CCPS Science Unit Plan

Grade	4	**Subject**	Science	**Unit #**	1
Unit Name	Unit 1: Stars, Planets, and Moon		**Timeline**	7 weeks	
How to use the Framework	This Framework should be used to implement daily science instruction. The resources and instructional strategies reflected in the Framework will provide a foundation for effective implementation and student mastery of standards. Please see the hyperlinked abbreviation document to ensure understanding of all abbreviations used with this framework. CCPS Department of Science Website for access to all unit frameworks				
Unit Overview	*All resources related to this Framework are embedded in this document or can be located via the Science Department website. **Background Information:** In this unit, students study that a model solar system can give an indication of relative sizes and positions of the planets. It can also be a great way to show that all the planets in our solar system revolve around the sun. However, it cannot easily be an accurate scale model unless an entire gymnasium is dedicated to the orbits of most of the planets. That is because of the enormous difference in size and the scale of orbits to be represented. Students will learn about how the position of the Earth affects the length of day and night as well as how the tilt of the Earth affects the seasons throughout the year. Students will also learn **Prerequisites:** Second Grade - Unit 1: Patterns in Day and Night (Standards: S2E1/S2E2) **Throughout this unit the students will**: ● *compare and contrast* the physical attributes of stars and planets ● *model* the effects of the position and motion of the Earth and moon in relation to the sun as observed from the Earth ● *use* data to *explain* why some stars appear larger than others, especially the Sun. **Throughout this unit the teacher will:** ● *support* students with generating questions, ● *evaluate* models to determine strengths and limitations of our solar system ● *provide* students with opportunities to develop multiple models ● *assist* students with constructing explanations of the differences between stars and planets and the relationship between earth's orbit and seasonal changes. **Science-4th-Teacher-Notes.pdf**				
Standards	**GSE**	**Science and Engineering Practices**	**Crosscutting Concepts**		

	S4E1. Obtain, evaluate, and communicate information to compare and contrast the physical attributes of stars and planets. **a**. Ask questions to compare and contrast technological advances that have changed the amount and type of information on distant objects in the sky. **b**. 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.) **c**. Construct an explanation of the differences between stars and planets. **d**. 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.** **a**. Develop a model to support an explanation of why the length of day and night change throughout the year. b. Develop a model based on observations to describe the repeating pattern of the phases of the moon (new, crescent, quarter, gibbous, and full). **c.** Construct an explanation of how the Earth's	**Ask Questions** A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested. **Plan and Carry Out Investigations** Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. **Construct Explanations** The products of science are explanations and the products of engineering are solutions. **Develop and Use Models** A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations. **Analyzing and Interpreting Data** Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.	**Patterns** Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. **Cause and Effect** Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts. **Systems and System Models** Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering. **Scale, proportion, and quantity:** In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance. **Energy and matter:** Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.

	orbit, with its consistent tilt, affects seasonal changes.		
NGSS Alignment	NGSS Alignment to Disciplinary Core Ideas		

The Phenomenon Protocol

Anchoring Phenomena	Learning Targets
S4E1a - Mars Rover	**Students will explain how technology influenced the amount and type of information available to us.**
S4E1b - Stars	**Students will construct an argument on why some stars appear larger and/or brighter than others.**
S4E1c - Objects in the Night Sky (video link)	**Students will explain how stars and planets are different.**
S4E1d - Solar System Models	**Students will evaluate the strengths and limitations of different solar system models.**
S4E4b - The Moon	**Students will develop a model to describe the repeating pattern of the moon**
S4E4a - Length of Daylight Hours	**Students will develop a model to explain why the length of day and night**
S4E4c - What season is it?	**Students will explain how the earth's orbit and tilt affects seasonal changes.**

Weekly Lesson Tasks

Navigation: Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Additional Resources

Week 1

Standards | Phenomenon | Weekly Lessons

GSE: S4E1.a	**Focused Concept:** ● Ask questions to compare and contrast technological advances that have changed the amount and type of information on distant objects in the sky.
Learning Target	I can ask questions to compare and contrast the technology that is used to understand objects in the sky.

Lab Safety

1. Do not eat or drink in the science lab when working on investigations
2. Use all tools and materials appropriately
3. Do not horseplay, hit, or throw materials
4. Computers should be shared where appropriate

General Safety Practices for the Elementary Science Classroom- TOC.docx

Materials:

Student Chromebook per group, hand lens concave mirror small square clear plastic	**Gizmos:** Student Exploration Document Gizmo Online Activity Space Technology Research

wrap bottle of glue permanent marker plastic spoon medium styrofoam balls	Slides Studying Objects in Outer Space

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Ask Questions and Define Problems.pdf

Phenomenon: S4E1.a - Mars Rover

DQ: How has technology influenced the amount and type of information accessible to us?

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomenon Introduction (5-7 minutes) Show students the phenomenon card and accompanying article: **S4E1a.pdf : The Mars Rovers** The teacher should allow students a few minutes to learn about each rover by clicking on the link in the website. If students do not have access to computers the teacher can review the images on the board in front of students. Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' questions on chart paper for the entire class to see and refer to throughout the week. **Inquiry Activity**	**Introduce the Driving Question: (7-10 minutes)** Have students review the driving question: *How has technology influenced the amount and type of information accessible to us?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. ****Teacher Note:** Students	**Review the Driving Question: (1-2 minutes)** *How has technology influenced the amount and type of information accessible to us?* **Graphic Organizer (2-3 minutes for students to access)** Students will need and use the student lab sheet for "Technology in Astronomy?" linked below: Instructions for Research **Materials** Space Technology Research Slides **Investigation Facilitation (20-25 minutes)** **Technology Investigation Research** "How does technology help us to observe more about objects in space?" **Objective**: Students will	**Text Annotation Strategy (30-45 minutes)** Have students read and annotate the following text: Technology in Astronomy The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysi… During the teacher-led discussion, the teacher should ask the following questions: *1.Why did early sky watchers observe and record the position*	**Review the Phenomenon (5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to the questions?* **Claim-Evidence-Reasoning (15 -25 minutes)** Students will write a response to the following driving question in the CER format. ***How has technology influenced the amount and type of information accessible to us?***

(10-15 minutes)

Gizmos: Programmable Rover
Student Handout Task (google doc)

Students will need access to computers for this activity. If available, the teacher can assign student groups of 3 to a device. If computers are unavailable, the teacher will complete the activity on the Mimio Board.

