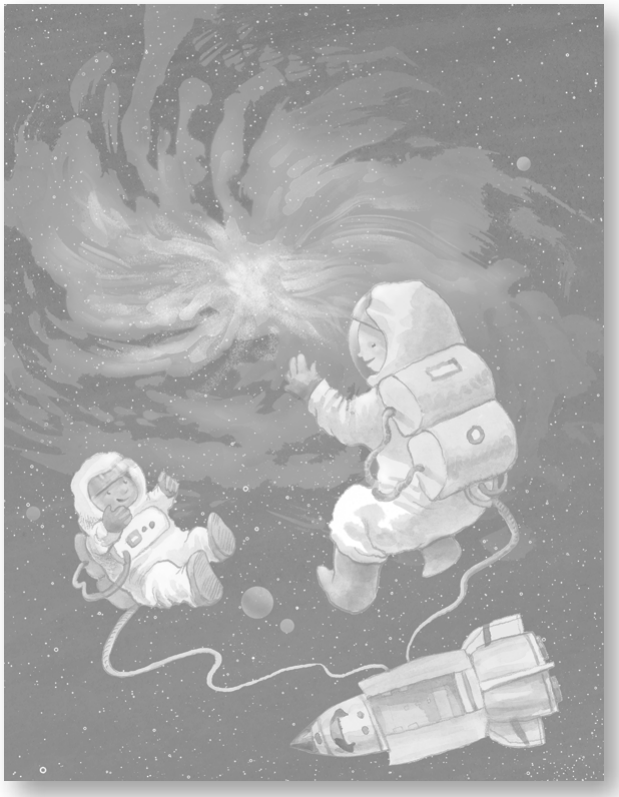
Astronomy

Tell It Again!™ Read-Aloud Anthology

GRADE 1 Core Knowledge Language Arts® • Listening & Learning™ Strand

Core Knowledge®



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GRADE 1

Core Knowledge Language Arts®

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Alignment Chart for Astronomy

The following chart contains core content objectives addressed in this domain. It also demonstrates alignment between the Common Core State Standards and corresponding Core Knowledge Language Arts (CKLA) goals.

Alignment Chart for Astronomy	**Lesson**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Core Content Objectives									
Recognize the sun in the sky	✓								
Explain that the sun, moon, and stars are located in outer space	✓								
Explain that the sun is a source of energy, light, and heat	✓							✓	
Classify the sun as a star	✓		✓					✓	
Identify Earth as a planet and our home		✓						✓	
Identify the earth's rotation, or spin, as the cause of day and night		✓						✓	✓
Explain that other parts of the world experience nighttime while we have daytime		✓							
Explain sunrise and sunset		✓							
Explain that Earth orbits the sun		✓		✓				✓	✓
Describe stars as large, although they appear small in the night sky			✓						
Describe stars as hot, distant, and made of gas			✓						
Explain that astronomers study the moon and stars using telescopes			✓	✓	✓	✓	✓		
Describe how people sometimes tell stories about the moon and stars			✓	✓	✓	✓			
Explain what a constellation is				✓					
Identify the Big Dipper and the North Star				✓					
Identify the four phases of the moon—new, crescent, half, full					✓				
Explain that the moon orbits the earth					✓		✓		

Alignment Chart for Astronomy

	Lesson								
	1	2	3	4	5	6	7	8	9
Explain that astronauts travel to outer space						✓	✓		
Describe the landing on the moon by American astronauts							✓		
Explain the importance of the first trip to the moon							✓		
Explain that our solar system includes the sun and the planets that orbit around it								✓	✓
Indicate that there are eight planets in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune)								✓	✓
Classify Pluto as a dwarf planet									✓

Reading Standards for Literature: Grade 1

Craft and Structure

STD RL.1.5	Explain major differences between books that tell stories and books that give information, drawing on a wide reading of a range of text types.								
CKLA Goal(s)	Listen to, understand, and recognize a variety of texts, including fictional stories, fairy tales, fables, historical narratives, informational text, nursery rhymes, and poems, describing the differences between books that tell stories and books that give information			✓					

Reading Standards for Informational Text: Grade 1

Key Ideas and Details

STD RI.1.1	Ask and answer questions about key details in a text.								
CKLA Goal(s)	Ask and answer questions (e.g., *who, what, where, when*), orally or in writing, requiring literal recall and understanding of the details and/or facts of a nonfiction/informational read-aloud				✓				
	Answer questions that require making interpretations, judgments, or giving opinions about what is heard in a nonfiction/informational read-aloud, including answering *why* questions that require recognizing cause/effect relationships				✓				

Alignment Chart for Astronomy

		Lesson								
		1	2	3	4	5	6	7	8	9
STD RI.1.3	Describe the connection between two individuals, events, ideas, or pieces of information in a text.									
CKLA Goal(s)	Describe the connection between two individuals, events, ideas, or pieces of information in a nonfiction/informational read-aloud			✓		✓	✓	✓	✓	✓
Craft and Structure										
STD RI.1.4	Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.									
CKLA Goal(s)	Ask and answer questions about unknown words and phrases in nonfiction/informational read-alouds and discussions					✓				
Integration of Knowledge and Ideas										
STD RI.1.7	Use the illustrations and details in a text to describe its key ideas.									
CKLA Goal(s)	Use illustrations and details in a nonfiction/informational read-aloud to describe its key ideas					✓			✓	
STD RI.1.9	Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).									
CKLA Goal(s)	Compare and contrast (orally or in writing) similarities and differences within a single nonfiction/informational read-aloud or between two or more nonfiction/informational read-alouds								✓	
Range of Reading and Level of Text Complexity										
STD RI.1.10	With prompting and support, read informational texts appropriately complex for Grade 1.									
CKLA Goal(s)	Listen to and demonstrate understanding of nonfiction/informational read-alouds of appropriate complexity for Grades 1–3					✓				
Writing Standards: Grade 1										
Research to Build and Present Knowledge										
STD W.1.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.									
CKLA Goal(s)	Make personal connections (orally or in writing) to events or experiences in a fiction or nonfiction/informational read-aloud, and/or make connections among several read-alouds							✓		
	With assistance, categorize and organize facts and information within a given domain to answer questions	✓		✓				✓	✓	✓

Alignment Chart for Astronomy

		Lesson								
		1	2	3	4	5	6	7	8	9
Speaking and Listening Standards: Grade 1										
Comprehension and Collaboration										
STD SL.1.1	Participate in collaborative conversations with diverse partners about Grade 1 topics and texts with peers and adults in small and large groups.									
STD SL.1.1a	Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).									
CKLA Goal(s)	Use agreed-upon rules for group discussion, e.g., look at and listen to the speaker, raise hand to speak, take turns, say "excuse me" or "please," etc.					✓				
STD SL.1.1b	Build on others' talk in conversations by responding to the comments of others through multiple exchanges.									
CKLA Goal(s)	Carry on and participate in a conversation over at least six turns, staying on topic, initiating comments or responding to a partner's comments, with either an adult or another child of the same age					✓				
STD SL.1.1c	Ask questions to clear up any confusion about the topics and texts under discussion.									
CKLA Goal(s)	Ask questions to clarify information about the topic in a fiction or nonfiction/ informational read-aloud					✓				
STD SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.									
CKLA Goal(s)	Ask and answer questions (e.g., *who, what, where, when*), orally or in writing, requiring literal recall and understanding of the details, and/or facts of a fiction or nonfiction/informational read-aloud	✓	✓		✓	✓			✓	
STD SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.									
CKLA Goal(s)	Ask questions to clarify directions, exercises, classroom routines, and/or what a speaker says about a topic				✓			✓		
Presentation of Knowledge and Ideas										
STD SL.1.4	Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.									
CKLA Goal(s)	Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly	✓	✓	✓			✓	✓		✓

Alignment Chart for Astronomy

		Lesson								
		1	2	3	4	5	6	7	8	9
STD SL.1.5	Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.									
CKLA Goal(s)	Add drawings or other visual displays to oral or written descriptions when appropriate to clarify ideas, thoughts, and feelings	✓		✓	✓		✓	✓		
STD SL.1.6	Produce complete sentences when appropriate to task and situation.									
CKLA Goal(s)	Produce complete sentences when appropriate to task and situation					✓				

Language Standards: Grade 1

Vocabulary Acquisition and Use

STD L.1.5	With guidance and support from adults, demonstrate understanding of word relationships and nuances in word meanings.									
STD L.1.5a	Sort words into categories (e.g., colors, clothing) to gain a sense of the concepts the categories represent.									
CKLA Goal(s)	Sort words into categories (e.g., colors, clothing) to gain a sense of the concepts the categories represent	✓								
	Provide examples of common synonyms and antonyms			✓	✓				✓	
STD L.1.5c	Identify real-life connections between words and their use (e.g., note places at home that are *cozy*).									
CKLA Goal(s)	Identify real-life connections between words and their use (e.g., note places at home that are *cozy*)					✓				
STD L.1.5d	Distinguish shades of meaning among verbs differing in manner (e.g., *look, peek, glance, stare, glare, scowl*) and adjectives differing in intensity (e.g., *large, gigantic*) by defining or choosing them or by acting out the meanings.									
CKLA Goal(s)	Distinguish shades of meaning among verbs differing in manner (e.g., *look, peek, glance, stare, glare, scowl*) and adjectives differing in intensity (e.g., *large, gigantic*) by defining or choosing them or by acting out the meanings									
STD L.1.6	Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., *because*).									
CKLA Goal(s)	Learn the meaning of common sayings and phrases		✓		✓					

Alignment Chart for Astronomy

	Lesson								
	1	2	3	4	5	6	7	8	9
Additional CKLA Goals									
Listen to a variety of texts, including informational text					✓				
Identify new meanings for familiar words and apply them accurately	✓							✓	
Prior to listening to an informational read-aloud, identify what they know about a given topic		✓	✓	✓	✓			✓	✓
While listening to an informational read-aloud, orally predict what will happen next in the read-aloud based on the text heard thus far, and then compare the actual outcome to the prediction						✓			
Use possessive pronouns orally							✓		

✓ These goals are addressed in all lessons in this domain. Rather than repeat these goals as lesson objectives throughout the domain, they are designated here as frequently occurring goals.

Introduction to Astronomy

This introduction includes the necessary background information to be used in teaching the *Astronomy* domain. *The Tell It Again! Read-Aloud Anthology* for *Astronomy* contains nine daily lessons, each of which is composed of two distinct parts, so that the lesson may be divided into smaller chunks of time and presented at different intervals during the day. Each entire lesson will require a total of sixty minutes.

This domain includes a Pausing Point following Lesson 5. At the end of the domain, a Domain Review, a Domain Assessment, and Culminating Activities are included to allow time to review, reinforce, assess, and remediate content knowledge. **You should spend no more than thirteen days total on this domain.**

Week One				
Day 1 #	**Day 2** #	**Day 3** #	**Day 4** #	**Day 5** # ⑩
Lesson 1A: "Introduction to the Sun and Space" (40 min.)	Lesson 2A: "The Earth and the Sun" (40 min.)	Lesson 3A: "Stars" (40 min.)	Lesson 4A: "Stargazing and Constellations" (40 min.)	Lesson 5A: "The Moon" (40 min.)
Lesson 1B: Extensions (20 min.)	Lesson 2B: Extensions (20 min.)	Lesson 3B: Extensions (20 min.)	Lesson 4B: Extensions (20 min.)	Lesson 5B: Extensions (20 min.)
60 min.	60 min.	60 min.	60 min.	60 min.

Week Two				
Day 6 ⑩	**Day 7** #	**Day 8**	**Day 9** #	**Day 10**
Pausing Point (40 min.)	Lesson 6A: "History of Space Exploration and Astronauts" (40 min.)	Lesson 7A: "Exploration of the Moon" (40 min.)	Lesson 8A: "The Solar System, Part I" (40 min.)	Lesson 9A: "The Solar System, Part II" (40 min.)
Pausing Point (20 min.)	Lesson 6B: Extensions (20 min.)	Lesson 7B: Extensions (20 min.)	Lesson 8B: Extensions (20 min.)	Lesson 9B: Extensions (20 min.)
60 min.	60 min.	60 min.	60 min.	60 min.

Week Three		
Day 11	**Day 12** ⑩	**Day 13**
Domain Review (40 min.)	Domain Assessment (40 min.)	Culminating Activities (40 min.)
Domain Review (20 min.)	Domain Assessment (20 min.)	Culminating Activities (20 min.)
60 min.	60 min.	60 min.

⑩ Lessons include Student Performance Task Assessments

\# Lessons require advance preparation and/or additional materials; please plan ahead

Domain Components

Along with this Anthology, you will need:

- *Tell It Again! Media Disk* or the *Tell It Again! Flip Book* for *Astronomy*
- *Tell It Again! Image Cards* for *Astronomy*
- *Tell It Again! Supplemental Guide* for *Astronomy*
- *Tell It Again! Multiple Meaning Word Posters* for *Astronomy*

Recommended Resource:

- *Core Knowledge Teacher Handbook (Grade 1),* edited by E.D. Hirsch, Jr. and Souzanne A. Wright (Core Knowledge Foundation, 2004) ISBN: 978-1890517700

Why Astronomy Is Important

In this domain, students will be introduced to the solar system—our home in space. They will learn that Earth, the planet on which we live, is just one of many different celestial bodies within the solar system. They will learn how the sun, the stars, the moon, and the other planets relate to the earth (given its position in space). In the early read-alouds, students will learn that the sun is a giant star as well as a source of light, heat, and energy for the earth. They will also learn about the earth's orbit around the sun, and how the earth's own rotation on its axis leads to the phenomenon of day and night.

Part of this domain is focused on the history of space exploration and the missions to the moon. Students will learn about NASA, the Space Race, the Apollo missions, and what it takes to be an astronaut. Students will get a good introduction to the basics of astronomy in this domain, and this foundation will be built upon when students study the solar system in much greater depth in the third grade.

