6th Grade Unit 3 - Astronomy

Content Area: **Science**
Course(s): **Science Grade 6**
Time Period: **MP3**
Length: **45 days**
Status: **Published**

NJSLS - Science

SCI.MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
SCI.MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
SCI.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.

Science and Engineering Practices

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)

Disciplinary Core Ideas

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-ESS1-2, MS-ESS1-3)

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)

The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)

Crosscutting Concepts

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)

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-ESS1-2)

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)

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-ESS1-1, MS-ESS1-2)

Rationale and Transfer Goals

This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way galaxy, and the universe. There is a strong emphasis on a systems approach and using models of the solar system to explain the cyclical patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories explaining the formation and evolution of the universe. Students examine geosciences data in order to understand the processes and events in Earth's history. The crosscutting concepts of patterns, scale, proportion, and quantity and systems and systems models provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models and analyzing and interpreting data. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Enduring Understandings

Earth is in the exact position in space to support life, including human life.

Essential Questions

What causes the cyclic pattern of the seasons?

What causes the cyclic pattern of lunar phases?

What causes the cyclic pattern of eclipses?

What role does gravity play in the formation and motion of components within galaxies and our solar system?

What are the distinguishing properties of objects in our solar system?

Content - What will students know?

- Patterns in the apparent motion of the sun, moon, and stars in the sky can be observed, described, predicted, and explained with models.
- The Earth and solar system 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.
- Patterns can be used to identify cause-and-effect relationships that exist in the apparent motion of the sun, moon, and stars in the sky.
- Science assumes that objects and events in the solar system systems occur in consistent patterns that are understandable through measurement and observation.
- Gravity plays a role in the motions within galaxies and the solar system.
- Gravity is the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them.
- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.
- 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.
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.
- Models can be used to represent the role of gravity in the motions and interactions within galaxies and the solar system.
- Objects in the solar system have scale properties.
- Data from Earth-based instruments, space-based telescopes, and spacecraft can be used to determine similarities and differences among solar system objects.
- 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.
- Time, space, and energy phenomena in the solar system can be observed at various scales, using models to study systems that are too large.
- Engineering advances have led to important discoveries in space science, and scientific discoveries have led to the development of entire industries and engineered systems.

Skills - What will students be able to do?

- Students will develop and use a physical, graphical, or conceptual model to describe patterns in the apparent motion of the sun, moon, and stars in the sky.
- Students develop and use models to explain the relationship between the tilt of Earth's axis and seasons.
- Analyze and interpret data to determine similarities and differences among objects in the solar system.

Activities - How will we teach the content and skills?

- Inspire Science Earth and Space Science Unit 1 Module 1: Lesson 1 Earth's Motion Around the Sun
- Inspire Science Earth and Space Science Unit 1 Module 1: Lesson 2 Lunar Phases
- Inspire Science Earth and Space Science Unit 1 Module 1: Lesson 3 Eclipses
- Inspire Science Earth and Space Science Unit 1 Module 2: Lesson 1 Gravity and the Universe
- Inspire Science Earth and Space Science Unit 1 Module 2: Lesson 2 The Solar System
- MS-ESS1-1 Lesson Examples
- MS-ESS1-2 Lesson Examples
- MS-ESS1-3 Lesson Examples

Evidence/Assessments - How will we know what students have learned?

- Inspire Science Labs
- Inspire Science STEM Module Projects
- Inspire Science Earth and Space Science Unit 1 Module 1 Assessment
- Inspire Science Earth and Space Science Unit 1 Module 2 Assessment
- Daily Warm Ups
- Daily Exit Tickets
- Grade 6 Unit 3 Benchmark Assessment

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
• Patterns in the apparent motion of the sun, moon, and stars in the sky can be observed, described, predicted, and explained with models. • The Earth and solar system 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.	By the end of Grade 5, students understand that: Earth's orbit and rotation and the orbit of the moon around Earth cause observable patterns. Certain features on Earth can be used to order events that have occurred in a landscape.	5-ESS1-2 Activities 1-ESS1-1 Activities

Key Resources

McGraw Hill Inspire Science

NASA Solar System Exploration

Eclipse Interactive

Pull of the Planets

All Bottled Up: The Perfect Ecosystem

Phases of the Moon

Interactive Lunar Phases Activity

Interactive Seasons Investigation

Mystery Science Spaceship Earth Unit

Space Exploration

21st Century Life and Careers

WRK.9.2.8.CAP.8	Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.

Career Readiness, Life Literacies, & Key Skills

TECH.9.4.8.CI.1	Assess data gathered on varying perspectives on causes of climate change (e.g., cross-cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).
TECH.9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
TECH.9.4.8.CT.2	Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
TECH.9.4.8.CT.3	Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.
TECH.9.4.8.TL.1	Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
TECH.9.4.8.TL.2	Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).
TECH.9.4.8.TL.3	Select appropriate tools to organize and present information digitally.
TECH.9.4.8.TL.4	Synthesize and publish information about a local or global issue or event (e.g., MSLS4-5, 6.1.8.CivicsPI.3).
TECH.9.4.8.IML.3	Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g.,

	6.SP.B.4, 7.SP.B.8b).
TECH.9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.
TECH.9.4.8.IML.5	Analyze and interpret local or public data sets to summarize and effectively communicate the data.

Interdisciplinary Connections/Companion Standards

NJSLS ELA

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-2, MS-ESS2-3)

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)

NJSLS Math

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.6 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)