**TEACHER NOTE:
Students and teachers can access GIZMO through the Clever portal provided in Rapid Identity/ CCPS Portal. Be sure to assign the **Programmable Rover** task in Gizmo to all students prior to class or students can search for it in the GIZMO App through the search engine.

If computers are unavailable, the teacher will use the Mimio board to display the activities while students participate analogue style with "coding block" cut outs : LINK
Print out the entire page in landscape.
Each group will need at least two copies.
Cut out the coding blocks so that students can manipulate the order of the blocks.
Allow students groups to work together to write the code necessary for each section of the activity.

should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-

explore the technological advances used to understand space and design a presentation on it

Students will need to work in groups no larger than 3 students. The teacher should assign groups prior to the beginning of the activity.

The teacher should guide students through the activity in the lab.
The teacher should actively facilitate and monitor the students by walking around observing and posing questions to help them generate ideas.

Technology in Astronomy

**TEACHER NOTE:
This activity will allow students to investigate one form of technology per group by attempting to view objects through different materials. Students will then research the technology to add context to what they've observed. At the end of the research period, students will create a digital presentation describing their technology.

****NOTE:** Students who research the Radio Waves may not be able to view it through a physical model but may find a video example

Students may be unfamiliar with Google Slides and how to use it. Space Technology Research Slide

and motion of objects in the sky?
2.If you were interested in building your own telescope out of a tube with lenses, which type of telescope would you be constructing?
3.Why was it important for scientists to record their data?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
astronomy
distant
discover
research

Vocabulary Terms Chart
Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Re…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)
3-5 Student Writing Template (editable)

Have students use the handout to record their thinking and answer prompts provided in the student task.

The teacher will ask the following questions:
How has using the rover's technology helped scientists make discoveries? How can this type of technology be used in different ways? What other technology do you think can be used to see distant objects in the sky?

Materials
Student Exploration Document
Gizmo Online Activity

Additional Activity (if computers are available):

Students can complete research about what rovers actually do.
Phenomenon Rover Tas…

Phenomenon Rover Task Editable

Assessment Prep Activity:
(7-10 Minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

evidence-reasoning sample.

Review this student sample:
Moon Phases Student Sample

This CER will introduce a concept that students will learn later in the unit. However, the goal of unit is to ensure that students know how to analyze a CER correctly

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reason… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.

2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.

3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.

Ask the following questions to students as they analyze the

The teacher may scaffold the work by using the following digital template.

Students will take notes on their graphic organizer as other groups present. They will use the information that they gather for their CER on Day 5.
Studying Objects in Outer Space

The teacher will ask the following questions:
How have technological advancements helped scientists understand more about objects in space?
How does the information from each tool compare with the information from another tool?

Assessment Prep Activity:
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

Vocabulary Connect Two Strategy
Provide students with the graphic organizer (editable) or pdf handout.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to research the word using reference tools (google, research options, peer discussion, etc.). The teacher should model researching the word and using the information gathered to decide on another term that creates connections between the vocabulary word

3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:
(10-15 Minutes)

S4E1a Technology and …

	student samples: Claim-Evidence-Reason… Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… **Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.		and another term/word. Allow students to work in collaborative groups to discuss and research the other provided vocabulary terms and repeat the modeled instructional strategy. Have students collaborate, in groups, to complete the strategy for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	

Week 2 Standards | Phenomenon | Weekly Lessons	
GSE: S4E1.b	**Focused Concept:** • **Construct an argument that compares stars distance and brightness affect how we view them**
Learning Target	Students will construct an argument to support why some stars look larger and brighter than other stars
Lab Safety Protocol: **1.** Do not eat or drink in the science lab when working on investigations 2. Modeling clay should stay on the desk 3. Use all tools and materials appropriately 4. Do not horseplay, hit, or throw materials	**Materials:** Modeling Clay for each planet Flashlight Construction Paper Metric Ruler
SEP TEACHER TIP: To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Construct Explanations and Argue from Evidence.pdf	
Phenomenon: S4E1b Stars	**DQ: "Why do some stars appear larger and/or brighter than some other stars?**

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomenon Introduction (5-7 minutes) Show students the phenomenon card: S4E1b.pdf : A Look at the Stars? Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to review observations/questions from the previous week and discuss any changes or additions they would make. ' Students may have additional questions. Teacher should record all observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity (10-15 minutes)** **Savvas uConnect Lab:** **How Big is the Sun?** **The Brightness of the Sun and Others** **Objective:** Students will create a model of the sun and compare its size to other objects in the solar system. The teacher will show the student the "Brightness of the Sun and others" video for context before the student begins modeling.	**Introduce the Driving Question: (7-10 minutes)** Have students review the driving question: *Why do some stars appear larger and/or brighter than some other stars?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. **Teacher Note: Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.	**Review the Driving Question: (1-2 minutes)** *Why do some stars appear larger and/or brighter than some other stars?* **Graphic Organizer (2-3 minutes for students to access)** Students will need and use the student lab sheet for "How are distance and brightness related?" provided in their consumable book or the access to the student graphic organizer "How are distance and brightness related?" **Materials** Flashlight Construction Paper Metric Ruler **Investigation Facilitation (30-35 minutes)** How are distance and brightness related? **Objective**: Students will measure the distance in cm, of 4 objects in the room. The students will use a flashlight to rank the order of brightness (1 to 4) on their lab sheet. Students will work in groups of two or more. The teacher will assign groups prior to the activity. The teacher should actively	**Text Annotation Strategy (30-45 minutes)** Have students read and annotate the following text: The Brightness of the Sun and other Stars Reading Passage The text for this week's lesson can be found by accessing **SAVVAS Grade 5, Unit: Solar System, Lesson: Brightness of the Sun and Other Stars** The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysi… During the teacher-led discussion, the teacher should ask the following questions: *1. How does the distance of a star affect its brightness?* *2.Why does the sun appear to be the brightest star in the sky?* *3. Are there stars in the sky we can not see?* **TEACHER NOTE: Read	**Review the Phenomenon (5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to the questions?* **Claim-Evidence-Reasoning (15 -25 minutes)** Students will write a response to the following driving question in the CER format. ***"Why do some stars appear larger and/or brighter than some other stars?"*** Review the claim-evidence-reasoning poster with the students **TEACHER NOTE: Provide students with sentence starters by sharing on the boad: 3-5 Claim-Evidence-Re… Have students write their claim-evidence-reasoning

The lab for this week's lesson can be found by accessing **SAVVAS 5th Grade: Solar System Unit, Topic Launch**

**TEACHER NOTE:

Students will be asked to create models based off of their background and prior knowledge. The sizes of their suns will be different as they will have no context of their models' proportions.