What Students Have Already Learned in Core Knowledge Language Arts During Kindergarten

The following Kindergarten domains, and the specific core content that was targeted in those domains, are particularly relevant to the read-alouds students will hear in *Astronomy.* This background knowledge will greatly enhance your students' understanding of the read-alouds they are about to enjoy:

Seasons and Weather

- Identify the following units of time and their relationship to one another: day, week, month, year
- Characterize the North and South Poles as always cold in temperature, the middle section of the earth as usually warm, and the United States as having four seasons
- Describe any unique seasonal differences that are characteristic of their own locality (change of color and dropping of leaves in autumn; snow or ice in winter; increased rain and/or flooding in spring; etc.)
- Identify a thermometer as an instrument used to measure temperature, and describe how it works: i.e., as the temperature becomes warmer, the liquid in the thermometer rises; as the temperature becomes cooler, the liquid in the thermometer descends

Taking Care of the Earth

- Explain that Earth is composed of land, water, and air
- Explain that humans, plants, and animals depend on Earth's land, water, and air to live
- Explain that natural resources are things found in nature that are valuable and of great importance to people
- Explain that land, air, and water all suffer from different types of pollution, and most types of pollution are caused by human activities
- Compare and contrast freshwater, salt water, and wastewater
- Explain that many living things, including humans, need fresh water to survive, and that there is a limited supply of freshwater on Earth

Core Vocabulary for Astronomy

The following list contains all of the core vocabulary words in *Astronomy* in the forms in which they appear in the read-alouds or, in some instances, in the "Introducing the Read-Aloud" section at the beginning of the lesson. Boldfaced words in the list have an associated Word Work activity. The inclusion of the words on this list does not mean that students are immediately expected to be able to use all of these words on their own. However, through repeated exposure throughout the lessons, they should acquire a good understanding of most of these words and begin to use some of them in conversation. You will find a horizontal word wall activity in Lesson 4 for the academic vocabulary word *major.* We recommend that you take students through this activity for the remaining academic vocabulary, which is assessed in Part I (items #11-15) of the Domain Assessment. In this domain, the additional academic vocabulary words are: *ancient, appearance, determined,* and *categorize.*

Lesson 1

atmosphere
gas
rays
shadow
surface

Lesson 2

gravity
horizon
orbit
planet
rotates

Lesson 3

dusk
meteor
stars
telescopes
universe

Lesson 4

advances
ancient
celestial bodies
constellations
myths

Lesson 5

appearance
counterclockwise
craters
crescent
reflecting

Lesson 6

astronaut
launch
rockets
spacecraft
technology

Lesson 7

determined
disaster
historic
missions
nervously

Lesson 8

abundant
accomplish
inner
solar
unique

Lesson 9

categorize
debris
outer
probes
violent

Student Performance Task Assessments

In the *Tell It Again! Read-Aloud Anthology* for *Astronomy*, there are numerous opportunities to assess students' learning. These assessment opportunities range from informal observations, such as *Think Pair Share* and some Extension activities, to more formal written assessments. These Student Performance Task Assessments (SPTA) are identified in the *Tell It Again! Read-Aloud Anthology* with this icon: ⑩. There is also an end-of-domain summative assessment. Use the Tens Conversion Chart located in the Appendix to convert a raw score on each SPTA into a Tens score. On the same page, you will also find the rubric for recording observational Tens Scores.

Above and Beyond

In the *Tell It Again! Read-Aloud Anthology* for *Astronomy,* there are numerous opportunities in the lessons and the Pausing Point to challenge students who are ready to attempt activities that are above grade level. These activities are labeled "Above and Beyond" and are identified with this icon: .

Supplemental Guide

Accompanying the *Tell It Again! Read-Aloud Anthology* is a *Supplemental Guide* designed specifically to assist educators who serve students with limited English oral language skills or students with limited home literary experience, which may include English Language Learners (ELLs) and children with special needs. Teachers whose students would benefit from enhanced oral language practice may opt to use the *Supplemental Guide* as their primary guide in the Listening & Learning Strand. Teachers may also choose to begin a domain by using the *Supplemental Guide* as their primary guide before transitioning to the *Tell It Again! Read-Aloud Anthology,* or may choose individual activities from the *Supplemental Guide* to augment the content covered in the *Tell It Again! Read-Aloud Anthology.*

The *Supplemental Guide* activities that may be particularly relevant to any classroom are the Multiple Meaning Word Activities and accompanying Multiple Meaning Word Posters, which help students

determine and clarify different meanings of words; Syntactic Awareness Activities, which call students' attention to sentence structure, word order, and grammar; and Vocabulary Instructional Activities, which place importance on building students' general academic, or Tier 2, vocabulary. These activities afford all students additional opportunities to acquire a richer understanding of the English language. Several of these activities have been included as Extensions in the *Tell It Again! Read-Aloud Anthology.* In addition, several words in the *Tell It Again! Read-Aloud Anthology* are underlined, indicating that they are multiple-meaning words. The accompanying sidebars explain some of the more common alternate meanings of these words. *Supplemental Guide* activities included in the *Tell It Again! Read-Aloud Anthology* are identified with this icon: ⇆.

Recommended Resources for Astronomy

The *Tell It Again! Read-Aloud Anthology* includes a number of opportunities in Extensions, the Pausing Point, and the Domain Review for teachers to select trade books from this list to reinforce domain concepts through the use of authentic literature. In addition, teachers should consider other times throughout the day when they might infuse authentic domain-related literature. If you recommend that families read aloud with their child each night, you may wish to suggest that they choose titles from this trade book list to reinforce the domain concepts. You might also consider creating a classroom lending library, allowing students to borrow domain-related books to read at home with their families.

1. *Astronomy* (DK Eyewitness Books), by Kristin Lippincott (DK Children, 2008) ISBN 978-0756637675
2. *Exploring the Solar System,* by Mary Kay Carson (Chicago Review Press, 2008) ISBN 978-1556527159
3. *Find the Constellations*, by H. A. Rey (Houghton Mifflin Books for Children, 2008) ISBN 978-0547131788
4. *Find Out About Astronomy,* by Robin Kerrod (Armadillo, 2012) ISBN 978-1843228684
5. *The Magic School Bus: Lost in the Solar System*, by Joanna Cole and illustrated by Bruce Degen (Scholastic Inc., 1992) ISBN 978-0590414296

6. *Midnight on the Moon (Magic Tree House, No. 8)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 1996) ISBN 978-0679863748
7. *The Moon Seems to Change*, by Franklyn M. Branley and illustrated by Barbara and Ed Emberley (HarperCollins, 1987) ISBN 978-0064450652
8. *National Geographic Readers: Planets,* by Elizabeth Carney (National Geographic Children's Books, 2012) ISBN 978-1426310362
9. *National Geographic Little Kids First Big Book of Space,* by Catherine D. Hughes and illustrated by David A. Aguilar (National Geographic Children's Books, 2012) ISBN 978-1426310140
10. *Once Upon a Starry Night: A Book of Constellations*, by Jacqueline Mitton and illustrated by Christina Balit (National Geographic Children's Books, 2009) ISBN 978-1426303913 (**Note:** This book's beautiful illustrations can help students imagine what the constellations look like when they look up at the stars. The myths/text, however, is not recommended for first grade.)
11. *Our Solar System*, by Seymour Simon (Collins, 2007) ISBN 978-0061140082
12. *Planets: A Solar System Stickerbook*, by Ellen Hasbrouck and illustrated by Scott McDougall (Little Simon, 2001) ISBN 978-0689844140
13. *Stargazers*, by Gail Gibbons (Holiday House, 1999) ISBN 978-0823415076
14. *Starry Sky,* by Kate Hayden (DK Children, 2006) ISBN 978-0756619596
15. *Sun Up*, Sun Down, by Gail Gibbons (Voyager Books, 1987) ISBN 978-0152827823
16. *What Makes Day and Night*, by Franklyn M. Branley and illustrated by Arthur Dorros (HarperCollins, 1986) ISBN 978-0064450508

17. *Wynken, Blynken, and Nod*, by Eugene W. Field and illustrated by Giselle Potter (Schwartz & Wade, 2008) ISBN 978-0375841965

Note: Please remember to tell students that not very long ago, students in school were taught that there were nine planets in the solar system, including Pluto. However, in 2006, astronomers decided to categorize Pluto as a dwarf planet, so there are now eight major planets. If you choose additional books to read aloud, be sure to include the phrase *dwarf planet* when referring to Pluto. Remember also that there are still many excellent astronomy books in print that classify Pluto as a planet, but are otherwise informative trade books.

Websites and Other Resources

Student Resources

1. Interactive Earth Rotation
   http://www.bbc.co.uk/schools/scienceclips/ages/9_10/earth_sun_moon.shtml
2. NASA Kids' Club
   http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html
3. National Geographic Space Activities and Photos
   http://kids.nationalgeographic.com/kids/photos/space-shuttles/#/columbia-launch-gpn-2000-000756_14481_600x450.jpg
4. PBS Game on Outer Space
   http://pbskids.org/martha/games/socksinspace/index.html

Teacher Resources

5. American Museum of Natural History Resources on Space
   http://www.amnh.org/content/search?SearchText=space&x=0&y=0
6. Photographs from the Hubble Space Telescope
   http://hubblesite.org/gallery/album/entire/npp/all/

Introduction to the Sun and Space

1

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Recognize the sun in the sky
- ✓ Explain that the sun, moon, and stars are located in outer space
- ✓ Explain that the sun is a source of energy, light, and heat
- ✓ Classify the sun as a star

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ With assistance, categorize and organize information about what things are located in Earth's atmosphere and what things are located in outer space (W.1.7)
- ✓ Ask and answer *what* questions orally, requiring literal recall and understanding of the details or facts from "Introduction to the Sun and Space" (SL.1.2)
- ✓ Describe the sun with relevant details, expressing ideas and feelings clearly (SL.1.4)
- ✓ Add drawings to descriptions of Earth's atmosphere and outer space to clarify the concepts (SL.1.5)
- ✓ Sort words into categories to gain of sense of the concepts of atmosphere and outer space (SL.1.6)

Core Vocabulary

atmosphere, *n.* The bubble of air that surrounds Earth
Example: The earth's atmosphere allows us to breathe.
Variation(s): atmospheres

gas, *n.* Unlike liquids or solids, a thin substance through which objects can pass, such as smoke or steam
Example: One cold day when I saw my breath, I realized that my breath was a gas.
Variation(s): gases

rays, *n.* Straight beams of light or energy
Example: The sun's rays were shining in my eyes.
Variation(s): ray

shadow, *n.* A shaded spot created when light is blocked from an area behind or under an object
Example: I like trying to step on my shadow when I am walking down the sidewalk.
Variation(s): shadows

surface, *n.* The outside or top layer of a solid object
Example: The surface of the moon is very bumpy.
Variation(s): surfaces

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**Domain Introduction**		10
	Where Are We?	world map or globe	
	Essential Background Information or Terms		
	Purpose for Listening		
Presenting the Read-Aloud	**Introduction to the Sun and Space**	world map or globe	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Gas	blown-up balloon	5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Astronomy Journals**	Instructional Master 1B-1; one blank sheet of 8½" by 11" paper, drawing tools [This exercise requires advance preparation.]	20
	Multiple Meaning Word Activity: Space	Poster 1M (Space)	
Take-Home Material	**Family Letter**	Instructional Masters 1B-2, 1B-3	*

Introduction to the Sun and Space

1A

Introducing the Read-Aloud

***10** minutes*

Domain Introduction

Tell students that over the next few weeks they will be learning about astronomy, the study of outer space. Ask them if they have ever heard of outer space. If so, ask them what can be found in outer space beyond the earth.

Note: The earth is located in space. When we use the term "outer" space, we are referring to areas *beyond* the earth's immediate atmosphere. If students name objects that they can see in the sky, such as airplanes, birds, or clouds, keep in mind that these objects are in the first level of sky called the atmosphere, so they are not considered to be in outer space.

State that they might be surprised to know that they see objects from outer space in the sky every day. Ask the following questions:

- What is the big, hot, bright object we can see in the sky during the day? (the sun)
- What is the big object that we can see in the sky at night and that appears to be glowing? (the moon)
- What are the small, twinkling lights we can see in the sky at night? (the stars)

Point out that all of these objects—the sun, moon, and stars—are actually in outer space. Tell students that over the next few weeks, they will learn more about the sun, the moon, the stars, and other objects in outer space.

Where Are We?

Show students a globe, and tell them that the globe is a model of the earth, where we live. Point to the appropriate location on the globe as you say the following:

- You live in (your town).
- (Your town) is in the state of (your state).
- (Your state) is in the country of the United States of America.
- The United States of America is on the continent of North America.
- North America is on Earth.

Explain that even though it seems that the ground we stand on is flat and still, we actually live on a tiny part of a huge sphere, or ball, just like this globe. This huge sphere is called Earth, and it is always moving in space. If you traveled in a rocket far, far up in the sky and then looked back down, you would see something that looked like this globe moving in a huge, black, seemingly endless space. Emphasize the following points:

- The earth, sun, moon, and stars are all in space.
- The sun, moon, and stars are beyond the earth, where we live. To us on Earth, the sun, moon, and stars are in *outer* space.

Essential Background Information or Terms

Tell students that the name for the study of objects in outer space, the area beyond the earth, is *astronomy.* Ask students to repeat the word *astronomy.* Explain that *astro–* actually means stars, and that astronomy is a science that includes the study of the stars. Direct students to say the word *astronomer.* Explain that astronomers are scientists who study outer space. Tell students that astronomers look at the stars through telescopes and try to learn about our universe. A person must study for many years before becoming an astronomer. Emphasize that over the next few weeks, students will pretend to be astronomers as they learn about outer space.

Purpose for Listening

Explain to students that the sky they see during the day or night actually has two parts: the part with air and clouds that looks blue during the day and is close to Earth, called the *atmosphere;* and a huge, black part even farther away called *outer space*. Tell students to listen carefully to hear about some objects they can see in the sky, and to hear which of these objects are actually located in outer space.

Presenting the Read-Aloud — **15** *minutes*

Introduction to the Sun and Space

Show image 1A-1: Sky

Have you looked up at the sky lately? What did you see?[1] Perhaps you saw a clear, blue sky, or maybe there were a few puffy, white clouds floating around. Or maybe the sky was streaked with gray clouds.

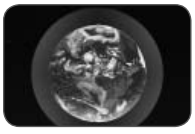
1 [Pause for responses. If there is a window in your classroom, ask one student to look out and describe the clouds.]

Show image 1A-2: Plane, bird, red balloon, clouds

Occasionally when you look up in the sky you can see an airplane or a bird flying by, or even a red balloon someone accidentally let loose.[2] Some days, it is fun to lie on your back in the grass and stare up at the interesting shapes of the puffy, white clouds overhead. Perhaps you or someone you know has even flown in an airplane, up among the clouds high above the earth's **surface.**[3]

2 [Point to these objects in the image.]

