5th Grade Unit 4 - Earth and Space Patterns

Content Area: **Science**
Course(s): **Science Grade 5**
Time Period: **MP4**
Length: **45 days**
Status: **Published**

NJSLS - Science

SCI.5-ESS1-2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
SCI.5-ESS1-1	Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
SCI.5-PS2-1	Support an argument that the gravitational force exerted by Earth on objects is directed down.

Science and Engineering Practices

Engaging in Argument from Evidence

Support an argument with evidence, data, or a model. (5-PS2-1, 5-ESS1-1)

Analyzing and Interpreting Data

Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)

Disciplinary Core Ideas

PS2.B: Types of Interactions

The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)

ESS1.A: The Universe and its Stars

The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)

ESS1.B: Earth and the Solar System

The orbits of Earth around the sun and the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)

Crosscutting Concepts

Cause and Effect

Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)

Patterns

Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)

Scale, Proportion, and Quantity

Natural objects exist from the very small to the immensely large. (5-ESS1-1)

Rationale and Transfer Goals

In this unit of study, students develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. The crosscutting concepts of patterns, cause and effect, and scale, proportion, and quantity are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in analyzing and interpreting data and engaging in argument from evidence. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Enduring Understandings

The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's

center.

Stars range greatly in their distance from Earth.

The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its north and south poles, cause observable patterns.

Essential Questions

What pulls objects down?

How does Earth move through space?

Where is Earth located in space?

What causes some stars to be brighter than others?

Content - What will students know?

- Cause-and-effect relationships are routinely identified and used to explain change.
- The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.
- Natural objects exist from the very small to the immensely large.
- The sun is a star that appears larger and brighter than other stars because it is closer.
- Stars range greatly in their distance from Earth.
- Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena.

- The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its north and south poles, cause observable patterns. These include: day and night, daily changes in the length and direction of shadows, different positions of the sun, moon, and stars at different times of the day, month, and year.

Skills - What will students be able to do?

- Identify cause-and-effect relationships in order to explain change.
- Support an argument with evidence, data, or a model.
- Support an argument that the gravitational force exerted by Earth on objects is directed down. ("Down" is a local description of the direction that points toward the center of the spherical Earth.) (Assessment does not include mathematical representation of gravitational force.).
- Support an argument that differences in the apparent brightness of the sun compared to that of other stars is due to their relative distances from Earth. (Assessment is limited to relative distances, not sizes, of stars, and does not include other factors that affect apparent brightness, such as stellar masses, age, or stage.)
- Sort, classify, communicate, and analyze simple rates of change for natural phenomena using similarities and differences in patterns.
- Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.
- Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. (Assessment does not include causes of seasons.) Examples of patterns could include: The position and motion of Earth with respect to the sun or selected stars that are visible only in particular months.

Activities - How will we teach the content and skills?

- Inspire Science Grade 5 Unit 4 Earth's Patterns and Movement Module: Lesson 1 The Role of Gravity
- Inspire Science Grade 5 Unit 4 Earth's Patterns and Movement Module: Lesson 2 Earth's Motion
- Inspire Science Grade 5 Unit 4 Earth and Space Module: Lesson 1 Earth's Place in Space
- Inspire Science Grade 5 Unit 4 Earth and Space Module: Lesson 2 Stars and Their Patterns
- 5-ESS1-1 Lesson Examples
- 5-ESS1-2 Lesson Examples

- 5-PS2-1 Lesson Examples

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

- Inspire Science Labs
- Inspire Science STEM Module Projects
- Inspire Science Grade 5 Unit 4 Earth's Patterns and Movement Module: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 4 Earth's Patterns and Movement Module: Lesson 2 Lesson Check
- Inspire Science Grade 5 Unit 4 Earth's Place in Space: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 4 Earth's Place in Space: Lesson 2 Lesson Check
- Daily Warm Ups
- Daily Exit Tickets
- Science Journal
- Grade 5 Unit 4 Benchmark Assessment
- CER - Claim Evidence Reasoning Written Response

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its north and south poles, cause observable patterns. These include: day and night, daily changes in the length and direction of shadows, different positions of the sun, moon, and stars at different times of the day, month, and year.	Grade 1: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. Grade 1: Seasonal patterns of sunrise and sunset can be observed, described, and predicted. Grade 3: Each force acts on one particular object and has both	1-ESS1-1 Activities 3-ESS2-2 Activities

	strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. Grade 3: The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. Grade 3: Objects in contact exert forces on each other. Grade 3: Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.	

Key Resources

Inspire Science

Gravity and Falling Objects

Solar System Exploration

Day and Night Example Notes

Earth, Moon and Stars

NASA Videos

Interactive Solar System

Generation Genius

Planet Song

Dwarf Planet Song

Planet Song

We don't talk about Pluto

Space Place

Earth, Moon and Stars

Magnets

How Magnets Work

Mystery Science Spaceship Earth Unit

BrainPop Seasons

Mass, Weight, & Gravity Lesson Plan

Gravity and Falling Objects

Solar System Exploration

Our Super Star

Earth, Moon and Stars

Kinesthetic Astronomy

21st Century Life and Careers

WRK.9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
WRK.9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

Career Readiness, Life Literacies, & Key Skills

TECH.9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).
TECH.9.4.5.CI.2	Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).
TECH.9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.

Interdisciplinary Connections/Companion Standards

NJSLS ELA

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-PS2-1, 5-ESS1-1)

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS1-1)

RI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). (5-ESS1-1)

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-PS2-1, 5-ESS1-1)

W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1, 5-ESS1-1)

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2)

NJSLS Mathematics

MP.2 Reason abstractly and quantitatively. (5-ESS1-1, 5-ESS1-2)

MP.4 Model with mathematics. (5-ESS1-1, 5-ESS1-2)

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-ESS1-1)

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)