However, this will create an opportunity for discussion and questions. The teacher may guide students to create the sun first, and then the planets in order to structure the student's working time and thinking.

The teacher should provide context for students after they research the approximate amount of mass of the solar system that the sun takes up.

The teacher should say: "*Everything has mass. Mass is the amount of space something takes up. The sun takes up 99.86% of all of the space in our solar system. That's almost 100%! Imagine if ____ took up almost 100% of this room, how big would that be? Now reconsider your model, how big is the sun? How big are your planets?*"

The teacher should also ask the following questions:
Certainly! Here are three higher-order thinking questions

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

Review this student sample:
Stars vs Planet Student …
This CER will introduce a concept that students will learn later in the unit. However, the goal of unit is to ensure that students know how to analyze a CER correctly

The teacher or students should read over student sample(s) to analyze

facilitate and monitor the students by walking around observing and posing questions to help them generate ideas.

The lab for this week's lesson can be found by accessing **SAVVAS Grade 5, Unit: Solar System, Lesson: Brightness of the Sun and Other Stars**

**TEACHER NOTE:
The teacher should make the classroom as dark as possible by turning off the lights and blocking the light sources that cannot be turned off.

This activity will allow students to connect the idea that some stars appear brighter because they are closer to the light source. At the end of the activity students will be able to explain why the sun appears to shine so brightly in the sky.

The teacher should explicitly tell students that the sun is the only star in our solar system while other stars exist in our galaxy. Our galaxy is much larger than our solar system. We are able to see the stars that are so far away because of how bright they are.

In the activity, students will measure the brightness of a light source at different distances. Students will learn that in order to compare brightness, they must measure how big the diameter of the light on the wall is at different distances. Students will not need to learn the word

and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
distance
solar system
star
satelite

Vocabulary Strategy:

Vocabulary Terms Chart
Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)
3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

tailored for a group of 9-year-old 4th graders, centered around creating a model of the Sun and comparing its size to other objects in the solar system: *How can we use different objects to represent the sizes of the Sun and planets in our solar system?* *Why is it important to understand the size differences of objects in our solar system?* *If our model Sun is a large beach ball, what objects would best represent the sizes of the planets?* *How do these size comparisons help us understand the solar system better?* *Why do you think the Sun is much larger than the planets?* *How does the Sun's size affect the planets and their orbits in the solar system?* **Materials:**Modeling Clay for each planet **Assessment Prep Activity:** **(7-10 Minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol: Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reason… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reason… Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… **Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn	"diameter" explicitly. The teacher can guide student thinking by having a discussion about the provided data chart for the investigation. The teacher should ask: *how do we measure distance? what tool can we use? how will we know that we've changed the distance of our light source? what materials will we use to show this change? What is diameter and how is it related to light?* The teacher may shine the light on a wall and ask *How do you think we can measure the diameter of the light that we see here? Would we consider this a bright light? Why or why not? How can we determine what rank we should give this brightness?* **Assessment Prep Activity:** **(7-10 Minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term. Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups. **Vocabulary Connect Two Strategy** Provide students with the graphic organizer (editable) or pdf handout. Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to research the word using reference tools (google, research options, peer discussion, etc.). The teacher should model researching the word and using the information gathered to decide on another term that creates connections between the vocabulary word and another term/word. Allow students to work in collaborative groups to discuss and research the other provided vocabulary terms and repeat the modeled instructional strategy.	*How are your thoughts or understanding similar to another writer on the topic?* *How are your thoughts or understanding different to another writer on the topic?* *What would you like to learn more about? Why?* **Assessment for Learning:** **(10-15 Minutes)** **S4E1b Assessment.pdf**

	vocabulary on Day 4.		Have students collaborate, in groups, to complete the strategy for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	

Week 3
Standards | Phenomenon | Weekly Lessons

GSE: S4E1.c	**Focused Concept:** • **Construct an explanation to compare and contrast stars and planets**
Learning Target	I can explain the differences and similarities between stars and planets

Lab Safety Protocol:

5. Do not eat or drink in the science lab when working on investigations
6. Use all tools and materials appropriately
7. Do not horseplay, hit, or throw materials

General Safety Practices for the Elementary Science Classroom- TOC.docx

Materials:

1 Tape measure (per class) ¼ inch piece of string (per class) 2 ½ inch piece of string (per class) 5 inch piece of string (per class)	2 ft 4 ½ inch piece of string (per class) 5ft piece of string (per class) 1 Rubber band (per group) Consumable 1 Marker (per group) 1 Roll masking tape (per class)

Phenomenon: Objects in the Night Sky (video link)	**DQ: How are stars and planets different?**

SEP TEACHER TIP: To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Construct Explanations and Argue from Evidence.pdf

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary

Phenomenon Introduction
(5-7 minutes)
Show students the phenomenon card: **S4E1c.pdf : Objects in the Night Sky (video link)**

Use the See-Think-Wonder protocol to guide student thinking.

Teachers should provide students opportunities to review observations/questions from the previous week and discuss any changes or additions they would make. Students may have additional questions. Teacher should record all observations and questions on chart paper for referencing throughout this week's lesson.

Inquiry Activity
Comparing Stars and Planets

Objective: Students will create a scaled model of different planets and stars in order to compare the sizes

Have students follow the procedure provided in the lab and answer the Discuss Questions

The lab for this week can be found here:
4E1C Comparing Stars and Planets Teacher Instructions

**TEACHER NOTE:

Students will be using chalk or markers and will need a large amount of space (outside for

Introduce the Driving Question:
(7-10 minutes)

Have students review the driving question:

How are stars and planets different?

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****Teacher Note:**
Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Review the Driving Question:
(1-2 minutes)

How are stars and planets different?