3 The ground that we walk on is the top layer of the earth called the earth's surface.



Show image 1A-3: Bubble of air

You can think of the sky in two layers. There is a big blanket or bubble of air that surrounds Earth. This bubble covers the whole earth—all the ground and oceans and everything else on the earth's surface, including you! This bubble of air is called the **atmosphere.** But the blue atmosphere does not tell the whole story. The second layer of the sky is all of outer space, which lies beyond the atmosphere, an endless expanse of stars and moons and other objects.[4]

Of course, during the day here on Earth, it is easy to forget that outer space is there, but it always is. The earth—your home—is just one little object moving around in the middle of it all, like a speck of sand amidst all the sands in the ocean.

4 Here the word *space* means the region beyond Earth's atmosphere in which there are stars and planets. The word *space* can also mean a blank area separating written or printed words.

Show image 1A-4: Sun over a field

During the day, the sun shines over the earth, shedding light on all the animals and plants that live on the earth's surface. The sun's **rays**[5] spread across the skies, which appear blue to your eyes.

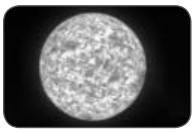
5 or beams of light

The sun itself is a star. It is not part of Earth or Earth's sky. In fact, the sun is far, far away from Earth—so far away that it would take more than three months to reach it in the fastest rocket ship. But even if you *could* reach the sun in a rocket ship, you would never be able to get close to it. That is because the sun, like other stars, is an enormous ball of very hot hydrogen **gas.** [6] Everything that gets too close to it burns up instantly.

Just how enormous is the sun? Think about this: if the sun was a huge bowl and the earth was a little marble, you could stuff about one million marbles into that bowl. In other words, it would take a million Earths to fill the sun! [7]

6 That means that the sun is not a solid object or a liquid. It is made of gas, a thin substance that objects could pass right through—if they didn't burn up first!

7 [Show the globe.] The real Earth is much, much bigger than this. The sun is gigantic if it's the same size as a million Earths!



Show image 1A-5: The sun

The sun is just one out of billions of stars in space. However, the sun is *our* star; it is the earth's star. Without the sun, Earth would be a cold, lifeless hunk of rock. All living things on Earth—from the trees to the bees to the flowers and the fleas—rely on the sun in one way or another. The heat, light, and energy of the sun allow life to flourish here on Earth. [8]

8 Living things wouldn't be able to live without the heat, light, and energy of the sun.

Show image 1A-6: Sunrise

The rising sun signals the start of a new day. In the morning, the sun rises in the east, and its rays shed light across the land. [9] People wake up and get ready for a new day, getting dressed and eating breakfast, and then traveling outside to wherever it is they go—to school, to the office, to a store, or simply out for a walk.

9 The sun warms up the land, too. It's usually colder at night than during the day.

Show image 1A-7: Shadows

Have you ever noticed your **shadow** on the ground? If the sun is behind you while you are walking down the sidewalk, then your body blocks the sun's rays and creates a shadow [10] on the ground. Your shadow is not the only shadow in the world. [11] Clouds cast shadows as well. So do buildings and trees. Have you ever rested under the shade of a tree on a hot summer day? If so, you were resting in the shadow cast by the tree's leaves and branches.

10 or shaded spot

11 [Point to the shadows in the image.]

Show image 1A-8: Applying sunscreen

On a hot summer day you can feel the warmth of the sun on your skin, and if you do not use sunscreen [12] then you may get a sunburn. Ouch! The sun's energy can burn your skin, and that's bad. Sunburns hurt, and if you get sunburned too often, it can cause serious damage to your skin.

12 [Point to the sunscreen.]

On the other hand, the sun's light is also good for you. When your bare skin is exposed to sunlight, your body creates Vitamin D, which is one of the many vitamins your body needs in order to stay healthy and strong. So playing outside in the sunshine isn't just fun; it's good for you, too!

Show image 1A-9: Moon

At the end of each day, when the sun goes down in the west, the sky changes. It isn't blue anymore. The sky becomes black, and new sights appear. Instead of clouds and birds and blue sky, you may see an array of shining stars. You may see something else, as well—not the sun, but another object hovering in the skies above: the moon. [13]

13 [Point to the moon in the image.] Sometimes you can also see the moon during the day.

Show image 1A-10: Outer space

Over the next several days you will learn about the sun, the moon, the stars, and all sorts of amazing and interesting facts about outer space—the place beyond the earth's sky or atmosphere. This study of the stars and other things in outer space is called *astronomy.* [14] The read-alouds you will hear in the coming days will provide a basic introduction to astronomy, but it's only a beginning. There is so much to learn about the stars and other objects in space, that you can spend the rest of your life studying it and never run out of new things to learn and discover. That is because astronomy is the study of *everything* beyond our little home that we call Earth. [15] And if astronomers have learned anything through the years, they know that there is no end to the amount of new knowledge and surprises to be discovered in the study of the stars and outer space.

14 Do you remember what *astro–* means?

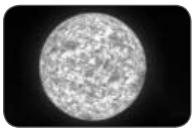
15 Do you remember what an astronomer is?

Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — *10 minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding the students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Literal* Name some objects you can see in the sky. (Answers may vary, but may include things such as airplanes, clouds, and birds.)
2. *Literal* You just heard that the sky has two levels. The first level is made up of a blanket or bubble of air that surrounds the earth. What do we call this bubble of air? (the atmosphere)
3. *Literal* You also heard that beyond or above the atmosphere is the level of the sky we call outer space. Name some objects that can be found in outer space. (stars, sun, moon)



Show image 1A-5: The sun

4. *Inferential* What is this a picture of? (the sun) What did you learn about the sun? [Ask any of the following questions to cover information missing from students' descriptions of the sun.]
   - Is the sun a rock or a star? (star)
   - Is the sun hot or cold? (hot)
   - What is the sun made of? (gas, specifically hydrogen gas)
   - Is the sun near Earth or far away? (far away)
   - Is the sun bigger or smaller than the earth? (bigger) How much bigger? (a million times)
5. *Inferential* What is a shadow? (a shady spot) How are shadows created? (When light shines on an object, the object blocks the light that hits it from landing behind that object, causing a shaded area.)

6. *Literal* After the sun sets, what other objects from outer space are visible in the night sky? (stars, moon)

7. *Literal* What do we call the scientific study of stars and outer space? (astronomy) What do we call a scientist who studies astronomy? (an astronomer)

[Please continue to model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

8. *What? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. Think of a question you can ask your neighbor about the read-aloud that starts with the word *what*. For example, you could ask, "What does the sun do in the morning?" Turn to your neighbor and ask your *what* question. Listen to your neighbor's response. Then your neighbor will ask a new *what* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

9. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Gas *5 minutes*

Note: You may wish to show students an inflated balloon and demonstrate deflating it to help them see that there is a gas (oxygen) inside.

1. In the read-aloud you heard, "[T]he sun, like other stars, is an enormous ball of very hot hydrogen *gas*."
2. Say the word *gas* with me.
3. A gas, unlike a solid or a liquid, is a thin, sometimes invisible, substance through which objects can pass.
4. An example of a gas you might know is steam, the cloud that rises above hot water.
5. Where do you think there is a gas in the classroom? Outside? [Ask two or three students. If necessary, guide and/or rephrase the students' responses, "_____ is a gas."]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I am going to name some substances. If the substance I name is a gas, say, "That is a gas." If not, say, "That is not a gas."

1. orange juice (That is not a gas.)
2. wood (That is not a gas.)
3. steam (That is a gas.)
4. air (That is a gas.)
5. brick (That is not a gas.)
6. your breath that you can see on a cold day (That is a gas.)

Complete Remainder of the Lesson Later in the Day

Introduction to the Sun and Space

1B

Extensions

***20** minutes*

Astronomy Journals (Instructional Master 1B-1)

Prior to the lesson, make a journal for each student using Instructional Master 1B-1. Directions: Take copies of this sheet and staple one blank piece of 8½" by 11" paper inside to make a four-page book. Read the title of the Instructional Master to students and encourage each of them to write their name on the blank line on the cover of the Instructional Master.

Emphasize to students that over the next few weeks they are going to pretend to be astronomers as they learn about outer space. Tell them they will use their astronomy journals to record both observations (what they see) and facts (what they learn) about outer space.

Then take students outside, or if that is not possible, take them to a large window where they can see the sky. Direct students to spend five minutes sketching the objects they see in the sky on the first page of their journals. Tell students that a sketch is a simple drawing with few details or colors. Also tell them to label the objects they draw using the letter-sound correspondences learned thus far. Remind students about the two levels of the sky: the atmosphere and outer space. Discuss students' sketches, helping them recognize which objects in their drawings are located inside Earth's atmosphere. (birds, airplanes, clouds, etc.) Then direct students to circle any object that is found in outer space, outside or beyond the bubble of air we call the atmosphere. (the sun, or possibly the moon if it is visible)

Multiple Meaning Word

Associated Phrase: Space

1. [Show Poster 1M (Space)] In the read-aloud you heard, "The second layer of the sky is all of outer *space,* which lies beyond the atmosphere, an endless expanse of stars and moons and other objects." [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
2. *Space* can also mean a blank area separating written or printed words. [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
3. [Point to the image of outer space.] With your partner, talk about what you think of when you see this kind of space. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this type of space, I think of the sun, the moon, planets, etc.)
4. [Point to the image of the blank area between words.] With your partner, talk about what you think of when you see this kind of space. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this type of space, I think of empty lines, no letters, etc.)

Take-Home Material

Family Letter

Send home Instructional Masters 1B-2 and 1B-3.

The Earth and the Sun 2

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Identify Earth as a planet and our home
- ✓ Identify the earth's rotation, or spin, as the cause of day and night
- ✓ Explain that other parts of the world experience nighttime while we have daytime
- ✓ Explain sunrise and sunset
- ✓ Explain that Earth orbits the sun

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Ask and answer *where* questions orally, requiring literal recall and understanding of the details or facts from "The Earth and the Sun" (SL.1.2)
- ✓ Describe the causes for night and day on Earth with relevant details, expressing ideas and feelings clearly (SL.1.4)
- ✓ Explain the meaning of "AM" and "PM" and use in appropriate contexts (L.1.6)

Core Vocabulary

gravity, *n.* The force or pull of objects down to Earth or toward each other
Example: Every time I throw a ball up in the air, gravity pulls it down again.
Variation(s): none

horizon, *n.* The place in the distance where the land or a body of water appears to meet the sky
Example: While I was standing on the beach, I saw a large ship on the horizon, far off in the distance.
Variation(s): horizons

orbit, *n.* A regular and repeated path that one object takes around another, usually in space
Example: People used to believe that the sun circled the earth; now we know the earth travels in an orbit around the sun.
Variation(s): orbits

planet, *n.* A large object in space that does not provide its own light but circles around a star for light
Example: The earth is a planet that circles around the sun.
Variation(s): planets

rotates, *v.* Spins around an axis or center
Example: The ballet dancer rotates round and round very fast during a pirouette.
Variation(s): rotate, rotated, rotating

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Essential Background Information or Terms	globe; hula hoop; pin	
	Purpose for Listening		
Presenting the Read-Aloud	**The Earth and the Sun**	globe	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Horizon	drawing paper, drawing tools	5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**Day and Night Demonstration**	flashlight; globe	20
	Sayings and Phrases: AM and PM	analog or digital clock	

The Earth and the Sun

2A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Begin with a review of the previous lesson by asking students the following questions:

- What do we call a scientist who studies astronomy or space? (an astronomer)
- Name some objects that are in space. (the earth, sun, moon, and stars)
- What do we call the first level of the sky, the bubble of air that surrounds the earth? (the atmosphere)
- Which of the objects in space—sun, moon, or stars—can be seen during the day? (the sun and sometimes the moon) Which can be seen at night? (the moon and the stars)

Remind students even though it is far away from the earth and looks smaller, the sun is actually much larger than the earth and provides the earth with light, heat, and energy.

Essential Background Information or Terms

Tell students that the earth moves in two different ways and that you are going to show them these ways today. Using a flag or pin, mark the approximate location of your town on a globe. Tell students that this is where you live and emphasize that you live on the planet Earth, which is represented by the globe.

Tell students that even though they can't feel it, the earth is spinning. Explain that astronomers use the word *rotation* to describe the earth's spin. When the earth spins around, we say it rotates. Spin the globe to demonstrate this rotation. Then ask students to rotate or spin in place. Tell students that this is one of the two ways the earth moves in space.

Share that the earth doesn't just rotate or spin in place; it also travels around, or revolves around, the sun. Place a hula hoop on the floor and tell students that you will now pretend that the hula hoop is the sun. Explain that the real sun is much bigger than the earth, just like the hula hoop is much bigger than the globe. Begin walking around the hula hoop while holding and continuing to spin the globe. Tell students that astronomers call the path the earth follows as it revolves or travels around the sun its orbit. Ask one or two students to walk around or orbit the hula hoop sun. Tell students that it takes the earth one year to travel all the way around the sun.

Tell students that the earth is always orbiting, or revolving around, the sun. Share with students that the earth is also always rotating, which is why we always have day and night.

Purpose for Listening

Tell students to listen carefully to find out how the earth's rotation causes day and night.

Presenting the Read-Aloud — **15** *minutes*

The Earth and the Sun

Show image 2A-1: Sunrise

All plants, animals, and people rely on the sun for life. The sun's energy gives life to plants, which in turn provides food for animals and people. The sun's heat keeps the surface of the earth warm enough for plants and animals to survive.

For people on Earth, it makes sense to say that the sun *rises* in the morning. Each morning at dawn, the sun appears on the **horizon** in the eastern sky.[1] At dawn, some people say, "Look! The sun is coming up!" This first appearance of the sun above the eastern horizon is called sunrise.

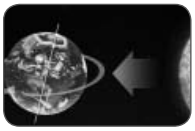
1 The horizon is the line in the distance where it appears that the land meets the sky.

Show image 2A-2: Sunset

Over the course of the day, the sun appears to move across the sky, gradually following its path from east to west. In the evening, the sun sets in the west. Ever so slowly, it gets lower in the sky and disappears below the horizon. That's when people say, "The sun is going down." This disappearance of the sun below the western horizon is called sunset.

So, based on what we can see from where we live on Earth, it seems sensible to say that the sun moves across the sky each day—rising, or moving up, in the east; and setting, or sinking down, in the west.[2] But that's not actually true. It is the daily rotation, or spin, of the earth that makes the sun *appear* to rise and set each day.

