enhancements</p> <p>To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p><u>Listening</u></p> <ul style="list-style-type: none"> ● <u>Cross- Linguistic Practices</u>: Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates). ● <u>Activating Prior Knowledge</u> Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content. ● <u>Visuals</u> - GIFs, pictures- will assist students in understanding what they are listening to. Use <u>visual thinking strategies</u> to set the lens for learning. ● Video to review or introduce a topic – use <u>closed captioning</u> to help students see the words and pronunciations while they listen to the content. ● <u>Word stretching / Vowel stretching</u> when instructing allows students to listen closely to the pronunciation of the word. ● <u>Performance Level Descriptors</u> this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening. Scroll for grade 8. <p><u>Speaking</u></p> <ul style="list-style-type: none"> ● <u>Sentence Stems/Frames</u> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> ● <u>Academic Conversation Starters</u>: Have a visual of a list of academic sentence starters that students can refer to in a discussion. ● <u>Choral Reading</u> - To build fluency, self-confidence and motivation with <u>reading/speaking</u>. ● Create <u>movement</u> to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning. ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grade 8. <p><u>Reading</u></p> <ul style="list-style-type: none"> ● Supplementary Text to help reinforce concepts. ● <u>Visual Aids</u> - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use <u>closed captioning</u> to help students read along while they listen to the content. ● <u>4 Square / Frayer models</u> to help students gain a deeper understanding of vocabulary. ● <u>Highlighting</u> important text to assist students in answering questions after the reading. ● <u>Chunking</u>-Break reading of text into chunks or paragraphs ● <u>Vocabulary Morphology</u>- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary.

	<ul style="list-style-type: none"> ● Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grade 8. <p><u>Instructional Accommodations (depending on the student’s needs)</u></p> <ul style="list-style-type: none"> ● Extended time for tests in class, projects and assignments ● Directions read. Broken down as necessary ● Model how to complete the activity in the lesson ● Oral simplification of directions or questions ● Translated version of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><u>Instructional</u></p> <ul style="list-style-type: none"> ● Pre-teach vocabulary ● Use picture vocabulary ● Scaffold Depth of Knowledge questions ● Provide copy of notes/notes in “cloze” form ● Use of Think, Pair, and Share strategy to help process information ● Scaffold written assignments with the use of graphic organizers ● Allow for multiple ways to respond (verbal, written, response board) ● Provide model of performance task ● Modify informational text to fit the needs of the students ● Provide a digital or paper interactive notebook ● Present complex tasks in multiple ways ● Provide mnemonic strategies for scientific concepts <p><u>Technology:</u></p> <ul style="list-style-type: none"> ● Audio reading of text ● Text to type functions ● Videos to clarify/visualize science concepts ● Record class lecture/discussions and make accessible to student ● Nearpod- interactive presentations of notes <p><u>In Class Assessments</u></p> <ul style="list-style-type: none"> ● Provide multiple options for projects ● Use of timer in class ● Break all complex tasks into chunks
<p>Step Up to Writing</p> <p>Step Up to Writing Materials can be found in BPS Science K-12 Schoology Folder □ Grade 8 Resources □ Grade 8 SUTW materials</p>	<ul style="list-style-type: none"> ● Easy Two-Column Notes ● Breaking Down Definitions ● Paragraph Frame- What I Learned ● Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grade 8.
<p>Culturally and Linguistically Responsive Teaching (CLRT) in the Science</p>	<ul style="list-style-type: none"> ● 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

Classroom	
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