Graphic Organizer
(2-3 minutes for students to access)
Students will need and use the student lab sheet for Comparing Stars and Planets

Materials
Stars vs. Planets Video
GA_4E1C_ComparingS…
Comparing Stars and Planets Data Cards
Comparing Stars and Planets

Investigation Facilitation
Stars vs Planets
GA_4E1C_ComparingS…

Objective: In this activity, students become a living model of the solar system and use their observations to compare stars and planets.

The teacher will show the video, Stars vs. Planets, prior to the activity to build understanding of the terms and reasoning being addressed in the activity.

After the video, the teacher should follow the instructions outlined in the teacher guidance: Teacher Instructions

The teacher should actively facilitate and monitor the students by walking around observing and posing questions

Text Annotation Strategy
(30-45 minutes)

Have students read and annotate the following text:

Planets without a Sun

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysi…

During the teacher-led discussion, the teacher should ask the following questions:

1.Is there a specific order of the planets in our solar system?
2. How would you describe planets?
3. How would you describe stars?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Claim-Evidence-Reasoning
(15 -25 minutes)
Students will write a response to the following driving question in the CER format.

How are stars and planets different?

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Re…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer"

chalk) or paper (indoor for markers)

The teacher should prepare for this lesson by creating the tools in advance.

The string measurements are long and could be cut down by a fourth to make the images shorter and easier to operate with. Here are the measurements cut into fourths:
¼ inch - Earth
2 ½ inch - Saturn
5 inch - Barnard's Star
2 ft 4 ½ inches - Sun
5ft - Sirius A

The strings represent the radius of the stars and planets, therefore a lot of space or paper is needed to draw the stars.

Note planets and stars should be drawn in the order listed in order to provide guided discussion around their comparison

The teacher should ask the questions from steps 12 to 16 in order. In addition to those questions throughout the investigation, the following questions should be posed to students:
Sure! Here are three higher-order thinking questions for 9-year-old 4th graders, focused on creating a scaled model of different planets and stars to compare their sizes:

How can we choose the right objects to represent different planets and stars in our scaled

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

to help them generate ideas.

**TEACHER NOTE:
MODIFICATION: The teacher can supply some students with flashlights **instead** of hanging string lights around the classroom.

If teachers use this modification, students with flashlights should stand still while the other students orbit around the "sun"

The teacher should choose 8 students to represent the 8 planets in our solar system.

If available, flashlights should come in different sizes.

The teacher should ask the following questions:
How can we position ourselves to represent the different planets and stars in our living model of the solar system?
What does a model need to help us to understand the structure of the solar system?
When we observe our living model, what do we notice about the movement and placement of planets compared to stars?
How does acting out the positions and movements of stars and planets deepen our understanding of their characteristics and relationships?

Assessment Prep Activity:
(7-10 Minutes)
Following the task, click the link above. Have students

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
Constellation
galaxy
universe
astronaut

Vocabulary Strategy:
Four Square
Provide students with the graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words.

Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate to complete the four square strategy for the other vocabulary terms.

Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics.

Allow groups to share their thinking through academic dialogue and compare their completed task with members

to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)
3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning:
(10-15 Minutes)
S4E1c Comparing Stars …

model? If we use a basketball to represent the Sun, what objects would be good choices for representing the sizes of other stars and planets? How do these comparisons help us understand the differences between them? Why do you think some stars are much larger than others and even larger than planets? How does understanding the size differences between stars and planets help us learn more about our universe? **Materials** 1 Tape measure (per class) ¼ inch piece of string (per class) 2 ½ inch piece of string (per class) 5 inch piece of string (per class) 2 ft 4 ½ inch piece of string (per class) 5ft piece of string (per class) 1 Rubber band (per group) Consumable 1 Marker (per group) 1 Roll masking tape (per class) **Assessment Prep Activity:** **(7-10 Minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	Claim-Evidence-Reason… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reason… Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… ****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	practice applying their knowledge to an assessment question.	of other groups.	

GSE: S4E1.d		**Focused Concept:** • Students will evaluate the strengths and limitations of models of our solar system based on the relative size, order, appearance, and composition (gaseous or rocky only) of planets and the sun		
Learning Target	The students will construct an explanation solar system models for their strengths and limitations			
Lab Safety Protocol: **8.** Do not eat or drink in the science lab when working on investigations 9. Use all tools and materials appropriately 10. Do not horseplay, hit, or throw materials 11. Computers may need to be shared when needed **General Safety Practices for the Elementary Science Classroom- TOC.docx**		**Materials:** Gizmos: Solar System Model Instructions Brightness Test Solar System Scale Model Printout		
SEP TEACHER TIP: To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Construct Explanations and Argue from Evidence.pdf				
Phenomenon: Solar System Models			**DQ: Are all solar system models the same? Why or why not?**	
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomenon Introduction **(5-7 minutes)** Show students the phenomenon card: **S4E1d.pdf :Are Solar system models the same?** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity** **(10-15 minutes)**	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *Are all solar system models the same? Why or why not?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.	**Graphic Organizer** **(2-3 minutes for students to access)** *Are all solar system models the same? Why or why not?* Students will need and use the student lab sheet for: Brightness Test Copy of Mystery Scienc… **Materials** Brightness Test Solar System Scale Model Printout **Investigation Facilitation** **(30-35 minutes)** Mystery Science: How can the sun help us explore other stars and planets?	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: Planets in the Solar System The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol:	**Claim-Evidence-Reasoning** **(15 -25 minutes)** Students will write a response to the following driving question in the CER format. **Are all solar system models the same? Why or why not?** Review the claim-evidence-reasoning poster with the students **TEACHER NOTE: Provide students with sentence starters by sharing on the board: 3-5 Claim-Evidence-Re… Have students write their claim-evidence-reasoning **writing a claim**

Gizmos: Solar System
(link)

Objective: Students will observe the structure and function of a digital model of a solar system

Have students complete the Gizmo Activity and chart here: Gizmos: Solar System Model Instructions

**TEACHER NOTE:

Students should not complete the entire Gizmo Activity, only the portion snipped in the Google Slides Template above.

Before students begin, Teacher should ask the following questions:

How many planets are in our solar system? What are the names of the planets in our solar system? How can we understand the solar system from earth?

The teacher should allow students a few minutes to interact with the components of the simulation allowing them to interact with different parts of the Gizmo.

Ensure that students reset the Gizmo before continuing. The teacher should support students by modeling the steps for the first or second planet, then allow students to complete the rest on their own.