2 In fact, that's exactly what people thousands of years ago thought was happening.



Show image 2A-3: Earth rotation

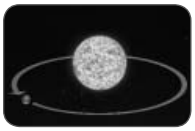
Earth spins, or **rotates,** on its axis.[3] Imagine the earth's axis as an imaginary pole sticking through the center of the planet from north to south. It takes twenty-four hours, or one day, for the earth to spin, or rotate, all the way around one time.

3 [Show the globe.] Remember how we made the globe rotate earlier?

This daily rotation explains why there is always night and day on Earth. As it spins, certain parts of Earth's surface face the sun,

receiving its heat and light. When it is light on one side of the earth, it is dark on the other side. So, if it is daytime where you are right now, then on the other side of the earth it is nighttime, and the children there are sound asleep.[4] And, when you are nestled in your bed tonight, children on the other side of the planet will be waking up to a bright new day.

4 [Using the globe from earlier in the lesson, point out to students the country that is on the opposite side of the world from them.]



Show image 2A-4: Orbit diagram

This spinning or rotation of the earth, however, is not the only way Earth moves in space.

Because Earth is a **planet,** it also moves, or revolves, around the sun. The word *planet* means a large object in space that revolves around a star for light.[5] Earth moves, or revolves, around the sun, following a constant path. The path that Earth follows around the sun is called the earth's **orbit.**[6]

5 Remember that the sun is a star and provides the earth with light.

6 Remember when I carried the globe around the hula hoop sun? I was imitating the earth's orbit.

Earth follows the same path as it revolves around, or orbits, the sun. It takes about 365 days, or one year, for Earth to make one complete orbit, or revolution, around the sun. But how and why does Earth orbit the sun? The answer to this question involves one of the most important lessons you can learn in the study of astronomy.

Show image 2A-5: Person jumping

In space there are large objects, like the sun, and there are smaller objects, like the earth and moon. All objects in space actually pull on all other objects, but larger objects pull harder than smaller objects. The force that causes objects to pull on each other is called **gravity.** As this pulling action happens, the force of the sun's gravity holds Earth in its place. Although Earth continues to follow its orbit around the sun, the earth does not wander off into space.[7]

7 So the sun's gravity holds the earth in place.

Just as the sun pulls on the earth and other objects out in space, the earth pulls on objects on or near its surface. Because of this, your feet stay planted firmly on the ground. And if you jump up, you come straight back down. If you throw a ball in the air, it falls straight back down, too. This force of gravity holds things on the ground and holds the planet Earth in orbit around the sun.

Show image 2A-6: Student at desk

You cannot tell that the earth is always moving as you sit in your classroom or wherever you happen to be. It rotates, or spins, all day and every day as it travels in its year-long course around the sun. These two types of movement—the rotation and the revolution of the earth—create the days and years that we keep track of on the calendar.

Discussing the Read-Aloud ***15** minutes*

Comprehension Questions **10** *minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding the students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Literal* Describe what we see at sunrise each day. (sun coming up over the horizon in the east) Describe what we see at sunset each day. (sun going down below the horizon in the west)
2. *Inferential* If we look up in the sky at different times of the day, the sun is in many different places and looks like it has moved. Does the sun move around the earth? (no) What moves? (the earth)
3. *Literal* When we are on the side of the earth facing away from the sun, is it day or night? (night) Is it day or night on the opposite side of the earth? (day)
4. *Inferential* When we are on the side of the earth facing the sun, is it day or night? (day) Is it day or night on the opposite side of the earth? (night) What causes night and day? (the earth's rotation)
5. *Literal* You also heard that the earth travels in a path around the sun, and that it takes one year to go all the way around the sun. What is this path called? (an orbit or revolution)

6. *Literal* What do we call a large object in space that revolves around a star for light? (a planet) On what planet do we live? (Earth)

7. *Inferential* The earth moves in two different ways. One way the earth moves is orbiting the sun. What is the other way it moves? (It spins or rotates on its axis.)

[Please continue to model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

8. *Where? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. We learned about where the sun rises and sets, as well as where the earth orbits and spins. Think of a question you can ask your neighbor about the read-aloud that starts with the word *where*. For example, you could ask, "Where is the atmosphere?" Turn to your neighbor and ask your *where* question. Listen to your neighbor's response. Then your neighbor will ask a new *where* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

9. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Horizon *5 minutes*

1. In the read-aloud you heard, "Each morning at dawn, the sun appears on the *horizon* in the eastern sky."
2. Say the word *horizon* with me.
3. The horizon is the line in the distance where it appears that the land or a body of water meets the sky.
4. When we look at the horizon in the morning, it looks like the sun is rising, and when we look at the horizon in the evening, it looks like the sun is setting.
5. Can you think of an example of anything else besides the sun that you might see far off on the horizon? [If you have a window with a distant view, have students look out.] Try to use the word *horizon* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "You can see _____ on the horizon."]
6. What's the word we've been talking about?

Use a *Drawing* activity for follow-up. Directions: When you look at the horizon, you can see a long line where the land or a body of water meets the sky. Draw a quick sketch of the horizon at sunrise or sunset, showing the top half of the sun and a line where the land would hide the rest of the sun, meeting the sky. Remember that a sketch is quickly drawn and does not include many details or colors.

Complete Remainder of the Lesson Later in the Day

Extensions — 20 minutes

Day and Night Demonstration

Remind students that earlier in the day they saw a demonstration of how the earth rotates on its axis and revolves around the sun. Explain that now you will repeat that demonstration, but that this time you will use a flashlight to demonstrate day and night. This demonstration will help students understand what's happening in the sky at sunrise and sunset.

Show students the globe with the town in which they live marked by a flag or pin. Darken the room. Ask a volunteer to point the flashlight at the globe while you hold it steady. Tell students that the flashlight represents the sun. Tell students that when the marked area is directly in the path of the sun, it is day in your town. Explain that when it is day in your town, it is night on the opposite side of the globe. Identify the country directly opposite your town, i.e., on the other side of the globe. Have students observe that when it is day in your town, the country on the opposite side of the globe is not illuminated and is in shadow. Then slowly spin the globe counterclockwise until that country is hit directly by the flashlight's beam. Ask a volunteer to point to the flag or pin for your town without spinning the globe. Ask students if they can guess whether it is day or night in your town when the sun is hitting the opposite side of the globe. (night)

Now continue slowly spinning the globe counterclockwise, until the flag or pin representing your town is once again directly in the beam of light. Explain that when the globe makes a full rotation, one whole day, or twenty-four hours, has passed on the earth. Remind students, however, that when it is day in one place on the globe, it is night on the opposite side. The side of the globe not facing the sun is in shadow, which makes the sky dark.

Now, tell students that by using the globe, you are going to show them how sunrise and sunset happens. Ask another volunteer to point the flashlight at the globe and hold it steady, reminding students that the flashlight represents the sun. Remind them that the globe is the earth and the flag or marked area on the globe is the town in which they live. Start with the marked side of the globe turned away from the flashlight. Say, "It's night in our town now." Then spin the globe very slowly counterclockwise (or to the left). Stop spinning the globe as soon as the light of the flashlight is near the mark that represents your town. Compare this to sunrise, when you just begin to see light in the sky in your town. Rotate the globe so the pin/flag representing your town is directly facing the flashlight. Compare this to twelve o'clock noon, when the sun shines directly on your town, and is directly overhead in the sky. Then rotate the globe counterclockwise again, until the light from the flashlight is just past the mark of your town. Compare this to sunset in your town, when there is only a little sun left in your view. Explain that at sunrise, you were turning the pin/flag representing your town toward the sun so the sun started to come into the view of your town. Explain that at sunset you were turning the pin/flag representing your town away from the sun, so the sun was starting to leave the view of your town.

Then ask students to turn to a neighbor and discuss the following question: why does the sun look like it's moving across the sky from sunrise to sunset? (because the earth is moving) Encourage students to share, and elaborate upon their responses with domain-related vocabulary.

Sayings and Phrases: AM and PM *5 minutes*

Remind students that each time the earth makes one complete rotation, one full day passes. There are twenty-four hours in one full day. Tell students that half of twenty-four hours is twelve hours, so there are approximately twelve hours in the day and twelve hours in the night. Point to the numbers on a clock dial as you count one o'clock through twelve o'clock. Explain to students that, in the United States, we don't say thirteen o'clock through twenty-four o'clock for the last twelve hours of the day. Instead, after we count to twelve o'clock for the morning hours, we start at one o'clock and begin counting to twelve all over again for the afternoon and evening hours. Tell students that there are two twelve o'clocks: one at noon and one at midnight; two one o'clocks, one in the afternoon and one at night; two two o'clocks, and so on. Explain to students that even though there are two twelve o'clocks, etc., people need to know at what time of day (morning, afternoon, or evening) we are referring to.

Tell students that this is the reason why, if we are talking about the hours between midnight and one minute before twelve o'clock noon, we say "AM." Have students repeat "AM." Tell students that AM stands for two Latin words (*ante meridian*) that mean "before noon." Note that if we are talking about noon or the hours between twelve o'clock noon and one minute to midnight, we say "PM." Have students repeat "PM." Tell students that PM stands for two other Latin words (*post meridian*) that mean "after noon."

As you read the following example, point to the corresponding numbers on a clock dial: "If the time is one hour before twelve noon, we say that it is eleven o'clock AM. If the time is one hour after twelve noon, we say that it is one o'clock PM." Tell students what activity you are usually engaged in at noon so that they can judge if they have reached noon yet today. Then point to the clock, and tell students what time it is. Ask students to judge whether you should add AM or PM to the time.

Find opportunities each day to talk about AM and PM.

Stars

3

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Classify the sun as a star
- ✓ Describe stars as large, although they appear small in the night sky
- ✓ Describe stars as hot, distant, and made of gas
- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Describe how people sometimes tell stories about the moon and stars

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Listen to and understand poetry about stars, such as "Star Light, Star Bright" and "The Star" (RL.1.5)
- ✓ Describe the connection between meteors and Earth's atmosphere (RI.1.3)
- ✓ With assistance, categorize and organize information about what things can be seen at dusk (W.1.8)
- ✓ Describe what is seen in the sky at dusk (SL.1.4)
- ✓ Add drawings to descriptions of what can be seen in the sky at dusk to clarify the concepts (SL.1.5)

- ✓ Accurately apply the meanings of the antonyms *dusk* and *dawn* (L.1.5)
- ✓ Prior to listening to "Stars," identify orally what they know and have learned about Earth, planets, and stars

Core Vocabulary

dusk, *n.* The time of day just after sunset when the sky is not yet dark
Example: In the summertime, my mom lets me play outside until dusk.
Variation(s): none

meteor, *n.* A rock that flies through space; sometimes mistakenly called a "shooting star"
Example: Some people make a wish on the first star they see at night, but I will make a wish on the first meteor I see.
Variation(s): meteors

stars, *n.* Hot balls of gas that give off light and heat
Example: Many stars are visible from Earth in the night sky.
Variation(s): star

telescopes, *n.* Tube-like tools with lenses and mirrors used for magnifying objects in space in order to observe them
Example: Telescopes are fun to use because you can see things in the sky that you cannot see at all without them.
Variation(s): telescope

universe, *n.* Everything in space taken together, including planets, stars, and space itself
Example: The universe is so big that I can't even imagine it.
Variation(s): universes

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Purpose for Listening		
Presenting the Read-Aloud	**Stars**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Dusk		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Astronomy Journals**	journals, drawing tools	20
	Poetry Read-Aloud	chart paper with "Star Light, Star Bright" nursery rhyme [This exercise requires advance preparation.]	

Stars

3A

Introducing the Read-Aloud

***10** minutes*

What Have We Already Learned?

Review the previous read-aloud, highlighting two ways the earth moves: rotating and orbiting, or revolving, around the sun. Remind students that the earth rotates when it spins on its own axis, and that this spin creates day and night. Remind students that the earth is a planet because it orbits the sun for light and heat. Ask students if the sun is a planet or a star. (a star)

Tell students that today's read-aloud is about stars. Remind students that they already learned about Earth's most important star, and ask them to identify it. (the sun) Show image 1A-5, and ask students what they remember learning about the sun. (very hot, made of gases, huge and far from Earth, appears to rise and set, etc.) Explain that if something is a gas, it is often hard to see; an example of a gas is the air around us. We know the air is not solid because it does not have or hold a shape, and it is not liquid because it cannot be poured. Stars are made up of gases even though they appear to be in shapes as we view them from so far away. Remember to repeat and expand upon each response using richer and more complex language, including, if possible, any read-aloud vocabulary.

Point out that the sun is one of billions of stars in space. It looks bigger than the stars we see in the night sky because it is much closer to Earth than the rest of the stars, even though it is still very far away. Ask students to give other examples of how things that are far away look smaller than they actually are. (houses when you are in an airplane; the village below when you are hiking up a mountain; etc.) Tell students that today's read-aloud will teach them more about the faraway stars, which actually look smaller to us than they really are.

Purpose for Listening

Explain to students that they will now learn more about stars. They will even learn about "shooting stars," which aren't really stars at all! Tell students to listen carefully to find out what "shooting stars" really are.

Presenting the Read-Aloud — **15** *minutes*

Stars

Show image 3A-1: Dusk

When nighttime comes, you can say good night to the sun—our daytime star—and you can say hello to all the millions of other **stars** that shine in outer space.[1] Remember, the stars are always out there. Outer space does not disappear during the day and then reappear at night. You can see those stars at night because the sun's light is no longer shining on your part of the earth, but the stars are always there.

1 Stars are hot balls of gas that give off light and heat.

At **dusk,** just after the sun has set in the west but before all of its light has faded, the first stars of night appear.[2] One, two, three, and then more and more. The darker it is, the more stars you can see. If you live in the city, then you can't see as many stars as people who live in the country can see. Lights in the cities brighten the night sky and make it difficult to see the stars. Out in the country—and especially out in the wilderness far away from buildings, street lights, and cars—the night sky seems to explode with glittery, twinkling stars.

2 It is dusk in this image.

Show image 3A-2: Starry night

They may look small, but many of those stars that you see[3] are actually incredibly large. Many stars are larger than our own sun, which, as you may remember, is big enough to fit a million Earths inside. The stars look small because they are so far away.[4] And the stars look like they're blinking, but they're actually shining steadily. The gases in our atmosphere cause their light to look like it is twinkling.

3 [Point to a few stars.]

