

Unit 4 Overview

Unit Title: Earth, the Moon, and the Stars

Grade Level: 5

Recommended Pacing: 2 months – block scheduling

Unit 4 Summary:

It is a clear summer night. You gaze at the shining stars. You see the Big Dipper and even Orion’s belt. You wonder, what are the other star patterns in the night sky? Later, you go back outside to show your parents the Big Dipper. But it has moved! If you watched the stars throughout the night, they and the moon would all appear to move. In this unit, you will discover how the moon and stars change and move in patterns. These patterns can be explained. And you will read about the tools scientists use to discover these objects.

Unit 4 NGSS:

5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down.

5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.

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.

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

CCSS:ELA

- RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
- W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS: Mathematics

- 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.

Unit 4 ISTE Standards:

1 .a-d Creativity and Innovation- Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes through technology.

2. a-d Communication and Collaboration- Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

<p>3. a-d Research and Information Fluency- Students apply digital tools to gather, evaluate, and use information.</p> <p>4. a-d Critical Thinking, Problem Solving, and Decision Making- Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</p>	
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<p><u>Unit 4 Essential Questions:</u></p> <ul style="list-style-type: none"> ● What does gravity do? ● Why is the sun brighter than other stars? ● Why is there day and night? ● How do shadows change during the day and year? ● How does the moon seem to move and change shape? ● What tools do scientists use to observe space? 	
<p><u>Unit 4 Learning Targets</u> <i>Students will be able to...</i></p> <ul style="list-style-type: none"> ● identify a claim that includes the idea that the gravitational force exerted by Earth on objects is directed down toward the center of Earth 	<p><u>Unit 4 Learning Targets</u> <i>Students will do...</i></p> <ul style="list-style-type: none"> ● read for content mastery

- identify and describe the given evidence, data, and/or models that support the claim that indicate the Earth's shape is spherical, that objects dropped appear to fall straight down, and that people live all around the spherical Earth, and they observe that objects appear to fall straight down
- evaluate the evidence to determine whether it is sufficient and relevant to supporting the claim and determine whether any additional evidence is needed
- use reasoning to connect the relevant and appropriate evidence to support the claim with argumentation
- identify and support a claim that includes the idea that the apparent brightness of the sun and stars is due to their relative distances from Earth
- describe the evidence, data, and/or models that support the claim, including: the sun and other stars are natural bodies in the sky that give off their own light, the apparent brightness of a variety of stars, including the sun, a luminous object close to a person appears much brighter and larger than a similar object that is very far away from a person, and the relative distance of the sun and stars from Earth

- develop and use content related vocabulary
- cite specific textual evidence to support analysis of science and technical texts
- complete a variety of laboratory activities to support the content
- write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content
- view various content related videos

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| <ul style="list-style-type: none">● use reasoning to connect the relevant and appropriate evidence to support the claim with argumentation● identify and support a claim that includes the idea that the apparent brightness of the sun and stars is due to their relative distances from Earth● use graphical displays to organize data pertaining to daily and seasonal changes caused by the Earth's rotation and orbit around the sun● use the organized data to find and describe relationships within the datasets, including: the apparent motion of the sun from east to west results in patterns of changes in length and directions of shadows throughout a day as Earth rotates on its axis; the length of the day gradually changes throughout the year as Earth orbits the sun, with longer days in the summer and shorter days in the winter; some stars and/or groups of stars can be seen in the sky all year, while others appear only at certain times of the year● use the organized data to find and describe relationships among the datasets, including: similarities and differences in the timing of observable changes in shadows, daylight, and the appearance of stars show that events occur at different rates | |
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Unit 4 Evidence of Learning

Formative Assessments:

- Associated quizzes
- Exit tickets
- Reading Challenges
- Student Interactive notebook
- Labs and engineering based projects
- Homework
- BrainPOP quizzes
- Participation: individual/group

Unit 4 Summative Assessments:

- Associated Chapter tests/quizzes
- Labs and engineering based projects
- PBL -after observing a model to see how Earth's rotation causes shadows to change length and direction, students will build and use a sundial
- Design and build a telescope to practice the engineering design process

Unit 4 Lab Activities

- GizmoLabs: H-R Diagram; Seasons: Earth, Moon, and Sun; Seasons: Why do we have them?; Summer and Winter
- Phases of the Moon kit
- Motions of the Sun Simulator: www.astro.unl.edu/naap/motion3/animations/sunmotions.html
- Changing Shadows - Sun-Earth Days - NASA: www.sunearthday.nasa.gov/2007/materials/changing_shadows.pdf
- Gravity Launch interactive: www.sciencenetlinks.com/afterschool-resources/gravity-launch
- Lab - Falling for Gravity: www.sciencenetlinks.com/afterschool-resources/falling-gravity/
- Write an essay to counter the statement, “The force of gravity does not exist on Earth.”
- STEM lesson designing a model that explains how rotation of the Earth and Moon helps explain a change in time as well as patterns we see on Earth: www.stem-talk.weebly.com/sample-lessons.html
- Solar System Size and Scale: <https://marsed.asu.edu/solar-system-scale-and-size>

Unit 4 Materials/Equipment:

Required Lab Materials:

inflatable model of the Earth, flashlights with size D batteries, light bulb, light socket, paper bowls, chalk, large paper clips, lenses (double concave, 10cm focal length), lenses (double convex, 15 cm focal length), cardboard tubes, stickers, sticky notes, clear tape, markers, pencils, yellow poster board, colored pencils, masking tape, construction paper, safety glasses; large craft pony beads in the following colors: yellow, opaque red, cream, clear blue, clear red, black, orange, clear gold, dark blue, light blue, brown (1 of each color per group); 4-ply knitting and weaving yarn (can be found on a large cone)

Materials/Equipment/Resources

- Star Gazing - www.ReadWorks.com
- Gizmos subscription
- Quizlet subscription
- BrainPOP subscription: Eclipse; Moon Phases; Solar System\
- Teachers Domain video clips: Gravity; Invisible Force Challenge; Planets; The Moon; Rapid Climate Change and the Ocean; Water Cycle; Why Does Climate Change Matter?
- Mr. Parr's science songs: Law of Gravity; Water Cycle Song
- TCI [Bringing Science Alive!](#) Grade 5 series
- Smart Board and student chromebooks