Be sure to create a reference for students to have throughout the week.
****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this

Objective: Students will design a solar system model using strips of paper. They will compare the brightness level of the sun from each planet.

Students will use the Brightness Test worksheet to determine how much light reaches their planet. The students will choose a planet and determine if their design of their rover is adequate for the amount of light that reaches the planet.

The teacher should guide students through the activity in the lab.
The teacher should actively facilitate and monitor the students by walking around observing and posing questions to help them generate ideas.

The lab for this week's lesson can be found by accessing **Stars & Planets Unit, Lesson 1**

**TEACHER NOTE:
Each model Solar System extends about 3 meters (10 feet) so each pair of students will need this amount of space. If you don't have enough floor space, a few student desks pushed together should work just fine! Students will also need enough space to walk along the side of their model Solar System for their brightness tests.

If you don't have enough space, you can adapt the model to omit Neptune. Simply leave

3-5 Information Analysis Student Organizer (editable)

3-5 Information Analysi…

During the teacher-led discussion, the teacher should ask the following questions:

1. What are the limitations of solar system models?
2. How do planet sizes compare to the sizes of stars?
3. Can a model be created with no limitations?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
distance
dim
bright
solar energy

Vocabulary Strategy:
Four Square
Provide students with the graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of

Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to

Once students complete the Task, the teacher should ask the following questions: *How is this model different from the pictures in our phenomenon? How does this model help us to understand our solar system? How is the photo model limited? What is one limitation of the simulation model? Which model do you prefer, why? Do you think you could build a model without limitations?*

Materials:
Gizmos: Solar System Model Instructions

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reason… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.

2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.

3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.

Ask the following questions to students as they analyze the student samples:

Claim-Evidence-Reason…

the strips of paper H, I, J, and K unattached. This will create a model that is 2 meters (6 feet) long. Be sure to discuss with students that Neptune is missing from their model. Have students predict how bright the Sun would appear from Neptune using their other observations.

The teacher should discuss with the students what they notice about the order of the planets. Students should learn the order of the planets through this investigation as well as the distance between them. To extend students' learning the teacher should allow students to gather more information about what each planet is made of using internet research or by using the following diagram: Planet Composition
Students can add this information to their graphic organizer and use it to help them decide where to send the rover.

The teacher should ask the following questions:

How can we tell if a model of the solar system shows the planets' sizes and distances accurately?
When looking at different models of the solar system, how can we determine which ones show the correct order and appearance of the planets?
Why is it important to recognize the differences between gaseous and rocky planets in these models?

the provided vocabulary words.

Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate to complete the four square strategy for the other vocabulary terms.

Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

Understanding Vocabulary Strategy

Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, antonym, synonym, picture, *in my own words* (meaning), and sentence

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide and post the meaning of the word for students to refer to.

Allow students to work in

another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:
(10-15 minutes)
S4E1D Solar System M…

	Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… **Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	*Why do you think some models of the solar system are better at showing certain details, like the size of planets, while others might not? How do these strengths and limitations affect our understanding of the solar system's composition and structure?* **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	collaborative groups to discuss an antonym and a synonym. The group should draw or provide/insert an image of the word based on their understanding, write the provided meaning in their own words and write a sentence using the vocabulary word. Have students collaborate, in groups, to complete the strategy for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	

Week 5 Standards | Phenomenon | Weekly Lessons				
GSE: S4E2.b		**Focused Concept:** Develop a model to describe the repeating pattern of the phases of the moon		
Learning Target	Students will develop a model based on observations to describe the repeating patterns of the phases of the moon			
Lab Safety Protocol: **12.** Do not eat or drink in the science lab when working on investigations 13. Use all tools and materials appropriately 14. Do not horseplay, hit, or throw materials **General Safety Practices for the Elementary Science Classroom- TOC.docx**		**Materials:** Phases of the Moon Student Edition Graphic Organizer Skewer (or pencil) Styrofoam ball (2") Bright flashlight		
SEP TEACHER TIP: To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Develop and Use Models.pdf				
Phenomenon: S4E4b - The Moon		**DQ: Why does the appearance of the moon change?**		
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomenon Introduction:	**Introduce the Driving**	**Review the Driving Question:**	**Text Annotation Strategy**	**Review the Phenomenon**

(5-7 minutes)

Show students the phenomenon card: **S4E4b - The Moon**

Use the See-Think-Wonder protocol to guide student thinking.

Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson.

Inquiry Activity
(10-15 minutes)

Gizmo
Phases of the Moon

Objective: Students will understand the phases of the Moon by observing the positions of the Moon, Earth and Sun

Have students follow the procedure provided in the graphic organizer:

Phases of the Moon Student Edition

The lab for this week's lesson can be found by accessing **Gizmos: Phases of the Moon**

**TEACHER NOTE:
In this activity, students observe a view of the Moon from Earth as shown on the right as the Moon orbits Earth.

Question:
(7 - 10 minutes)

Have students review the driving question:

Why does the appearance of the moon change?

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

**TEACHER NOTE:
Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

(1-2 minutes)

Why does the appearance of the moon change?

Graphic Organizer and Materials
(2-3 minutes for students to access)

Students will not need graphic organizers and will instead discuss what they observe during the investigation by answering questions in their Check for Understanding: Why Does the Moon Change Shape?

Materials:
Skewer (or pencil) (per group)
Styrofoam ball (2") (per group)
Bright flashlight
(per group)
Why Does the Moon Change Shape? (per student)

Investigation Facilitation
(20-25 minutes)

Mystery Science: Why does the moon change shape?

Objective: Students will explore why the Moon seems to change shape (phases) over the course of a month.

In this investigation students groups will use a flashlight and a styrofoam ball to model the phases of the moon.

The teacher should guide students through the activity in the lab.
The teacher should actively facilitate and monitor the

(30-45 minutes)

Have students read and annotate the following text:

The Ever Changing Sky

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysi…

During the teacher-led discussion, the teacher should ask the following questions:

1.When does a full moon occur?/How do you know it's a full moon?
2. The phases of the moon are caused by the moon's orbit around the earth. How long does this orbit to occur?
3.What are some examples of how the sky is ever-changing?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit

(5-7 minutes)

Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1.

Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?*

Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to those questions?*

Claim-Evidence-Reasoning
(15 -25 minutes)

Students will write a response to the following driving question in the CER format.

Why does the appearance of the moon change?

