

# Englewood Public School District

## Science

### Grade 5

#### Fourth Marking Period

### Unit 6: Interactions within the Earth, Sun and Moon Systems

**Overview:** 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. This unit is based on 5-PS2-1, 5-ESS1-1, and 5-ESS1-2.

**Time Frame:** 20 days

#### Enduring Understandings:

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

*The sun is a star that appears larger and brighter than other stars because it is closer.*

*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 effect does Earth's gravitational force have on objects?*

*What effect does the relative distance from Earth have on the apparent brightness of the sun and other stars?*

*What patterns do we notice when observing the sky?*

Standards	Topics and Objectives	Activities	Resources	Assessments
<b>(5-PS2-1):</b> <b>Support an argument that the gravitational force exerted by Earth on objects is directed down.</b>	<b>Topics</b>	<b><u>Gravity and Falling Objects:</u></b>	<b><u>Gravity and Falling Objects:</u></b>	<b>Formative Assessments:</b>
	Sun, Moon, and Earth Stars  Twenty-First Century Themes and Skills include: <ul style="list-style-type: none"> <li>• The Four C's</li> <li>• Environmental Literacy</li> <li>• Global Awareness</li> </ul>	Students investigate the force of gravity and how all objects, regardless of their mass; fall to the ground at the same rate. (5-PS2-1, MP.2, RI.5.9)	<b><u>Multimedia Resources</u></b> <ul style="list-style-type: none"> <li>• Galileo on the Moon Video</li> <li>• Galileo: His Experiments Flash Interactive</li> <li>• What Is "Weightlessness"? QuickTime Video</li> </ul>	<b><u>Gravity and Falling Objects:</u></b> Student Lab Notes  <b>Benchmark Assessments:</b> Exact Path  <b>Summative Assessments:</b> <b><u>Our Super Star:</u></b>

<p><b>(5-ESS1-1):</b> Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.</p> <p><b>(5-ESS1-2):</b> 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.</p>	<p><b>Objectives</b></p> <p><b><u>Gravity and Falling Objects:</u></b> Students will describe gravity as a force that exists between any two objects that have mass” and demonstrate that all objects, regardless of their mass, fall to the ground at the same rate.</p> <p><b><u>Our Super Star:</u></b> Students will understand the relationship between the sun and earth and the cycles it causes.</p> <p><b><u>The Sun, Earth, and Moon Relationship:</u></b> Students understand the relationships among the Sun, Earth, and moon.</p> <p><b><u>Passing of Time:</u></b> Students will explain how Earth's movement around the Sun causes changes in season, day/night, and year.</p> <p><b><u>Constellation Patterns:</u></b> Students explain how constellations move in the sky.</p>	<p><b><u>Our Super Star:</u></b> Students understand the basic facts about the Sun, model the mechanics of day and night, and use solar energy to make a tasty treat. (RI.5.7, RI.5.8, 5.G.2, CRP8)</p> <p><b><u>The Sun, Earth, and Moon Relationship:</u></b> Students will create a model illustrating the movement of the Earth and Moon in relation to the Sun. (5-ESS1-1, MP.4, CRP6)</p> <p><b><u>Passing of Time:</u></b> Students will develop and use a model of the Earth rotating and revolving around the Sun to explain the idea of passing time. ( 5.NBT.2, 9.2 8.B.3)</p> <p><b><u>Constellation Patterns:</u></b> Students evaluate and communicate information on the apparent movement of constellations using a variety of resources: interactive star map, planisphere, videos, modeled demonstration, and online resources. (5-ESS1-2, W.5.1, RI.5.1, CRP4, SL.5.5,8.1.5.F.1, 9.2.8.B.3)</p>	<p><b><u>Materials</u></b></p> <ul style="list-style-type: none"> <li>• Chart paper</li> <li>• Hammer</li> <li>• Feather</li> <li>• Apples</li> <li>• Knife</li> <li>• Two balls of same mass, different volumes</li> <li>• Two balls of same volume, different masses</li> <li>• Foam cups (optional)</li> <li>• Various liquids, including water (optional)</li> <li>• Bucket (optional)</li> </ul> <p><b><u>Our Super Star:</u></b></p> <p><b><u>Multimedia Resources</u></b></p> <ul style="list-style-type: none"> <li>• Observe Sunrise and Sunset QuickTime Video</li> <li>• Galileo: Sun-Centered System QuickTime Video</li> <li>• Characteristics of the Sun QuickTime Video</li> <li>• Cooking Cookies with Solar Power QuickTime Video</li> </ul> <p><b><u>Materials</u></b></p> <ul style="list-style-type: none"> <li>• 1 directional compass</li> <li>• 1 calendar (optional)</li> <li>• 1 lamp with exposed light bulb</li> <li>• 1 extension cord</li> <li>• Styrofoam balls -- one for each student</li> <li>• Small sticker dots -- two for each student</li> <li>• Pencils to mount Styrofoam balls -- one for each student</li> </ul> <p><b>For each solar cooker:</b></p>	<p>Solar Oven Student paragraph</p> <p><b><u>The Sun, Earth and Moon Relationship:</u></b> Model Student Explanation</p> <p><b><u>Passing of Time:</u></b> Question Sheet Evaluation Paragraph</p> <p><b><u>Constellation Patterns:</u></b></p> <ul style="list-style-type: none"> <li>• 3 Vocabulary Cards (circumpolar constellations, seasonal constellations, planisphere)</li> <li>• <u>Student Star Tracking Observations</u></li> <li>• <u>Student Notes</u></li> <li>• <u>Star Wheel Sticking Out of Envelope</u></li> <li>• 1 Fact-Based Argument Card</li> </ul> <p><b>Alternative Assessments:</b> Students will support an argument with evidence, data, or a model.</p> <p>Checklists, Journals, Notes, Research, Peer Reviews</p> <p>Students will sort, classify, communicate, and analyze simple rates of change for natural phenomena using</p>
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- 2 large sheets of poster board, preferably black
- 1 sheet of black construction paper
- 1 medium-sized cardboard box
- Aluminum foil
- Tape