4 Everything looks smaller when it is far away. Think of how small an airplane looks when it is high up in the sky.

Just how far away are the stars? Here's one way to think about it: if someone put you on the fastest rocket ship today and launched you out into space, it would take you thousands of years—about seventy-three thousand to be exact—to reach the nearest star beyond our sun![5] That's pretty far away. However, you

5 Here the word *ship* means a large spacecraft. The word *ship* can also mean to send a package through the mail.

can still see the light from that massive, hot star, even though it looks more like a tiny, twinkling diamond from here on the earth.

Show image 3A-3: Observatory

At night, astronomers study the stars. Astronomers work in observatories, which are buildings where large **telescopes** are housed.[6] Observatories are built high up on hills or mountaintops, where there are no buildings or trees blocking the telescope.[7] The roof of the observatory is designed so that it can open and allow the giant telescope inside to move up and down and all around without bumping into anything.

6 Telescopes are tube-like tools with lenses and mirrors used for magnifying objects in space in order to observe them.

7 What smaller word do you hear in the word *observatories*? *Observe* means to look.

Show image 3A-4: Inside observatory

Astronomers need really big, powerful telescopes to do their work. This is the kind of telescope you find inside an observatory.[8] That's a big telescope!

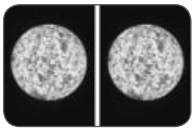
8 [Point to the large telescope.]

Show image 3A-5: Conventional telescope

But you don't need a massive telescope and a fancy mountaintop observatory to enjoy the wonders of stargazing, or looking at the stars. If you want to get a better look at the stars or a closer look at the moon, a pair of binoculars will do the trick.[9] Or you can use a telescope like this one.[10] You'd be surprised by all the different things you can see through a telescope!

9 [Hold your hands to your eyes like you are holding binoculars.]

10 [Point to the telescope in the image.]



Show image 3A-6: Magnified stars[11]

Through careful study, astronomers have figured out many interesting facts about stars, even though no person is able to travel and study a star up close.[12] Astronomers have learned that some stars are older than other stars. Some stars are hotter than others. Some appear red through the telescope[13] and others appear blue.[14] Stars change color depending on how hot they are, and how hot a star is depends on its age, size, and other factors.

11 These are pictures of stars that have been made larger, or magnified.

12 Remember, it would take thousands of years to get close to one.

13 [Point to the red star on the left.]

14 [Point to the blue star on the right.]

Show image 3A-7: Meteor

But you do not need a telescope in order to appreciate the wonders of outer space. If you look at the sky long enough on any given night, you will eventually see a **meteor,** or "shooting star."

A meteor is simply a rock that flies through space. It appears as a streak in the sky before it disappears in the blink of an eye. At first glance, a meteor may look like a star that is literally falling through the sky. However, stars do not move like that. Meteors—although they are sometimes called "shooting stars"—are not stars at all. [15]

15 So if you see a shooting star, what are you really seeing?

Show image 3A-8: Close-up of meteor hitting earth's atmosphere

There are billions of meteors out there. Some meteors are quite large, but most are tiny, between the size of a grain of sand and a baseball. [16]

16 When rocks break in space, all the broken pieces just move around together because there isn't enough gravity for them to fall anywhere.

Meteors are whizzing around all over the place in outer space. Occasionally, a meteor crashes toward Earth. Before it can hit Earth's surface, however, the meteor crashes into Earth's atmosphere. For a space rock, hitting the earth's atmosphere is like a person running into a brick wall, except the atmosphere doesn't stop the meteor. The meteor hits the atmosphere at an incredible speed and keeps moving though the atmosphere. As it does so, it generates intense heat. The meteor burns up as it enters the uppermost parts of earth's atmosphere, creating a streak of light, or a "shooting star" as some people call it. [17]

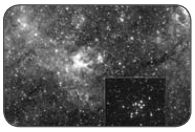
17 If meteors hit Earth's atmosphere and burn up all the time, why do we only see them at night?

Show image 3A-9: Recovered meteorite

Occasionally, bits and pieces of meteors survive their trip through the atmosphere and fall to Earth. This is rare, but it does happen from time to time, and it is possible to find pieces of them on the ground. When part of a meteor survives the trip through the atmosphere and lands on Earth, the meteor becomes a meteorite, or space rock. [18]

18 [Point to the meteorite in the image.]

The meteorite in this picture is probably not the most exciting rock you have ever seen, but it is pretty amazing to think that it came from outer space. Sometimes, by studying meteorites, scientists discover new types of rock that do not exist on Earth!



Show image 3A-10: Star cluster

Outer space is a strange and wonderful place. By studying the stars, planets, and other objects in space, astronomers have learned many things about this incredible place called the **universe,** of which we and our planet Earth are but a teeny, tiny part.[19] Feast your eyes on this massive star cluster[20] for a moment and imagine, if you can, the incredible number of stars and the incredible distances between us and them, and how much there is for us to learn about our universe. For instance, look at the very center of this photo. There in the middle is a little cluster of fourteen bluish stars. Added together, astronomers estimate that these fourteen stars combined are over 20,000 times larger than our sun![21] That's so huge, it's hard to think about, and that's just fourteen stars out of all the stars in this photo!

19 The universe is everything in space taken together, including planets, stars, and space itself.

20 or group

21 And remember, our sun is a million times bigger than the whole planet Earth.

Discussing the Read-Aloud *15 minutes*

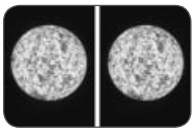
Comprehension Questions *10 minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding the students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Literal* Describe what you might see in the sky at dusk. (sun setting, colors of sunset, stars coming out, darkening sky, moon coming up)

2. *Inferential* When we look up at the stars at night, they look like they are blinking and they look tiny. Are stars actually tiny and blinking? (no) Why do they look like they're blinking? (Gases in our atmosphere cause stars to look like they are twinkling.) Why do they look tiny? (They are really far away.)

3. *Literal* Stargazers stand outside and look up at the stars, sometimes using binoculars. Astronomers have special buildings they go to in order to study the stars. What are these buildings called? (observatories) What tools do astronomers use to see the stars more clearly? (telescopes)



Show image 3A-6: Magnified stars

4. *Inferential* We learned that not all stars are the same. Why are some stars blue and some stars red? (Some are hotter than others.)

5. *Literal* If you look up in the sky at night, you might see a streak of light, sometimes called a "shooting star." Is it actually a star? (no) Do any stars fall through the sky? (no) What are you probably really seeing? (a meteor)

6. *Inferential* What is a meteor? (a rock that flies through space) What happens to meteors when they hit the earth's atmosphere? (They usually burn up completely.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative* *Think Pair Share:* People who lived thousands of years ago didn't have telescopes or books about stars, so all they knew about stars was what they could see outside at night. Imagine that you could travel back in time thousands of years and tell these people that the sun is actually a star. Do you think they would believe you? (probably not) Why or why not? (Answers may vary, but may include that the stars look so small compared to the sun, and the stars come out at night, whereas the sun comes out during the day.)

8. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Dusk *5 minutes*

1. In the read-aloud you heard, "At *dusk,* just after the sun has set in the west but before all of its light has faded, the first stars of night appear."
2. Say the word *dusk* with me.
3. Dusk is the time of day just after sunset, when the sky is not yet as dark as it will be.
4. The sky glows with the colors of sunset at dusk, when the day ends and the night begins.
5. What do you usually do at dusk? Try to use the word *dusk* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "At dusk I usually . . . "]
6. What's the word we've been talking about?

Use an *Antonyms* activity for follow-up. Directions: We know that dusk is the time when the sun is going down and day turns into night. The opposite of *dusk,* or its antonym, is *dawn,* the time when the sun is coming up and night turns into day. Listen to the following examples. If I am describing something that would be going on in the sky at dusk, say, "That happens at dusk." If I am describing something that would be going on in the sky at dawn, say, "That happens at dawn."

1. The sun sets. (That happens at dusk.)
2. The sun rises. (That happens at dawn.)
3. The stars fade. (That happens at dawn.)
4. The stars get brighter. (That happens at dusk.)
5. The moon rises. (That happens at dusk.)

Complete Remainder of the Lesson Later in the Day

Extensions — 20 minutes

Astronomy Journals

Remind students that over the next few weeks they will pretend to be astronomers by recording what they learn and observe about outer space in their astronomy journals. Distribute the journals, and remind students that they drew pictures of objects in the sky the last time they used their journals. Remind students that when you draw what you see, you are recording your observations. Now tell students that today, on the second page of their journals, they will sketch a picture of the sky at dusk. Review the term *dusk*. Ask students if they have ever looked at the sky at dusk. (Encourage them to ask their parents if they can observe the sky in the evening at home.) Today, they will be recording what they have learned by sketching all of the objects they might see in the sky at dusk. Point out that a sketch is quickly drawn and does not include many colors or details. Ask students to list some of the objects they might want to include. (stars, meteors, the moon, and the setting sun) As students work, circulate around the room, encouraging the use of domain vocabulary by asking them to identify and label the objects in their pictures. Then ask students to label their sketches with the word *dusk*. Remind them that when they are labeling, they may use the letter-sound correspondences they have learned thus far.

Poetry Read-Aloud

Tell students that for thousands of years, people have been stargazing, looking up and wondering about the same stars that you can also see every night. Explain that perhaps because the stars are so far away and there are so many of them, or perhaps because they make the night so beautiful, the stars have inspired people to imagine and dream as they gaze at the night sky. Explain that students have listened to a nonfiction, or true, read-aloud

to learn facts about stars. Tell them that now they will listen to imaginative poems about stars. Discuss how a poem is different from a story. (fewer words, not in full sentences, sometimes rhymes, has descriptive language, etc.)

Point out that according to one nursery rhyme, people can make a wish on a star and it will come true, especially if it's the first star they see in the evening. Show students the chart paper with the "Star Light, Star Bright" nursery rhyme. Explain that they will learn a nursery rhyme about wishing on a star, using the echo technique.

Directions: First I will read the whole nursery rhyme while you listen. Watch as I point to each word. Then I am going to repeat the first line and point to each word as I read it. Then I will stop and give you a chance to echo the words while I point to the words again. When you echo the words, it means you will say the exact words that I said. We will continue doing this for each line of the rhyme.

Star light, star bright
First star I see tonight
I wish I may, I wish I might
Have the wish I wish tonight.

Then ask students if they know any songs about stars. Take a few responses, and if "Twinkle, Twinkle, Little Star" does not get mentioned, bring it up at this point. Explain that the words from "Twinkle, Twinkle, Little Star" actually come from a poem written over two hundred years ago (in 1806) by a woman who liked to gaze at the stars. The name of the poem was "The Star," and the woman's name was Jane Taylor. Explain that the poem is a lot longer than the song they know. Read the poem aloud, encouraging students to listen carefully for the verses that follow the famous first verse.

The Star

by Jane Taylor

Twinkle, twinkle, little star,
How I wonder what you are!
Up above the world so high,
Like a diamond in the sky.

When the blazing sun is gone,
When he nothing shines upon,
Then you show your little light,
Twinkle, twinkle, all the night.

Then the traveler in the dark,
Thanks you for your tiny spark,
He could not see which way to go,
If you did not twinkle so.

In the dark blue sky you keep,
And often through my curtains peep,
For you never shut your eye,
Till the sun is in the sky.

'Tis your bright and tiny spark,
Lights the traveler in the dark:
Though I know not what you are,
Twinkle, twinkle, little star.

Discuss the poem, highlighting the line "how I wonder what you are." Explain that over two hundred years ago, most people, with the exception of astronomers, really didn't know much about what stars were. Stargazers from long ago only knew what they could see with their own eyes: that stars were tiny, that they covered the night sky, and that they twinkled. Everything else they had to imagine. Encourage students to look out their windows at night, or if their parents allow them, to go outside and look at the stars and let the view of outer space inspire their imaginations.

Stargazing and Constellations

4

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that Earth orbits the sun
- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Describe how people sometimes tell stories about the moon and stars
- ✓ Explain what a constellation is
- ✓ Identify the Big Dipper and the North Star

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Ask and answer *who* questions orally, requiring literal recall and understanding of the details or facts from "Stargazing and Constellations" (SL.1.2)
- ✓ Ask questions to clarify directions for an activity in which students are creating a model of the Big Dipper (SL.1.3)
- ✓ Add drawings to descriptions the Big Dipper to clarify the concept (SL.1.5)
- ✓ Accurately apply the meanings of the antonyms *ancient* and *modern,* and the antonyms *major* and *minor* (L.1.5a)
- ✓ Explain the meaning of "hit the nail on the head" and use in appropriate contexts (L.1.6)

✓ Prior to listening to "Stargazing and Constellations," identify orally what they know and have learned about stars

Core Vocabulary

advances, *n.* Modern improvements; progress
Example: With advances in medicine, babies get shots to protect them from many terrible diseases.
Variation(s): advance

ancient, *adj.* Very, very old or long, long ago
Example: In ancient times, Egyptians built the pyramids.
Variation(s): none

celestial bodies, *n.* Any objects, including planets, stars, comets, or meteors, that can be found in outer space
Example: The sun, the moon, and other stars are examples of celestial bodies.
Variation(s): celestial body

constellations, *n.* Certain groups of stars in the night sky that seem to form specific shapes or outlines of "pictures"
Example: Last summer, my dad showed me how to find different constellations in the night sky.
Variation(s): constellation

myths, *n.* Stories that people tell to explain things in nature, or to teach people how to act
Example: In ancient times, some people believed in myths about a sun god who ruled over the world.
Variation(s): myth

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Purpose for Listening		
Presenting the Read-Aloud	**Stargazing and Constellations**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Ancient		5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**Vocabulary Instructional Activity: Major/Minor**	chart paper; index cards [This exercise requires advance preparation.]	
	Sayings and Phrases: Hit the Nail on the Head	chart paper, chalkboard, or whiteboard	20
	The Really Big Dipper	chart paper; drawing tools	

Stargazing and Constellations

4A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Review the previous read-aloud during which students heard a variety of facts about stars. Ask students to describe surprising facts they learned about stars. (stars are really far away, really big, really hot, and don't twinkle or fall through the sky) Explain that all of these facts are known only because of the work of astronomers. Remind students that if you believe what you see in the night sky, you might think that stars are tiny and that they twinkle. You also might believe that they only come out at night. Explain that the scientists who study the stars (astronomers), with the help of observatories and telescopes, have learned that many of the things we might believe when we look at the stars are not actually true.

