



## Marietta City Schools

### District Unit Planner

#### Grade 4 Science

Theme	Unit 2: Stars, Planets, and Moon	Unit duration	7 weeks
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

#### GaDoE Standards/3D Science Elements

Georgia Standards:

**S4E1. Obtain, evaluate, and communicate information to compare and contrast the physical attributes of stars and planets.**

- Ask questions to compare and contrast technological advances that have changed the amount and type of information on distant objects in the sky.
- Construct an argument on why some stars (including the Earth's sun) appear to be larger or brighter than others. (Clarification statement: Differences are limited to distance and size, not age or stage of evolution.)
- Construct an explanation of the differences between stars and planets.
- Evaluate strengths and limitations of models of our solar system in describing relative size, order, appearance and composition of planets and the sun. (Clarification statement: Composition of planets is limited to rocky vs. gaseous.)

**S4E2. Obtain, evaluate, and communicate information to model the effects of the position and motion of the Earth and the moon in relation to the sun as observed from the Earth.**

- Develop a model to support an explanation of why the length of day and night change throughout the year.
- Develop a model based on observations to describe the repeating pattern of the phases of the moon (new, crescent, quarter, gibbous, and full).
- Construct an explanation of how the Earth's orbit, with its consistent tilt, affects seasonal changes.

**S4P1. Obtain, evaluate, and communicate information about the nature of light and how light interacts with objects.**

- Plan and carry out an investigation utilizing everyday materials to explore examples of when light is refracted.

**Unit Objectives:**

compare and contrast technological advancements used to gather information about distant objects in the sky.  
formulate questions about technological advancements used to gather information about distant objects in the sky.  
determine why some stars appear larger or brighter than others.  
compare and contrast the relative size and composition of stars and planets.

evaluate the strengths and limitations of various models of the solar system.  
 analyze data to support the claim that the length of day and night change throughout the year.  
 collect and analyze data about the phases of the moon.  
 explain that the Earth is in orbit and the tilt affects seasonal changes.  
 develop a model to explain why the length of day and night change throughout the year.  
 develop a model (2D or 3D) to describe the repeating pattern of the phases of the moon.

**Unit Phenomena:** Watch this YouTube video showing the relative sizes of planets and stars. Ask students to tell what they notice and what they are wondering.

[https://www.youtube.com/watch?v=MK5E\\_7hOi-k](https://www.youtube.com/watch?v=MK5E_7hOi-k) Access more phenomena at <https://www.georgiascienceteacher.org/phenomena>

Refracted light - put a clear cup of water on each group's table. Put a pencil in the cup. Ask students what they notice and what they are wondering.

**Page Keeley Probes:** Page Keeley probes can be used as phenomena. They are intended to elicit student understanding about science concepts. Starting a unit or lesson with a probe will help you uncover misconceptions and see what students already know about a topic. Using a probe at the beginning of a lesson and then at the end of the lesson serves the purposes of pretesting and then formatively evaluating student thinking. **Below is a list of probes from Page Keeley's book Uncovering Student Ideas in Science, that are appropriate for this unit.**

This book has been purchased for your grade level by the Office of Academic Achievement and can be found in your media center.

Gazing at the Moon (Volume 1)

Going Through a Phase (Volume 1)

Darkness at Night (Volume 2)

Emmy's Moon and Stars (Volume 2)

Objects in the Sky (Volume 2)

Summer Talk (Volume 3)

Where do Stars Go? (Volume 3)

Moonlight (Volume 4)

<b>Science &amp; Engineering Practices:</b> <ul style="list-style-type: none"> <li>• Asking questions and defining problems</li> <li>• Developing and using models</li> <li>• Engaging in argument from evidence</li> <li>• Obtaining, evaluating, and communicating</li> </ul>	<b>Disciplinary Core Ideas:</b> <ul style="list-style-type: none"> <li>• Technological advances for Space</li> <li>• Stars &amp; Planets</li> <li>• Moon Phases</li> <li>• Earth's orbit and tilt</li> <li>• Light refraction</li> </ul>	<b>Crosscutting Concepts:</b> <ul style="list-style-type: none"> <li>• Patterns</li> <li>• Scale, Proportion, and Quantity</li> <li>• Systems and system models</li> </ul>
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**Misconceptions:**

- Our solar system is an Earth-centered solar system in which the sun and planets revolve around Earth.
- The sun moves around the Earth, i.e. it rises in the East and sets in the West, to form day and night.
- The change of seasons occurs because the Earth revolves around the sun in an elliptical (oval-shaped) orbit. When Earth nears the sun, summer occurs; and when the Earth is farthest from the sun, winter occurs.
- Planets and stars are alike.
- All stars are alike.
- The sun is the largest star in the sky.

