Mp4a-Space Systems: Stars and the Solar System

Content Area: **Science**
Course(s): **Science 5**
Time Period: **Marking Period 4**
Length: **MP 4**
Status: **Published**

Essential Questions

- What are some observable patterns on Earth throughout a day, month, and year?
- Why do some stars appear brighter than others and can only be seen during
- different times in a month or year?
- What changes can be made on two or more objects that can have an effect on the
- gravity between those objects?
- What is the gravitational force of the Earth and what is its effect on objects
- of differing sizes and shapes?

Big Ideas

- Stars range greatly in size and distance from earth and this can explain their relative brightness.
- The earth's orbit and rotation, and the orbit of the moon around the earth cause observable patterns.
- The effect of unbalanced forces on an object results in a change of motion.
- Patterns of motion can be made used to predict future motion. Some forces act through contact, some forces act even when the objects are not in contact.
- The gravitational force of earth acting on an object toward the planet's center.

Cross-Curricular Integration

Integration Area: Language Arts

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.

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different perspectives of a topic.

SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Activity:

Students will conduct a research project about a space topic of their choice. Students will use at least two sources to find the information. Students will create a written description of their research. Students will

present the information that they found to the class.

Diversity Integration

Objective: Students will be able to learn about different famous astronauts from different cultural backgrounds through a research project.

Procedure:

1- Students will be presented with the project directions and the research template.

2- Students will pick which astronaut they want to research.

3- Students will use the links provided to find information on the astronaut that they chose.

4- Students will fill in the research template with the information that they found about their astronaut.

Social Justice

See Social Studies Appendix C

Book 1: 30,000 Stitches by Amanda Davis (Flag Day)

Book 2: We Are Water Protectors by Carole Lindstrom

Science and Engineering Practices

Planning and Carrying Out Investigations

• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
• Make predictions about what would happen if a variable changes.
• Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.

Engaging in Argument from Evidence

• Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.

Obtaining, Evaluating, and Communicating Information

• Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence.
• Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices.
• Communicate scientific and/or technical information orally and/or in written formats, including various forms of media and may include tables, diagrams, and charts.

Developing and Using Models
• Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events.
• Develop and/or use models to describe and/or predict phenomena.

Science and Society

Caroline Herschel

Astronomer who discovered many comets

Isacc Newton

“Father of Science”, telescope

Galilei Galileo

“Father of Modern Science”, telescope

Enduring Understandings

Motion and Stability: Forces and Interactions

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

Earth's Place in the Universe

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 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.

Student Learning Standards
ELA/Literacy
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)*

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)

Focus Areas

Knowledge

- That a star's distance from Earth affects how bright it appears to be.
- That the length of shadows decrease during the day until they reach a certain point, then the shadows gradual start to get larger.
- That the rotation of Earth causes night and day.
- That the path of the sun changes from month to month.
- Support an argument that the gravitational force exerted by Earth on objects is directed down.
- That the locations of constellations change due to the rotation and revolution of Earth.
- The history of our understanding of gravity. Where the center of mass of a sphere is.
- How mass and distance relate to the force of gravity.
- That an object's mass does not influence the force of Earth's gravity on it.

Skills

- Create an argument that relative brightness of the Sun compared to other stars is a function of the distance to those stars.
- Explain how day turns into night
- Explain why the sun casts different sized shadows.
- Explain that the location of constellation in the night sky appear in different locations due to the rotation and revolution of Earth.
- Show experimentally that things fall down because Earth's gravitational force is down.
- Explain the balance of the Sun's gravitational force on Earth, and the Earth's momentum cause the revolution of the Earth around the Sun.
- Show experimentally that objects fall at the same rate.

Understanding

- Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
- 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.

Resources

Primary Resources

Scott Foresman Interactive Science, 2016

- Chapter 6 - Earth and Space
- Chapter 2 - Forces and Motion

Leveled Readers

- *Stars and Galaxies*
- *Exploring the Universe*
- *Telescopes*
- *Earth in Space*
- *The Earth and Its Neighbors*
- *MoonLandings*
- *Forces in Motion*
- *Objects on the Move*
- *Building Science*

Scientific Inquiry

Core

- Which direction does gravity pull?
- How does location affect a stars appearance?
- How do the stars change with the seasons?

Supplemental

- What does a spiral galaxy look like from different angles? p.258