Explain that in today's read-aloud, students will take a step back in time thousands of years to ancient times, before astronomy had begun. Remind students that they have already learned about some people in ancient times, such as the Mesopotamians, ancient Egyptians, and the Maya, Aztec, and Inca people. They also learned in Kindergarten about another group of people who lived in ancient times but also still live in America today, the Native Americans. Briefly review some common features of all these ancient people, highlighting especially the limited scientific information about nature they possessed. Help students recall examples of natural events, such as rain or an abundant harvest, that ancient people could not always predict or explain. Then remind students that many ancient people often told stories, or myths, to explain how these events occurred. Emphasize that several ancient cultures believed in many gods and goddesses who were responsible for controlling the events in nature. Many of the myths or stories ancient cultures told featured these gods and goddesses.

Point out that since ancient times, tools have been invented to study space in a scientific way. Remind students that the scientific study of outer space is called astronomy. However, in ancient times, people knew very little about outer space. All they knew about space was what they could see with their own eyes when they looked up at the sky. These ancient people made up many stories or myths about what they saw when they looked up in the sky.

Purpose for Listening

Tell students that they will now learn about what ancient people saw when they looked at the stars. Explain to students that ancient people saw outlines of pictures in the way stars appeared in the night sky, and that people still look for these pictures today. Ask students to listen carefully for the name of these pictures made with stars.

Then emphasize that the first astronomers used science to study the stars and learned many things that ancient peoples may never have believed. Ask students to also listen for the names of two early astronomers who helped people understand the nature of the universe, developing new tools for studying the stars.

Presenting the Read-Aloud — *15 minutes*

Stargazing and Constellations

Show image 4A-1: Ancient Greeks under starry sky

Thousands of years ago, people had no telescopes or rocket ships. Although people back then did not have the tools and knowledge that we have today, they were just as curious about the stars and other **celestial bodies.**[1] The **ancient** Greeks, Arabs, Romans, Chinese, Egyptians, Turks, Mayans, Babylonians, and countless others[2] all studied the stars and tried to figure out what they were and why they were there.

1 or objects found in space

2 who lived long, long ago

Show image 4A-2: Group of ancient Arabs charting constellations

Although they did not know what the stars were made of or how far away they really were, the ancient people named the stars and mapped them out.[3] They figured out which stars appeared in the sky during certain times of year. And even though thousands of years have passed on Earth, the stars have basically remained the same. In other words, when you look up at the stars at night, you are seeing the very same stars the ancient Greeks, Arabs, and countless others saw, as well![4]

3 We still use these names today.

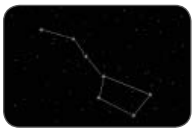
4 It's hard to believe outer space has changed so little in all those years!

Show image 4A-3: Constellation in the night sky

The ancient Greeks believed that the stars had been placed in the sky by gods—as if by magic—in order to tell stories and teach lessons.[5] The Greeks identified certain groups of stars in the night sky that seem to form specific shapes. These shapes are called **constellations.**[6] In the United States, Europe, and many other parts of the world, we still call the stars by the names that the ancient Greeks or Arabs used so long ago.

5 These stories are called myths.

6 That's the name for the pictures they saw in the stars.



Show image 4A-4: Big Dipper[7]

One of the first groups of stars that young stargazers in the United States learn about is also the easiest one to spot. The Big Dipper looks like a giant soup ladle up in the sky.[8] The Big Dipper is made up of seven stars. The Big Dipper looks different in the sky depending on the time of year.[9] Sometimes the Big Dipper looks right side up, sometimes it looks upside down, and sometimes it appears to be standing on its handle! That is not because the Big Dipper moves, but because the earth is rotating on its axis and revolving around the sun.

7 [The Big Dipper is not actually a constellation in itself, but part of a larger constellation called Big Bear. That is why it is referred to as a "group of stars" below.]

8 You might also think it looks like a pot with a handle.

9 [Rotate the Flip Book as you read the following sentence.]

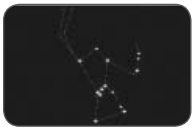
Show image 4A-5: Little Dipper

The Big Dipper has a friend called the Little Dipper. The Little Dipper also contains seven stars. The bright star at the end of the handle is special. It is called Polaris, or the North Star. Unlike other celestial bodies, the North Star basically stays in the same place in the sky as we observe it from Earth—always in the north.

Show image 4A-6: Columbus navigating sailing ship

Since ancient times, people have relied on this star to find their way in the world. Knowing which way is north is the first step to figuring out in which direction you are heading. Christopher Columbus and other sailors used to look for the North Star on starry nights out on the wide ocean.[10]

10 Because Polaris is always in the north sky, Columbus could use it like a compass to navigate his ships north, south, east, or west.



Show image 4A-7: Orion

This picture shows one of the most famous constellations of all: Orion. Ancient Greeks told stories, or **myths,** about Orion, a famous hunter.[11] The constellation Orion is known all over the world. The constellation itself contains eight main stars. Orion's Belt, made up of the three stars in a row across his body, is the easiest to spot. As you can see, it takes a little imagination to look at these stars and see a hunter. The single star in the upper left is imagined to be the beginning of a raised arm, which is holding a club or a sword. With his other arm, imagined to extend from another single star, he holds a shield.[12]

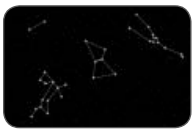
11 Myths are stories that people tell to explain things in nature, or to teach others how to behave.

12 [Point to the three stars on the right side of the image.]

Show image 4A-8: Scorpio constellation

According to one myth, Orion bragged he was such a good hunter that he could kill all the animals on Earth. The gods decided to punish him by creating Scorpio, a giant scorpion that Orion could not defeat. [13]

13 [Point to the tail.] A scorpion is a poisonous, spider-like insect with a curved tail.



Show image 4A-9: Orion, Taurus, Canis Major, and Canis Minor

Not far from the Orion constellation is Taurus, which shows the head and horns of a mighty bull. It is often said that the hunter Orion is fighting the bull Taurus. So, according to the myths, Orion has a tough time up there: he is being chased by a giant scorpion at the same time he is fighting a giant bull!

Fortunately, Orion has a couple of friends: his two loyal hunting dogs, Canis Major and Canis Minor. [14] These dogs follow Orion through the sky, helping him fight Taurus the Bull.

14 These are Latin words. *Canis* means dog, *major* means big, and *minor* means small.

Show image 4A-10: Constellation chart

There are eighty-eight major constellations, and most people around the world use the same basic list. When these constellations were first named, most ancient people could only guess what stars actually were. Ancient people told stories and myths based on what they could see with their own eyes when they looked up at the sky. But we have learned that there is much more to space than meets the eye. In fact, sometimes when we look into outer space, our eyes can play tricks on us.

The first astronomers began using mathematics and science to provide different kinds of explanations than the myths that ancient people told to describe what they saw in the sky. Rather than make up stories, astronomers developed hypotheses, or scientific guesses, based on facts they discovered about space.

Show image 4A-11: Copernicus with model of earth, showing it revolving around sun

For example, ancient people saw that the sun rose on one side of the sky in the morning and set on the other side of the sky in the evening. Seeing the sun's "movement" across the sky caused ancient people to believe that the sun moved while the earth stood still. Ancient Greeks and Arabs and, in fact, most people in the world, believed that everything in the universe—including the sun and all the stars—revolved around the earth. It took thousands of years before anyone believed that the opposite was true, that the earth in fact revolved around the sun. [15] This discovery was made by an early astronomer named Nicolaus Copernicus.

15 Do you remember how we orbited the hula hoop sun?

Copernicus was the first to use science to explain that Earth actually revolves around the sun. Unfortunately, hardly anyone believed him at the time. That was about 500 years ago.

Show image 4A-12: Galileo with telescope

Another astronomer named Galileo came after Copernicus, and he believed what Copernicus said about the earth revolving around the sun. He invented telescopes that helped astronomers prove that Copernicus's theory was true. [16] Although Galileo did not invent the first telescope, he did invent very powerful telescopes that helped him and other astronomers make many important discoveries about space. For this reason is he is considered by many to be the father of modern astronomy.

16 What is a telescope?

Show image 4A-13: Modern telescope

Since the time of these early astronomers, people have gained an incredible amount of knowledge about the stars and the universe and now use tools like telescopes to expand that knowledge each day. Copernicus and Galileo would be amazed by the **advances** [17] people have made in astronomy over the past century. Compare this incredibly large modern telescope to the one Galileo was holding in the last picture. [18] Astronomers today use telescopes like this one to study the stars and other distant parts of outer space that Galileo may have never imagined.

17 or progress

18 [Point to the telescope, and flip back to the previous page to point to Galileo's telescope.]

Show image 4A-14: Constellation chart

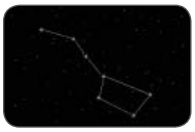
Yet even as we have gained new knowledge about outer space, our understanding of the stars is still built upon the stories and knowledge passed on by people for thousands of years. Next time you find a constellation in the sky, you will know that other stargazers have been studying and telling stories about that same group of stars for thousands and thousands of years.

Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — 10 *minutes*

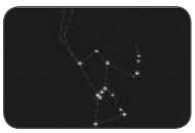
If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding the students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Literal* Were the stars that ancient civilizations observed at night different or the same as the ones we see? (same)
2. *Literal* The ancient Greeks believed that gods put certain groups of stars together in the sky in order to make pictures that would tell stories and teach lessons. What are these pictures called? (constellations)



Show image 4A-4: Big Dipper

3. *Inferential* Why is this group of stars called the Big Dipper? (group of stars that looks like a ladle or pot)
4. *Inferential* What is special about Polaris, the North Star? (It always stays in the north, making it a good star to use for navigation.)



Show image 4A-7: Orion

5. *Literal* This constellation is called Orion. [Trace a line with your finger connecting the three stars in his belt as you ask the following question.] These three stars form a famous piece of Orion's clothing. What do they form? (his belt)

6. *Literal* Remember that when you look at the sky during the day, the sun looks like it is moving. Also, the earth is so big that when it rotates, it doesn't feel like we are moving at all. Because of this, ancient people believed that the sun revolved around the earth. What astronomer was the first to say that the opposite was true, that the earth revolved around the sun? (Copernicus)

7. *Literal* We also learned about another important astronomer, Galileo. What invention did he improve upon that helped astronomers make new discoveries? (telescopes)

[Please continue to model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

8. *Who? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. A lot of people and animals were mentioned in today's read-aloud, from the ancient stargazers and Orion, Scorpio, and Taurus, to Copernicus and Galileo. Think of a question you can ask your neighbor about someone in the read-aloud that starts with the word *who*. For example, you could ask, "Who was 'the father of modern astronomy'?" Turn to your neighbor and ask your *who* question. Listen to your neighbor's response. Then your neighbor will ask a new *who* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

9. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Ancient *5 minutes*

1. In the read-aloud you heard, "The *ancient* Greeks, Arabs, Romans, Chinese, Egyptians, Turks, Mayans, Babylonians, and countless others all studied the stars."
2. Say the word *ancient* with me.
3. If something is ancient, it is very, very old or from a very, very long time ago.
4. You may remember we studied ancient Egypt and Mesopotamia, two ancient civilizations from thousands of years ago.
5. Think of one thing in your life that was not around in ancient times. For example, you could say, "There were no televisions in ancient times." Try to use the word *ancient* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "There were no _____ in ancient times."]
6. What's the word we've been talking about?

Use an *Antonyms* activity for follow-up. Directions: We know that *ancient* means a long, long time ago, or very, very old. The opposite of *ancient,* or its antonym, is *modern,* which means what is happening right now, or is very new. Listen to the following examples. If I describe something about ancient times, say, "That is ancient." If I describe something about modern times, say, "That is modern."

1. When people want to talk to someone who lives far away, they call them on the phone or write an e-mail. (That is modern.)
2. Barley was used for trade in Mesopotamia. (That is ancient.)
3. People built pyramids in which to bury their rulers. (That is ancient.)
4. People go to the refrigerator or to a restaurant when they are hungry. (That is modern.)
5. A person can choose to take recycling to a recycling bin. (That is modern.)
6. Instead of calculators, the abacus, or beads on rods in a frame was used to solve math problems. (That is ancient.)

Complete Remainder of the Lesson Later in the Day

Stargazing and Constellations

4B

Extensions — *20 minutes*

Vocabulary Instructional Activity

Horizontal Word Wall: Major/Minor

Materials: long horizontal chart paper; words written on index cards: *major, minor, big, important, giant, small, unimportant, tiny*

1. In the read-aloud you heard, "Fortunately, Orion has a couple of friends: his two loyal hunting dogs, Canis *Major* and Canis *Minor.*"
2. Say the word *major* with me. Say the word *minor* with me.
3. *Major* refers to something that is large or that means a lot. *Minor* refers to something that is little or something people don't really care about as much.
4. We will make a Horizontal Word Wall for the words *major* and *minor.* [Emphasize to students that you will be placing words on the Horizontal Word Wall, but they are not expected to be able to read the words because they are still learning all the rules for decoding. Emphasize that you are writing the words so that you don't forget them and that you will read the words to students.]
5. [Place *minor* on the far left side of the chart and *major* on the far right of the chart. Now hold up, individually, each of the other word cards *(big, important, giant, small, unimportant, tiny)* in random order, read the word to students, and then have student volunteers place each of the cards on the line near *major* or *minor,* depending on which word has a more similar meaning to the new word. Provide real-world examples of the words, such as "I have a major pain in my leg." "I have a minor pain in my leg." OR "Students spend a major part of their day in a classroom." "Students spend a minor part of their day in the cafeteria."]

6. Talk with your neighbor, using the different words on the Horizontal Word Wall. Remember to use complete sentences.

Sayings and Phrases: Hit the Nail on the Head *5 minutes*

Proverbs are short, traditional sayings that have been passed along orally from generation to generation. These sayings usually express general truths based on experiences and observations of everyday life. Although some proverbs do have literal meanings—that is, they mean exactly what they say—many proverbs have a richer meaning beyond the literal level. It is important to help students understand the difference between the literal meanings of the words and their implied or figurative meanings.

Ask students if they have ever heard the saying "hit the nail on the head." Have students repeat the saying. Write the saying on a chalkboard, a piece of chart paper, or a whiteboard. Explain that you are writing down the saying, but that they are not expected to be able to read what you write because they are still learning all the rules for decoding. Emphasize that you are writing the saying so that you don't forget, and tell them that you will read the words to them.

Repeat the saying and ask students what tool you usually use to hit a nail. (hammer) Then explain that the flat top of the nail is called the head. Draw a quick sketch of a nail on chart paper, a chalkboard, or a whiteboard, and point to the head. Explain that the words of the saying mean, literally, that when you are hammering, you're supposed to hit the nail on the head. Hitting the nail in another spot won't work; the only way to get it right and drive the nail into a piece of wood is to hit the nail on the head.