**For each student's s'more:**

- 2 graham crackers
- 1 large marshmallow
- 1 chocolate square
- 1 re-sealable plastic sandwich bag

similarities and differences in patterns.

Discussions, Pre/Post tests

Students will represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.

Graphic organizers, Questioning, Self-Assessments, Visual Representations

**The Sun, Earth, and Moon Relationship:**

- Video
- Three Claims PDF
- Evidence Based explanation
- Model

**Passing of Time:**

- Image
- Task Card
- Ping Pong Balls
- Flashlight
- Anchor Chart
- Question Sheet
- Day on Earth Video
- Longitude Video
- Evaluation Paragraph

**Constellation Patterns:**

- Envelope Books
- Vocabulary Cards
- Envelope 10 Pictures
- Fact Based Argument Cards
- Tracking Star Movement
- Star Wheel Teacher Model

- Constellation PDF
- Teacher Model of Graphic Organizer
- Thematic Graphic Organizer
- Star Gazers Video

**Additional Resources:**

[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=12&cad=rja&uact=8&ved=2ahUKEwiSmbzflubdAhWlnOAKHR6\\_CfcQFjALegQIDBAB&url=https%3A%2F%2Fstudy.com%2Facademy%2Flesson%2Finteractions-in-the-sun-earth-moon-system.html&usg=AOvVaw03xxuOn\\_FtFR19bmHxksmI](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=12&cad=rja&uact=8&ved=2ahUKEwiSmbzflubdAhWlnOAKHR6_CfcQFjALegQIDBAB&url=https%3A%2F%2Fstudy.com%2Facademy%2Flesson%2Finteractions-in-the-sun-earth-moon-system.html&usg=AOvVaw03xxuOn_FtFR19bmHxksmI)

[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=30&cad=rja&uact=8&ved=2ahUKEwiSmbzflubdAhWlnOAKHR6\\_CfcQFjAdegQICBAB&url=https%3A%2F%2Fwww.space.com%2F15957-moon-sun-surprising-interaction.html&usg=AOvVaw17XENjFO6XnyjC1f4E5A7](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=30&cad=rja&uact=8&ved=2ahUKEwiSmbzflubdAhWlnOAKHR6_CfcQFjAdegQICBAB&url=https%3A%2F%2Fwww.space.com%2F15957-moon-sun-surprising-interaction.html&usg=AOvVaw17XENjFO6XnyjC1f4E5A7)

<http://www.adaptedmind.com/gradelist.php?grade=5>

**Books:**

<https://www.readinga-z.com/book.php?id=1052>

[https://www.goodreads.com/list/show/9655.Best\\_Space\\_B](https://www.goodreads.com/list/show/9655.Best_Space_B)

## Accommodations and Modifications:

**Students with special needs:** Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

**ELL/ESL students:** Students will be supported according to the recommendations for “can do’s” as outlined by WIDA – [https://www.wida.us/standards/CAN\\_DOs/](https://www.wida.us/standards/CAN_DOs/)  
This particular unit has limited language barriers due to the physical nature of the curriculum.

**Students at risk of school failure:** Formative and summative data will be used to monitor student success at first signs of failure student work will be Reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

**Gifted and Talented Students:** Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity in planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> <li>● Speak and display terminology</li> <li>● Teacher modeling</li> <li>● Peer modeling</li> <li>● Provide ELL students with multiple literacy strategies.</li> <li>● Word walls</li> <li>● Use peer readers</li> <li>● Give page numbers to help the students find answers</li> <li>● Provide a computer for written work</li> <li>● Provide two sets of</li> </ul>	<ul style="list-style-type: none"> <li>● Utilize modifications &amp; accommodations delineated in the student’s IEP</li> <li>● Work with paraprofessional</li> <li>● Use multi-sensory teaching approaches.</li> <li>● Work with a partner</li> <li>● Provide concrete examples</li> <li>● Restructure lesson using UDL principals</li> </ul>	<ul style="list-style-type: none"> <li>● Peer Support</li> <li>● Using visual demonstrations, illustrations, and models</li> <li>● Give directions/instructions verbally and in simple written format. Oral prompts can be given.</li> <li>● Increase one on one time</li> <li>● Teachers may modify instructions by modeling what the student is expected to do</li> <li>● Instructions may be printed out in large print and hung</li> </ul>	<ul style="list-style-type: none"> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Curriculum compacting</li> <li>● Inquiry-based instruction</li> <li>● Independent study</li> <li>● Higher order thinking skills</li> <li>● Adjusting the pace of lessons</li> <li>● Interest based content</li> <li>● Real world scenarios</li> <li>● Student Driven Instruction</li> <li>● Engage students with a variety of Science and Engineering practices to</li> </ul>