Review the claim-evidence-reasoning poster with the students

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Re…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their

Students will make observations about the rotation of the moon and answer questions about what they see.

The teacher can discuss the questions with the students, whole group and record students' thoughts and answers on an anchor chart for the class to see and refer to later in the week.

The following questions should be discussed in addition to the Gizmo questions:
What do the positions of the Moon, Earth, and Sun tell us about why the Moon looks different at various times?
Why do you think the Moon goes through phases instead of always looking the same? How do the changing positions of the Moon, Earth, and Sun help explain these phases?
What patterns do you notice in the phases of the Moon when you observe its position relative to the Earth and Sun? How can understanding these patterns help us predict the Moon's appearance at different times of the month?

Materials
Phases of the Moon Student Edition Graphic Organizer

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reason…

students by walking around observing and posing questions to help them generate ideas.

The lab for this week's lesson can be found by accessing **Mystery Science, Spaceship Earth Unit, Lesson 5**
The Teacher should ONLY select the "**Hands-On Activity**"

**TEACHER NOTE:

Students will use the Why Does the Moon Change Shape? Check for Understanding to collect their observations.
The teacher should take time to review the questions on the document first. Then provide students with time to discuss how they will use the materials to answer the questions. Have the students write their plan on the back of the paper. The teacher can guide students thoughts and plans with questions like: *How will you position your materials to see what the student in the question saw? Will there be any moving parts? Why? What will move? Who will represent the moon? Who will represent the sun? What will represent the earth? What should each person do?*

Following the activity, the teacher should ask the following Questions:
What patterns did you explore?
How many phases did you see?
Does the moon produce the light that we see on earth?
What causes us to see moon phases?

time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
orbit
phase
rotate
revolve

Vocabulary Strategy:
Four Square
Provide students with the graphic organizer (editable) or pdf handout, explaining its four sections: word, meaning, picture, and sentence.

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words.

Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate to complete the four square strategy for the other vocabulary terms.

Monitor student progress, sharing new ideas for class discussion, and help students distinguish essential from non-essential characteristics.

Allow groups to share their thinking through academic

knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?

knowledge to an assessment question.	(PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reason… Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… **Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	*What could we use to build a model that shows moon phases? What does each material represent?* *What is the relationship between the sun moon and earth when the moon is fully reflecting the sun?* *Where is the moon in relation to the sun and earth when only part of the moon can be seen?* **Assessment Prep Activity:** **(7-10 minutes)** Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	dialogue and compare their completed task with members of other groups. **Understanding Vocabulary Strategy** Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, antonym, synonym, picture, *in my own words* (meaning), and sentence Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide and post the meaning of the word for students to refer to. Allow students to work in collaborative groups to discuss an antonym and a synonym. The group should draw or provide/insert an image of the word based on their understanding, write the provided meaning in their own words and write a sentence using the vocabulary word. Have students collaborate, in groups, to complete the strategy for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	*What would you like to learn more about? Why?* **Assessment for Learning:** **(10-15 minutes)** S4E2b Assessment

Week 6

Standards | Phenomenon | Weekly Lessons

GSE: S4E2.a	**Focused Concept:** • Develop a model to support an explanation of why the length of day and night change throughout the year
Learning Target	I can build a model to explain day and night

Lab Safety Protocol:

15. Do not eat or drink in the science lab when working on investigations
16. Use all tools and materials appropriately
17. Do not horseplay, hit, or throw materials
18. Computers may need to be shared
19. **General Safety Practices for the Elementary Science Classroom- TOC.docx**

Materials:

1 Globe (per group) 1 Pinch of modeling clay (per group) 1 Flashlight (per group)	Compass Paper Pencil Stick or straw Tape Paper plate

SEP TEACHER TIP:

To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol: Develop and Use Models.pdf

Phenomenon: Length of Daylight Hours

DQ: Why are the days longer in the summer in Georgia?

Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomenon Introduction: **(5-7 minutes)** Show students the phenomenon card: **S4E2a.pdf Why are the days longer in the Summer in Georgia?** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *Why are the days longer in the summer in Georgia?* Use the strategy to support students with making connections and understanding	**Review the Driving Question:** **(1-2 minutes)** *Why are the days longer in the summer in Georgia?* **Graphic Organizer and Materials** **(2-3 minutes for students to access)** Who Set the First Clock	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: Day and Night Good Morning The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following	**Review the Phenomenon** **(5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?*

students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson.

Inquiry Activity
(10-15 minutes)

Day and Night

Objective: Students will model why we experience day and night.

The teacher should follow the instructions in the activity:
GA_4E2A_DayandNigh…

**TEACHER NOTE:

The teacher should support student investigation skills by first asking them the following questions:
How do we know it is day?
How do we know it is night?
What happens to signal that day is coming? Night?
Then allow students to view the materials and determine how they can model what happens between the earth and sun and moon when there is day and night. Allow students to develop a set of procedures to show what happens when:
a city is experiencing night.
a city is experiencing day.
a city is experiencing sunrise.
a city is experiencing sunset.

the driving question (DQ).

Visualizing the Driving Question

Click here to access question words reference chart

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****Teacher Note:**
Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

Investigation Facilitation
(30-35 minutes)

Objective: Students will design a sundial to demonstrate the rotation of the Earth around the Sun on its tilt.

Students will learn how the day was divided into hours and how clocks measure the Sun's apparent movement. In the activity, Make a Shadow Clock, students make their own sundials.

Procedures For Building the Sundial:
1 Cut out the sundial and glue it to a paper plate. 2 Poke a hole through the center of the plate using the pencil. 3 Push the straw through the hole, and tape the short end underneath to hold it in place. 4 Take your sundial outside on a sunny day at noon and place it in a flat, sunny area.

****Teacher Note:**
First, students use flashlights indoors to understand how the position of the light affects the time shown on the clock. Then, students take their shadow clocks outside to see how the position of the Sun can tell them the time of day.

The teacher should refer to the models of earth's relation to the sun and moon from previous lessons highlighting earth's tilt. It is important for students to recognize how much light different parts of the earth get at various locations relative to

strategy:

3-5 Text Annotation Prot…

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)
3-5 Information Analysi…

During the teacher-led discussion, the teacher should ask the following questions:

What determines the length of days?
Why are the length of days in Georgia different from the length of days in California in the Summer?

TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

(10-15 minutes)
Vocabulary Words:
Rotation
Axis
Orbit

Vocabulary Strategy:
Vocabulary Terms Chart
Provide students with the graphic organizer (editable) or

Have students review their initial questions. Ask students:
What questions generated on Day 1 can you answer, now?
What are your answers to those questions?

Claim-Evidence-Reasoning
(15 -25 minutes)

Students will write a response to the following driving question in the CER format.
Why are the days longer in the summer in Georgia?

Review the claim-evidence-reasoning poster with the students

TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Re…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of

If a globe is not available for every student group, the teacher can have specific groups model the actions above and allow onlooking students to share why they agree or disagree

The teacher should model for students earth's "tilt" explaining that the earth does not sit straight up in its orbit, but is slightly tilted. Have the students to model day, night, sunrise, and sunset again this time paying attention to the difference with the tilt.
Ask the following questions:
How does this tilt affect the amount of sunlight that a city gets? Where would your city need to be to experience a longer day time? Night time? Why would a city experience a longer day time? Do you ever notice that the day seems longer throughout the year? When is that? Can you model on your globe why our area experiences more daylight hours?

Materials
1 Globe (per group)
1 Pinch of modeling clay (per group)
1 Flashlight (per group)

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

Claim-Evidence-Reasoning Record Observations Document (google doc)

Claim-Evidence-Reason… (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.

2. Identify the student's

the sun.

The teacher should pose the following questions:
1. What does the movement of the shadow on the sundial tell us about the Earth's rotation and tilt?
2. Why do you think the position and angle of the sundial are important for it to work correctly?
How does the Earth's tilt affect the shadows we observe throughout the day?
3. What patterns do you observe in the shadows on the sundial at different times of the day and year? How do these patterns help us understand the Earth's rotation around the Sun and the effect of its tilt?

Materials:
Compass
Paper
Pencil
Stick or straw
Tape
Paper plate
Flashlight

Assessment Prep Activity:
(7-10 minutes)
Following the task, click the link above. Have students practice applying their knowledge to an assessment question.

pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:
(10-15 minutes)
S4E2a Day and Night A…

	evidence in the sample and have the teacher or students write their observations or questions. *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reason… Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… **TEACHER NOTE: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.			

Week 7 Standards | Phenomenon | Weekly Lessons	
GSE: S4E2.c	**Focused Concept:** • **Construct and argument to explain how seasonal changes are affected by the earth's orbit and tilt**
Learning Target	I can explain how the earth's orbit and tilt affect seasonal changes
Lab Safety Protocol: **20.** Do not eat or drink in the science lab when working on investigations 21. Use all tools and materials appropriately 22. Do not horseplay, hit, or throw materials	**Materials:** large flashlight (for each group) styrofoam ball (for each group) skewer (for each ball)

23. Computers may need to be shared	black marker red marker

SEP TEACHER TIP:
To support students with the Science & Engineering Practices for this week, follow the guidance in this protocol:
Construct Explanations and Argue from Evidence.pdf

Phenomenon: S4E2c - What season is it?		**DQ: What season is it and how do you know?**		
Day 1: Opening	**Day 2 : Guided Practice/ Transition**	**Day 3: Independent Practice**	**Day 4: Independent Practice**	**Day 5: Assessment / Summary**
Phenomenon Introduction: **(5-7 minutes)** Show students the phenomenon card: **S4E2c.pdf What season is it and how do you know?** Use the See-Think-Wonder protocol to guide student thinking. Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations and questions on chart paper for referencing throughout this week's lesson. **Inquiry Activity** **(10-15 minutes)** **Mystery Science: How can the sun tell you the season? (Link)** **Objective**: Students explore how the Sun's path changes with the seasons. The lab for this week's lesson	**Introduce the Driving Question:** **(7 - 10 minutes)** Have students review the driving question: *What season is it and how do you know?* Use the strategy to support students with making connections and understanding the driving question (DQ). Visualizing the Driving Question Click here to access question words reference chart The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer. Be sure to create a reference for students to have throughout the week. ****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the	**Review the Driving Question:** **(1-2 minutes)** *What season is it and how do you know?* **Graphic Organizer** **(2-3 minutes for students to access)** **What happens when we revolve?** **Materials** large flashlight (for each group) styrofoam ball (for each group) skewer (for each ball) black marker red marker **Investigation Facilitation** **(25-30 minutes)** **What happens when we revolve?** **Objective**: Students will develop and evaluate a model of earth's rotation and tilt and discuss the relationship to seasons **Procedures**: Teacher Set Up 1. Draw a line around the	**Text Annotation Strategy** **(30-45 minutes)** Have students read and annotate the following text: What Causes the Seasons The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy: 3-5 Text Annotation Prot… Students should complete the following student handout as they work through the text annotation protocol: 3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysi… During the teacher-led discussion, the teacher should ask the following questions: *1. How does earth's tilt have an effect on the seasons we experience?* *2. How does the earth orbit in space? How do we know?*	**Review the Phenomenon** **(5-7 minutes)** Allow students to review the initial observations and questions from see, think, wonder strategy on Day 1. Have students review initial ideas. Ask students: *Have any of your ideas about the phenomenon changed? How?* Have students review their initial questions. Ask students: *What questions generated on Day 1 can you answer, now? What are your answers to those questions?* **Claim-Evidence-Reasoning** **(15 -25 minutes)** Students will write a response to the following driving question in the CER format. ***What season is it and how do you know?*** Review the claim-evidence-reasoning poster with the students

can be found by accessing **Mystery Science, Spaceship Earth Unit, Lesson 3**

**TEACHER NOTE:

Students will complete this visual activity using scientific observation and discussion. Students will observe images and guess the season by identifying clues in the photo.

The teacher should guide students observations by having them ask questions about their 5 senses like:
What might your body feel in this scene? What might you hear? What else would you see? Is there a smell that might be associated with this season? What are some tastes that you might have just in this season?
The teacher should guide students observations of the earth's position in relation to the sun by asking the following questions:
In the picture where you would feel hot, where is the sun in the sky? How might that play a role in why you feel hot?
Is the sun in the same position in the sky in the picture where you might be wearing a coat? What would have changed?