Explain to students that people have used this saying for years, not just to describe hammering, but to describe people who have said something that is exactly right, or who have made exactly the right conclusion and didn't miss the point. Remind students that Copernicus was the first astronomer to prove that the sun does not revolve around the earth; rather, the earth revolves around the sun. Explain that he got it exactly right, even though no one believed him at the time, and even though it would be years before other astronomers would agree with him. Then tell the students

that instead of saying that Copernicus got it exactly right, we can say that Copernicus "hit the nail on the head."

Copernicus hit the nail on the head when he said that the earth orbits the sun, because he got it exactly right. Tell students that you want to see if they can apply this saying correctly to the following situation. Directions: Listen as I tell you a short little story about two people. When I am done, tell me which person gets it exactly right when he or she talks, hitting the nail on the head.

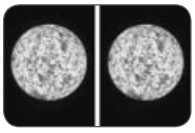
Joe and Mary stand in their backyard one night and both look up at the stars. Joe says, "The stars are so tiny!" Mary says, "Actually, the stars are huge; they're just really far away."

One of these children got it exactly right when describing the stars. Who hit the nail on the head: Joe or Mary?

Explain that a teacher might "hit the nail on the head" when she explains something in just the right way so you can understand it. Your dad might "hit the nail on the head" when he guesses exactly why you're sad or upset. Remind students that the next time a friend, a parent, or a teacher gets something exactly right, instead of saying "exactly," "that's it," or "you got it," you can say, "you hit the nail on the head!"

The Really Big Dipper

Show Flip Book images 4A-3 through 4A-9 to review the constellations and groups of stars that students learned about in today's read-aloud. (Big Dipper, Little Dipper, Orion, Scorpio, Taurus, Canis Major and Canis Minor) Remind students that these constellations were identified by ancient people who could only look at the stars with the "naked eye," that is, without anything else to help them see the stars more clearly. Then ask them the name of the tool astronomers look through to magnify stars, or make them appear larger. (telescope)



Show Flip Book image 3A-6 of magnified stars.

Explain that sometimes it is hard to believe that the tiny, twinkling stars we see at night are actually huge balls of gas, like our sun. Tell students that today they will work as a class to draw a model of the Big Dipper, a famous group of stars. However, instead of

drawing little dots for the stars, they will draw each of the seven stars in the Big Dipper as if they saw it through a telescope, like a real astronomer might see it. Make seven groups of students, and give each group a large piece of chart paper. (If you have enough students to create fourteen groups of at least two children each, consider having students make enough stars to make models of both the Big Dipper and the Little Dipper.) Encouraging the use of image 3A-6 as a model, have each group work together to draw and cut out one large star from their piece of chart paper. Remind students that stars can be red or blue and are not solid, but gaseous. Before they begin, check their understanding of the task to be done.

Say, "Asking questions is one way to make sure that everyone knows what to do. Think of a question you can ask your neighbor about the directions I have just given you. For example, you could ask, 'What should we do first?' Turn to your neighbor, and ask your own question now. I will call on several of you to share your questions with the class."

As students work, circulate around the room. Ask groups to describe their stars and encourage the use of domain-related vocabulary. When all seven (or fourteen) stars have been cut out, tell students that you will use the image of the Big Dipper (and possibly the Little Dipper) from the Flip Book to create a huge model of the Big Dipper, using the magnified stars they drew and cut out. Use as large a floor space as you have available to replicate the shape of the Big Dipper as shown in image 4A-4. To conclude this activity, encourage students to look for the Big Dipper in the night sky the next time they are able to stargaze. Remind students to think about just how large those stars are the next time they see tiny little lights in the night sky.

The Moon

5

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Describe how people sometimes tell stories about the moon and stars
- ✓ Identify the four phases of the moon—new, crescent, half, full
- ✓ Explain that the moon orbits the earth

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Describe the connection between the orbit of the moon around the earth and its appearance at various phases of the orbit (RI.1.3)
- ✓ Describe an illustration of the moon and the source of its illumination and use pictures and detail in "The Moon" to describe the read-aloud's key ideas (RI.1.7)
- ✓ Ask and answer *when* questions orally, requiring literal recall and understanding of the details or facts from "Introduction to the Sun and Space" (SL.1.2)
- ✓ Prior to listening to "The Moon," identify orally what they know and have learned about the earth, sun, and moon

Core Vocabulary

appearance, *n.* The way something or someone looks
Example: Whenever I want to check on my appearance, I look in a mirror.
Variation(s): appearances

counterclockwise, *adv.* Moving in a circle toward the left, which is the opposite direction from the increasing numbers on a clock face
Example: To loosen a screw, you have to put a screwdriver into it and turn counterclockwise.
Variation(s): none

craters, *n.* Large, dipped holes
Example: There were large craters in the middle of the road, so drivers had to drive carefully around them.
Variation(s): crater

crescent, *n.* The shape of the moon as seen in its first or last quarter
Example: My banana was shaped like a crescent.
Variation(s): crescents

reflecting, *v.* Bouncing light off one surface onto another
Example: When our power went off, I thought everything looked magical with candlelight reflecting off the walls of the room.
Variation(s): reflect, reflects, reflected

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Purpose for Listening		
Presenting the Read-Aloud	**The Moon**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Appearance		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Four Phases of the Moon**	Instructional Master 5B-1	20
	On Stage: Earth-Moon Relay	globe; hula hoop; five 8½" x 11" signs, one with the word *sun*, and four blank ones [This exercise requires advance preparation.]	
Take-Home Material	**Family Letter**	Instructional Master 5B-2	*

The Moon

5A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Tell students that today they will listen to a nonfiction, or true, read-aloud about the moon and will learn many interesting facts. Ask students what tool astronomers use to study objects in outer space. (telescopes) Remind students that they already learned that long ago, before astronomers had powerful telescopes, ancient people often believed many things about the earth, the sun, and the stars that were not true. Explain to students that the ancient people also believed many things about the moon that were also not accurate.

Remind students that sometimes the way objects in outer space look or appear to us on Earth may lead us to draw conclusions that are not correct. Ask students what ancient people believed about the movement of the earth and sun. (They believed the sun revolved around the earth.) Ask students if the ancient people were correct about this. (No, we now know that it is the earth that revolves around the sun, and it is the earth's movement that makes it seem like the sun is moving across the sky.)

When people observe the stars from Earth, they may think that stars are small and twinkle, but thanks to powerful telescopes that now allow us to see the stars in outer space more clearly, we now know that the stars are really enormous, shine steadily, and do not twinkle or blink. Also, remind students that sometimes people see a streak of light in the night sky and think it is a "shooting star" moving across the sky. Ask students what these objects are called. (meteors) Point out that people don't always come to the right conclusions or answers when they look at celestial bodies in the sky with the naked eye.

Purpose for Listening

Tell students that in today's read-aloud, they will hear about what people believed in the past about the moon because of the way it appeared when they looked at it from Earth. Ask students to listen carefully to find out what is true, or correct, about the moon and what were misunderstandings or old stories that people made up about the moon.

Presenting the Read-Aloud — **15** *minutes*

The Moon

Show image 5A-1: View of Earth and moon

Earth's closest celestial neighbor is featured in this photograph. What is this famous celestial body called? [1] It's the moon.

People have been looking at the moon and wondering about it for thousands and thousands of years, and they have invented all kinds of stories about it. Some ancient myths claimed that the moon was the sun's sister. Others said the moon was a giant face looking down on Earth. Some children's stories even said that the moon was made of cheese! [2]

In fact, the moon is basically just a big, cold, dark rock. You heard it right: although the moon sometimes appears to be shiny and bright in the night sky, the moon does not produce any light of its own. It is not a star, like the sun, but just a rock. [3] The light you see when you look at the moon is actually light from the sun **reflecting** [4] off it. [5]

Show image 5A-2: Diagram of moon orbiting Earth

While Earth orbits, or revolves around, the sun, the moon orbits, or revolves around, Earth. Do you remember how long it takes for Earth to orbit, or go all the way around, the sun? [6] It takes about 365 days, or one year. Can you guess how long it takes for the moon to orbit Earth? [7]

It takes a little more than twenty-seven days, or about a month, for the moon to make a complete trip around the earth. But the moon also rotates on its axis as it orbits Earth. [8] In fact, the moon rotates exactly once as it orbits Earth exactly once. This remarkable feature keeps the same side of the moon always facing Earth. That means we never see the back of the moon when we look up in the sky.

The **appearance** of the moon [9] changes depending on where it is in its orbit. Follow the arrows in this diagram and you can see

1 [Pause for responses.] Describe what you see in the picture. How does the moon look?

2 Why do you think people had these ideas about the moon?

3 So even though it looks like light is shining brightly from the moon, it is not; our eyes are playing tricks on us!

4 or bouncing

5 [Point to the moon in the illustration.] So where is this light coming from?

6 [Pause for responses.]

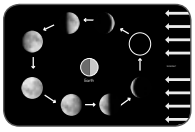
7 [Pause for responses.]

8 So the moon rotates on its axis and orbits the earth just like the earth rotates on its axis and orbits the sun.

9 or the way it looks

that the moon orbits Earth in a **counterclockwise** motion.[10] The sun is over on the right-hand side of this diagram.

10 Counterclockwise is this direction. [Trace your finger along the orbit.]



Show image 5A-3: Lunar phases

This image gives you a better idea of what the moon really looks like during each of its phases.

During the first half of its orbit, the moon is said to be waxing, meaning that, over the course of several nights, more and more of it becomes visible from Earth. Then, halfway through its cycle, sunlight arrow, are confusing the full moon appears, meaning that the side facing the earth is also facing the light of the sun.

As the moon completes the last half of its monthly orbit, less and less of it is visible each night. During this time we say that the moon is waning; less of the moon is seen. By the time it completes its cycle, it appears as little more than a shiny sliver of light in the sky.

On other nights, it looks like there is no moon at all! Remember how the moon does not make any light of its own? Well, sometimes the moon is between the sun and the earth, and the side of the moon facing the earth does not reflect any sunlight. When this happens, the side of the moon facing the earth is dark, and it looks like there is no moon in the sky.

Show image 5A-4: New moon

This is called a new moon.[11] The moon never looks exactly the same from one night to the next. The moon does not change its shape. It is always a big, round rock. Instead, it only appears to change shape depending on how sunlight hits the moon during its orbit.

11 So when there's a new moon, we can't actually see it, because no light is reflecting off the moon toward us.

Show image 5A-5: Crescent moon

On certain nights, you can only see a sliver or small piece of the moon. This is called a **crescent** moon.[12]

12 [Trace your finger down the curve.] See how the crescent shape is curved like a banana and comes to a point at the ends? What do we call the moon when it looks like a thin, curved sliver?

Show image 5A-6: Half moon

On other nights, it looks like someone sliced the moon in half. [13] This is called a half moon. [14] Remember, the moon only looks like it is changing shape. It is always a big, round rock, but it can look different during its orbit depending on how the light reflects off it.

13 [Drag your finger down the center line.]

14 Does the moon really change shape in the night sky or does it just look like it changes shape?

Show image 5A-7: Full moon

Halfway through its cycle, the moon looks like this. This is called a full moon because the full, round moon is shining brightly in the night sky. Because it takes only twenty-seven days for the moon to complete its orbit around Earth, and most months in the calendar have about thirty days, it is possible for a full moon to appear twice in the course of one calendar month every once in a while. [15] When this happens, it is called a "blue moon." But this is rare, meaning it only happens every few years. So, if you hear someone say that something only happens "once in a blue moon," they simply mean that it does not happen very often.

15 The few extra days each month add up over time.

Some people say they see what looks like a man's face when they look at the full moon. That is why people sometimes talk about the "man in the moon" as though there really were a face on the moon. Can you see what appears to be two eyes, a nose, and a mouth on this moon? Of course, in reality, there is no face on the moon; it's just a big, round rock. [16]

16 What do we call the moon when it looks like a big circle?

Show image 5A-8: Moon close-up [17]

People sometimes see what looks like a man's face in the moon because of dark areas on the moon's surface. [18] These dark areas are places where, a long time ago, lava from inside of the moon poured out onto the moon's surface. These areas no longer have lava in them, but the holes left behind reflect sunlight differently than the rest of the moon's surface. So when you look up at a full moon, you are actually seeing deep and dark holes across the moon's surface.

17 Let's take a closer look at the moon.

18 [Point to the dark areas of the moon.]

When you take a close-up look, you can see that the moon's surface is also covered with hundreds and thousands of **craters.** [19] To understand why these craters are there, you need to know a few more facts about the moon. Unlike Earth, the moon has no atmosphere. There is not a protective bubble of air around the moon, nor does the moon have any water, soil, plants, or any other signs of life whatsoever.

19 or big, dipped holes

Show image 5A-9: Close-up of large craters

Without an atmosphere, the moon has nothing to protect it from all the meteoroids that zoom through outer space. As you learned, meteoroids strike Earth all the time, but when they hit the atmosphere, most of them burn up in a streak of light known as a meteor. [20] Meteoroids, however, do not burn up when they hit the moon. They just crash right into the moon's surface and leave what are known as impact craters. [21]

20 What do some people call a meteor? (a shooting star)

21 An impact is a crash.

In a later read-aloud, you will learn the amazing, true story about real men on the moon—not just lava lakes that look like a man's face, but actual men who traveled to the moon and walked around on it. [22] How do you think they got there? [23] Keep listening over the next couple of days, and you will learn the answers.

22 Do you know what we call these people who travel in space?

23 [Pause for responses.]

Discussing the Read-Aloud ***15** minutes*

Comprehension Questions **10** *minutes*

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding the students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Inferential* When we look at the moon at night, it looks like it is glowing. Is it really glowing? (no) Why does the moon look lit up? (It reflects the light from the sun.)

2. *Literal* The earth orbits the sun. What does the moon orbit? (the earth)

3. *Literal* The earth takes a year to complete its orbit around the sun. About how long does the moon take to orbit around the earth? (a month)

4. You heard that the appearance of the moon changes throughout its orbit because more or less of the sun's light reflects off it. These changes in the moon's appearance are called phases.