<p>textbooks, one for home and one for school</p> <ul style="list-style-type: none"> <li>● Provide visual aides</li> <li>● Provide additional time to complete a task</li> <li>● Use graphic organizers</li> </ul>	<p>(<a href="http://www.cast.org/our-work/about-udl.html#.VXmoXcfD-UA">http://www.cast.org/our-work/about-udl.html#.VXmoXcfD-UA</a>).</p> <ul style="list-style-type: none"> <li>● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).</li> </ul>	<p>up for the student to see during the time of the lesson.</p> <ul style="list-style-type: none"> <li>● Review behavior expectations and make adjustments for personal space or other behaviors as needed.</li> <li>● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.</li> <li>● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).</li> </ul>	<p>provide students with multiple entry points and multiple ways to demonstrate their understandings.</p> <ul style="list-style-type: none"> <li>● Use project-based science learning to connect science with observable phenomena.</li> <li>● Collaborate with after-school programs or clubs to extend learning opportunities.</li> </ul>	
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<b>Interdisciplinary Connections:</b>				
<p><b>ELA-NJSLS/ELA:</b></p> <p><b>RI.5.1:</b> 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)</p> <p><b>RI.5.7:</b> 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)</p> <p><b>RI.5.8:</b> 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)</p> <p><b>RI.5.9:</b> 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)</p> <p><b>W.5.1:</b> Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-PS2-1), (5-ESS1-1)</p> <p><b>SL.5.5:</b> 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)</p>				
<p><b>Mathematics:</b></p> <p><b>MP.2:</b> Reason abstractly and quantitatively. (5-ESS1-1), (5-ESS1-2)</p> <p><b>MP.4:</b> Model with mathematics. (5-ESS1-1), (5-ESS1-2)</p> <p><b>5.NBT.2:</b> Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the</p>				

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.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)

**Career Ready Practices:**

**CRP6:** Demonstrate creativity and innovation.

**CRP4:** Communicate clearly and effectively and with reason.

**CRP8:** Utilize critical thinking to make sense of problems and persevere in solving them.

**Integration of Technology Standards NJSLS 8:**

**8.1.5.F.1:** Apply digital tools to collect, organize, and analyze data that supports a scientific finding.

**Integration of 21<sup>st</sup> Century Skills:**

**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

**Key Vocabulary:**

**Constellation:** a group of stars that humans see as a pattern and give a name

**Day:** the time between sunrise and sunset on Earth

**First-quarter Moon:** a phase of the Moon in the lunar cycle halfway between a new Moon and a full Moon

**Full Moon:** the phase of the Moon when all of the sunlit side of the Moon is visible from Earth

**Gibbous Moon:** the shape of the Moon when it appears to be more than a quarter but not yet full and when it is less than full but not quite a third quarter.

**Gravity:** the force of attraction between two objects

**Lunar cycle:** the 4-week period during which the Moon orbits Earth one time and goes through all of its phases

**New Moon:** the phase of the Moon when the sunlit side of the Moon is not visible from Earth

**Night:** the time between sunset and sunrise on Earth

**Orbit:** to move or travel around an object in a curved path

**Revolution:** to travel around something else in a circular path; orbit

**Rotation:** turning around on an axis

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<u>Developing and Using Models</u> <ul style="list-style-type: none"><li>Develop a model using an example to describe a scientific principle. (5-ESS2-1)</li></ul> <u>Engaging in Argument from Evidence</u>	<u>PS2.B: Types of Interactions</u> <ul style="list-style-type: none"><li>The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)</li></ul>	<u>Cause and Effect</u> <ul style="list-style-type: none"><li>Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)</li></ul>

<ul style="list-style-type: none"> <li>Support an argument with evidence, data, or a model. (5-PS2-1), (5-ESS1-1)</li> </ul> <p><b><u>Analyzing and Interpreting Data</u></b></p> <ul style="list-style-type: none"> <li>Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)</li> </ul>	<p><b><u>ESS1.A: The Universe and its Stars</u></b></p> <ul style="list-style-type: none"> <li>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)</li> </ul> <p><b><u>ESS1.B: Earth and the Solar System</u></b></p> <ul style="list-style-type: none"> <li>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; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)</li> </ul>	<p><b><u>Scale, Proportion, and Quantity</u></b></p> <ul style="list-style-type: none"> <li>Natural objects exist from the very small to the immensely large. (5-ESS1-1)</li> </ul> <p><b><u>Patterns</u></b></p> <ul style="list-style-type: none"> <li>Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)</li> </ul>
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