Materials
N/A

Assessment Prep Activity:
(7-10 minutes)

phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)
(10-12 minutes)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the claim-evidence-reasoning poster with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide

center of each styrofoam ball to represent the equator of the earth
2. Push a skewer through the middle of each styrofoam ball perpendicular to the horizontal line to represent the earth's axis

1. Provide student groups with the materials

2. Discuss what each item would represent by asking the questions: *1. How does the flashlight help us model the relationship between the Sun and the Earth? Explain the role of light in demonstrating this relationship.*
2. In what ways does the styrofoam ball represent the Earth in our model, and how does its positioning help us understand the Earth's movement in relation to the Sun?
3. How does the skewer through the styrofoam ball help us visualize the Earth's axis and its tilt? Discuss the significance of the Earth's tilt in relation to seasonal changes.
4. How does the line on the styrofoam ball enhance our understanding of the Earth's equator and its impact on the distribution of sunlight? Analyze how this affects the different seasons in various parts of the Earth.

3. Decide where Georgia will be located on your earth model and mark it with a medium red dot. It will be in the Northern Hemisphere

3. How can a model show why earth experiences seasons?

**TEACHER NOTE: Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy
(10-15 minutes)

Vocabulary Words:
rotation
revolution
axis
tilt
hemisphere
orbit

Vocabulary Strategy:

Vocabulary Terms Chart
Provide students with the graphic organizer (editable) or pdf handout, explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the

**TEACHER NOTE: Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Re…

Have students write their claim-evidence-reasoning

writing a claim
Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence
Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning
Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

3-5 Student Writing Template (editable)
3-5 Student Writing Template (pdf)

Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	student names. The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol: Claim-Evidence-Reasoning Record Observations Document (google doc) Claim-Evidence-Reason… (PDF) *1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.* *2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.* *3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.* Ask the following questions to students as they analyze the student samples: Claim-Evidence-Reason… Discuss the criteria of the the CER Rubric: Claim Evidence Reasoni… **Teacher Note: As students review the student samples,	4. Use the materials and their representations to develop a plan that illustrates why earth has day and night. 5. Use the materials and their representations to develop a plan that illustrates why the earth experiences seasons. 6. Record your plan on a sheet of paper and carry out your plan 7. In your investigation model, tilt your earth's axis about 35 degrees then re-run your plan. 8. Notice any differences in how the light hits "Georgia" **TEACHER NOTE: The teacher should pose the following questions: *How did you set up your model? What caused Georgia to experience the most "day time"? Was there a way to set up the model to make Georgia experience summer? Earth is tilted on its axis - the skewer in the middle. What happened when you tilted the earth? How did the light hit the area differently? What effect does the rotation of the earth around the sun have on where the light hits?* **Assessment Prep Activity:** **(7-10 minutes)**	connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term. Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups. **Vocabulary Connect Two Strategy** Provide students with the graphic organizer (editable) or pdf handout. Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. Allow students to research the word using reference tools (google, research options, peer discussion, etc.). The teacher should model researching the word and using the information gathered to decide on another term that creates connections between the vocabulary word and another term/word. Allow students to work in	**TEACHER NOTE: Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions: *How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?* **Assessment for Learning:** **(10-15 minutes)** **S4E2c Seasons Assessm…**

	they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.	Following the task, click the link above. Have students practice applying their knowledge to an assessment question.	collaborative groups to discuss and research the other provided vocabulary terms and repeat the modeled instructional strategy. Have students collaborate, in groups, to complete the strategy for the other vocabulary terms. Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.	

Assessment Prep (5-7 minutes)

Prepare students for assessment by reviewing the following Assessment Prep Presentation.

Objective: Have students make connections between in class tasks and assessment questions to provide an opportunity for students to analyze and interpret the expectations of test and quiz questions and apply knowledge of experience to answering the assessment questions accurately

Facilitation: The teacher will select an assessment question that relates to the concept of the day. Students should only analyze one question each day the *"Assessment Prep Activity"* is provided in the plan. Students should engage in discussion to argue and develop reasoning for answer choices that are both correct and incorrect.

Goal: The goal is to practice the skills of test taking, such as: process of elimination, reasoned assumption, avoiding premature selection, checking for consistency, time management, using context clues, reading questions carefully, etc to build confidence in students as they perform on summative assessments throughout the year.

Use the following:

G4U1 Stars, Planets, and Moon

Provide the following guidance:

Place students in groups and display the assessment question. Complete the following assessment prep protocol:

Ask the students the following questions as they work through the assessment prep protocol.

- *What is the question asking you?*
- *What do you know about the vocabulary or concept in the question?*
- *Is this question similar to any investigations or tasks we've completed?*
- *How can what you've done help you answer this question?*
- *Just view the assessment question: What is the question asking you?*

Guide students to think about how their inquiry task and investigation experience connects to the question.
Using the answer choices provided, students should begin asking themselves and their group members:

- Identify a wrong answer: How do I know this answer is incorrect?
- Identify the right answer: How do we know this answer is correct?

Allow the students time to discuss in collaborative groups.

TEACHER NOTE: If students struggle with the question, review the same question on the very next day. Do not feel the need to rush to the next question to review. Assessment prep is not meant to be a lengthy activity when considering time. Provide students with five - seven minutes to analyze the question and check for understanding.

Labs / Investigations		
Mandatory Labs	**Explore Learning Gizmo**	**Mystery Science/Phet**
Technology in Astronomy **How are distance and brightness related?** **Comparing Stars and Planets**	**Programmable Rover** **Solar System** **Phases of the Moon**	**How Can the Sun Help Us Explore Other Planets?** **Why does the moon change shape?** **How are distance and brightness related?** **Who Set the First Clock?** **How can the sun tell you the season?**

Additional- Resources/Tasks	
Unit Assessment	*Unit assessment can be found in Illuminate under De'Juan WInfield, titled "Science_CA Unit 1_GR4."*
Supplemental Labs	
Culminating Performance Task	CER Task: How has technology influenced the amount and type of information accessible to us? CER Task: Why do some stars appear larger and/or brighter than some other stars? CER Task: How are stars and planets different? CER Task: Are all solar system models the same? How? CER Task: Why does the appearance of the moon change? CER Task: Why are the days longer in the summer in Georgia? CER Task: What season is it and how do you know?

STEM Activities	
Lesson Plan guidance document and template	: https://drive.google.com/file/d/1dDFitw1NesctodMZ9XAr7zc0-S5GZKPB/view?usp=drive_link