- Constellations move across the sky at night.
- The same stars can be seen during the entire year.
- There are thousands of stars in our solar system.

### **Math/ELA Connections/STEM Connections**

ELAGSE4RI3: Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

ELAGSE4RI4: Determine the meaning of general academic language and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

ELAGSE4RI7: Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

ELAGSE4RI10: By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

ELAGSE4W2: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

ELAGSE4W4: Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

ELAGSE4W7: Conduct short research projects that build knowledge through investigation of different aspects of a topic.

MGSE4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec.

- Understand the relationship between gallons, cups, quarts, and pints.
- Express larger units in terms of smaller units within the same measurement system.
- Record measurement equivalents in a two-column table.

MGSE4.MD.2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

MGSE4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of the comparisons with the symbols  $>$ ,  $=$ , or  $<$ , and justify the conclusions by using visual models.

MGSE4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

STEM:

[Engineering Design Challenge](#) – Students create a model of the Earth, moon, sun for second graders. [Discovery Education STEM Project Starters](#)

**Discovery Education Science Techbook** – (Log into your DE account using your Google credentials to access DE links) You will find station rotation activities such as leveled reading passages, interactives, hands-on labs, virtual labs, video clips, and more on the **Explore** page in each Techbook unit.

[The Cycle of Day and Night](#) [The Seasons](#)

[Our Star the Sun](#)

[Physical Characteristics of the Moon](#) [Inner and Outer Planets](#)

[Planets in Our Solar System](#)

**Hands-on Activities**[Hands-On Activity: Rotate versus Revolve](#)[Hands-On Lab: Investigating Shadows over the Course of a Day](#)[Hands-On Activity: Star Maker](#)[Hands-On Activity: Viewing Stars](#)[Hands-On Activity: Sun Protection](#)[Hands-On Activity: Brightness and Distance of Stars](#)**Essential Questions****Factual—**

1. Why does light bend as it goes through various liquids or lenses?
2. Describe unique characteristics of each planet in our Solar System.
3. How has technology enhanced our knowledge of our Solar System?

**Inferential—**

1. Why do we study space?
2. What are some topics that scientists can explore by studying space?

**Critical Thinking-**

1. What benefits are there to studying space?
2. What are some problems with space travel and space exploration?

**Tier II Words-** High Frequency Multiple Meaning

planet, star, moon, telescope

**Tier III Words-** Subject/ Content Related Words

Relative size, moon phases, crescent, quarter moon, gibbous, full moon, orbit, tilt, composition, satellite, International Space Station (ISS), light refraction

**Resources**

These resources are intended to support teachers with background information and planning for instruction.

*The following Knowledge-Based Unit contains instructional read alouds designed to build knowledge around concepts associated with this planner. Highlighted lessons provide direct text-based support for the expectations of the associated SS or Sci standards and could be used to deepen student understanding/application of those standards. The remaining lessons build similar knowledge but do not directly relate to the content standards.*

[15-Day Plan: Characteristics of and Interactions Among Celestial Bodies](#)

[GaDOE Inspire Science 4th Grade: Stars, Planets, and Moon](#)

Objective or Content	Learning Experiences	Differentiation Considerations
<b>CLE 1-3:</b> S4E1. Obtain, evaluate, and communicate information to compare and contrast the physical attributes of stars and planets. S4E2. Obtain, evaluate, and communicate information to model the effects of the position and motion of the Earth and the moon in relation to the sun as observed from the Earth.	<a href="#">Stars, Planets, and Moon</a>  This Unit Segment will have students ask questions about technological advances to determine details about stars and planets. They will evaluate various models of the solar systems to determine strengths and limitations and they will analyze data and develop a model regarding day and night, orbit and tilt, and seasonal changes. Students will also develop a model to describe the repeating pattern of the phases of the moon.	Student Choice Performance Tasks Reflection and Goal Setting Learning Stations Choice Boards Formative Probes Science Journaling Multi-sensory activities Assistive Technology Flexible Grouping Multiple Means of Representation
Recommended High Quality Complex Text By Lexile Band		
<i>Learning About Our Solar System</i> by Debbie Routh  <i>Meet the Planets</i> by John McGranaghan  <i>The Planets</i> by Chelsea Donaldson  Nature of Light by National Science Teachers Association  <i>I Can See Planets and Stars from My Room</i> by Baby Professor		