   - *Literal* Which phase is the moon in when it looks like a big circle? (full moon)
   - *Literal* Which phase is it in when it looks as if it has been cut right down the middle? (half moon)
   - *Literal* Which phase is it in when it is a thin, curved sliver? (crescent moon)
   - *Literal* Which phase is it in when we can't see it at all? (new moon)

5. *Literal* Many people have said that the moon looks like it has a face, and there are many stories about the "man in the moon." What are those dark spots? (lava lakes)

6. *Inferential* You heard about some ways that the moon is not like the earth. The earth's atmosphere supports the plants and animals that live on Earth. Is there life (any plants or animals) on the moon? (no) Why not? (The moon doesn't have an atmosphere.)

7. *Inferential* What happens when meteors hit the moon? (They make big holes.) What are these holes called? (craters) Why isn't the earth covered with craters? (The earth's atmosphere burns up most meteors before they hit land.)

[Please continue to model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

8. *When? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. We learned a lot in today's read-aloud about how the moon changes: reflecting the sunlight, going through an orbit, and going through different

phases. Think of a question you can ask your neighbor about something that happens to the moon that starts with the word *when*. For example, you could ask, "When does the moon look like a circle?" Turn to your neighbor and ask your *when* question. Listen to your neighbor's response. Then your neighbor will ask a new *when* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

9. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Appearance

5 *minutes*

1. In the read-aloud you heard, "The *appearance* of the moon changes depending on where it is in its orbit."
2. Say the word *appearance* with me.
3. *Appearance* means the way something or someone looks.
4. If you say that you approve of my appearance, you mean that you like the way I look.
5. Share your favorite thing about your own appearance. Try to use the word *appearance* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "My favorite thing about my appearance is . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: Listen to the following examples. If I describe a person's appearance, say, "That is part of his/her appearance." If I do not describe someone's appearance, say, "That is not part of his/her appearance."

1. He has green eyes. (That is part of his appearance.)
2. She is really smart. (That is not part of her appearance.)
3. He has brown hair. (That is part of his appearance.)
4. She looks stylish. (That is part of her appearance.)
5. He is kind. (That is not part of his appearance.)

Complete Remainder of the Lesson Later in the Day

Extensions

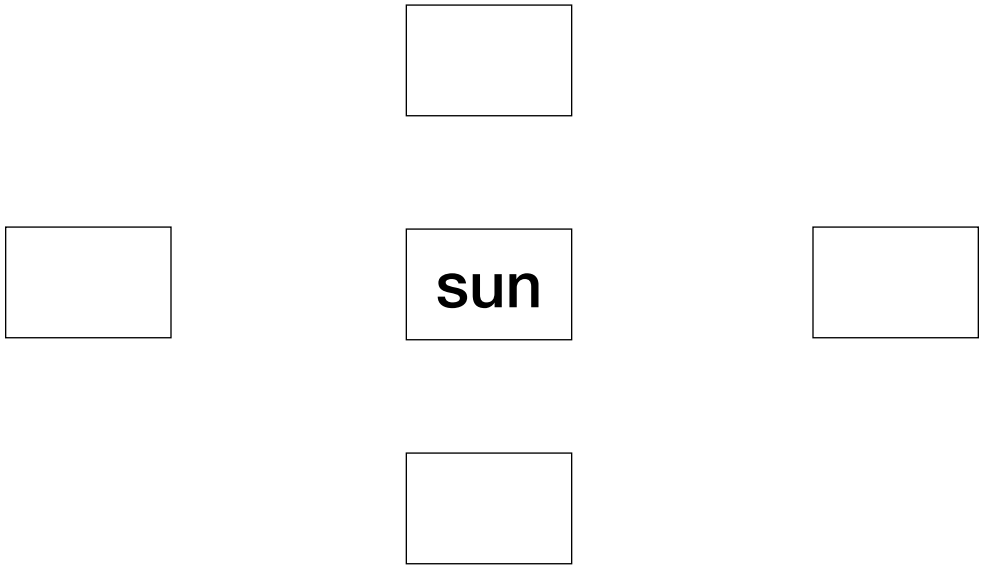
20 *minutes*

⑩ Four Phases of the Moon (Instructional Master 5B-1)

Give each student a copy of Instructional Master 5B-1. Explain that this sheet addresses the phases of the moon. Ask students to listen to the directions and write the appropriate number in the blank. Directions: The pictures show four different phases of the moon. Write the number "1" on the line below the new moon. Write the number "2" below the crescent moon. Write the number "3" below the half moon. Write the number "4" below the full moon.

On Stage: Earth-Moon Relay

This activity is best completed outdoors or in a large indoor space, such as a gym. If neither option is feasible, be sure to create a space in your classroom large enough for students to walk around in a circle. Prior to the lesson, make five signs that will be taped to the floor: "sun," and four blank cards. Put the sun sign down in the center of the space, and put the four blank cards on the floor in a circle, or if space permits, an ellipse. The floor should look like this:



Tell students that they have learned a lot about how the earth and the moon move in space. Announce that they will get to act out these movements, playing the roles of the sun, Earth, or moon. First, ask for two volunteers to stand back to back in the center of the circle, holding a hula hoop over both of them to act as the sun. Remind students that the sun is huge, which is why you want to use a hula hoop and more than one student. Also remind students that the sun doesn't orbit and that they need to stand stationary on the sign.

Step 1: Earth orbits sun

Remind students that the earth orbits, or revolves, around the sun. Hold up the globe and tell students that it represents the earth. Ask for four volunteers to carry the globe around the sun. Explain that, because you want to give everyone a turn, you will do this activity as a relay. Define *relay* for them by saying, "In a relay, one person goes part of the distance and tags or passes something to the next person to continue for them. In this relay, we will pass the earth."

Have each volunteer stand on one of the blank cards. Give the globe to the student standing on the card nearest to you, and have him or her slowly walk counterclockwise, handing the globe over to the person standing on the next blank sign before stepping out of the circle. Have them continue until the globe makes one full orbit. Say, "Go slowly, but please don't take a whole year to complete your orbit, like the real earth does!"

Step 2: Earth spins and orbits sun

Then remind students that the earth moves in two ways: it orbits, but it also rotates or spins on its axis. Tell all students to slowly spin around in place once. Say, "Go slowly, but don't take a whole day or twenty-four hours! That's how long the real earth takes to spin around once." [Monitor students to make sure that they spin only once and slowly to avoid dizziness.] Then say, "Does anyone want to try orbiting the sun again, spinning the globe at the same time?" Take four new volunteers.

Have each volunteer stand on one of the blank cards. [You may also want to choose new volunteers for the sun.] Give the globe

to the student standing on the nearest blank card and have him or her slowly walk counterclockwise, spinning the globe at the same time. When s/he reaches the person standing on the next blank card, s/he should carefully hand the globe over and step out of the circle. Have students continue until the globe makes one full orbit. Say, "Does anyone know how many times the earth spins as it goes around the sun once? Remember, each spin is a day, and the whole orbit takes a year. What I'm really asking is: How many days are in a year? Spin the globe, but don't worry about spinning it 365 times!"

Step 3: Moon orbits Earth

Remind students that, in today's read-aloud, they heard that the moon orbits the earth. Remind students that the same side of the moon always faces the earth. Demonstrate this motion by walking around one student, side-stepping so that your body remains facing them in the center.

Then direct students to find a partner to practice the moon's orbit. Allow students playing the "sun" to participate in this activity as well. One partner will play the earth, standing still while the moon walks around the earth. Remind students that the "moon" will have to step sideways in its orbit so it can remain facing the earth the whole time.

Step 4: Moon orbits the earth while the earth orbits the sun

Now remind students that they just practiced the moon's orbit while the earth was standing still. However, the earth never stands still. Tell them that they will now put all of the movements they've practiced together. Have some new volunteers stand in the center to play the role of the sun. Ask four new volunteers to play the role of the earth again as you did in Step 2, walking in an orbit while spinning the globe in relay style. Tell students that you will play the part of the moon, orbiting the earth while the earth is orbiting the sun. Making a wide berth around the student holding the globe, continue orbiting the "earth" as the globe changes hands. Remember to face the globe at all times. Tell students that you will go slowly but that you couldn't possibly take a whole month to go around the earth every time. That's how long it takes the moon to go around, or orbit, the earth just once. If time permits and

students want to try it, you can have four student volunteers play the role of the moon, orbiting the person who is holding the globe in relay style as well, from one blank card to the next.

Take-Home Material

Family Letter

Send home Instructional Master 5B-2.

Pausing Point

PP

Note to Teacher

You should pause here and spend one day reviewing, reinforcing, or extending the material taught thus far.

You may have students do any combination of the activities listed below, but it is highly recommended you use the Mid-Domain Student Performance Task Assessment to assess students' knowledge of astronomy. The other activities may be done in any order. You may also choose to do an activity with the whole class or with a small group of students who would benefit from the particular activity.

Core Content Objectives Up to This Pausing Point

Students will:

- ✓ Recognize the sun in the sky
- ✓ Explain that the sun, moon, and stars are located in outer space
- ✓ Explain that the sun is a source of energy, light, and heat
- ✓ Classify the sun as a star
- ✓ Identify Earth as a planet and our home
- ✓ Identify the earth's rotation, or spin, as the cause of day and night
- ✓ Explain that other parts of the world experience nighttime while we have daytime
- ✓ Explain sunrise and sunset
- ✓ Explain that Earth orbits the sun
- ✓ Describe stars as large, although they appear small in the night sky
- ✓ Describe stars as hot, distant, and made of gas

- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Describe how people sometimes tell stories about the moon and stars
- ✓ Explain what a constellation is
- ✓ Identify the Big Dipper and the North Star
- ✓ Identify the four phases of the moon—new, crescent, half, full
- ✓ Explain that the moon orbits the earth

Student Performance Task Assessment

⑩ The Earth, Sun, and Moon (Instructional Master PP-1)

Directions: I am going to read to you sentences that refer to either the earth, the sun, or the moon. If what I read to you describes something about Earth, circle the first picture in the row. If what I read to you describes something about the sun, circle the second picture in the row. If what I read to you describes something about the moon, circle the last picture in the row.

1. This celestial body is your home—the planet on which you live. (Earth)
2. This celestial body does not generate, or give off, any heat or light; it is just a big, cold rock. (moon)
3. This celestial body orbits around the sun. (Earth)
4. This celestial body is actually a star. (sun)
5. This celestial body revolves, or orbits, around the earth. (moon)

Activities

Image Review

Show the Flip Book images from any read-aloud again, and have students retell the read-aloud using the images.

Key Vocabulary Brainstorming

Materials: Chart paper, chalkboard, or whiteboard

Give students a key domain concept or vocabulary word such as *sun* or *star.* Have them brainstorm everything that comes to mind when they hear the word, such as, *made of gas*, *far away*, *big*, etc. Record their responses on chart paper, a chalkboard, or a whiteboard for reference.

Class Book: The Sun

Materials: Drawing paper; drawing tools

Tell the class or a group of students that they are going to make a class book to help them remember what they have learned about the sun. Have students brainstorm important facts about the sun. Have each student choose one idea to draw, and then have them write a caption for the picture. Bind the pages to make a book to put in the class library for students to read again and again.

Other possible topics you may wish to suggest for students to draw and write about:

- Objects found in outer space compared to those within the earth's atmosphere
- A comparison of the size of the earth to that of the sun
- A constellation or constellations presented in the read-aloud
- The four phases of the moon

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read a trade book to review a particular person, event, or concept; refer to the books listed in the Introduction. You may also choose to have students select a read-aloud to be heard again.

Riddles for Core Content

Materials: Image Cards 1, 2, and 6

Ask the students riddles such as the following to review core content.

Note: Use Image Cards 1 (Earth), 2 (Sun), and 6 (Full Moon) to reiterate the images after they answer the riddle.

- I am your home. (Earth) That's right, the earth is our home.
- I am the closest star to the earth. (sun) That's right, the sun is the nearest star to the earth.
- I orbit, or revolve around, the sun. (Earth) That's right, the earth orbits the sun.
- I orbit, or revolve around, the earth. (moon) That's right, the moon orbits the earth.
- It looks like I rise every morning and set every night. (sun) That's right, the sun looks like it rises and sets each day because the earth is rotating.
- Sometimes I look like a circle, and other times I look like half a circle or even just a sliver in the sky. (moon) That's right, the moon appears in different shapes during different parts of its orbit.

Day and Year Game

On the playground or in a large indoor space, tell students you will play a game to practice the two ways Earth moves relative to the sun: rotating and orbiting. Remind students that Earth's rotation on its axis creates day and night, and Earth's orbit around the sun creates our year. Stand in the center of the space. Tell students that you are pretending to be the sun and they are each going to pretend to be Earth. When you shout the word "day," they are to spin around in place, counterclockwise, pretending to rotate like Earth does every twenty-four hours. When you shout out "year," they are to run around you, the sun, counterclockwise, in an orbit.

Relative Sizes of Sun and Earth

Materials: Large sheet of yellow paper (bulletin board or butcher paper); chart paper, chalkboard, or whiteboard

Remind students that the sun is much, much bigger than Earth. Draw a circle on chart paper, a chalkboard, or a whiteboard, and draw a diameter across its center. Explain that this line is called

a diameter. Tell students that a diameter is the width of a circle measured by a straight line. Explain that the diameter of the sun, or the width of the sun, is 110 times bigger than the diameter of the Earth. Tell students that you will make a picture of the Earth and of the sun in order to appreciate how much larger the sun is compared to Earth. Make a circle one half inch in diameter. Tell students that this represents Earth. Then using a large sheet of yellow paper, make a circle that is four and a half feet in diameter. Tell students that this represents the sun.

More Constellations

Materials: Star stickers

Using a constellation chart as a guide, affix star stickers in the shapes of various constellations on the ceiling or on the underside of a large table in your classroom. Go "stargazing" with students, and see how many constellations they can recognize.

On Stage: Stargazers and Astronomers

Divide students into two groups: a group of astronomers, and a group of stargazers. Tell each group that you will give them a time of day. First, the stargazers will pretend to look up in the sky and describe exactly what they would see at that time of day. Then the astronomers will look through their pretend telescopes and explain to the stargazers what is really happening in space.

1. **noon**
   Stargazers: The sun is right over our heads.
   Astronomers: Our side of Earth is facing the sun.
2. **night**
   Stargazers: The sun is gone and the moon is out.
   Astronomers: Our side of Earth is facing away from the sun.
3. **sunrise**
   Stargazers: The sun is coming up; there are colors in the sky.
   Astronomers: We are rotating toward the sun.
4. **sunset**
   Stargazers: The sun is setting; there are colors in the sky.
   Astronomers: We are rotating away from the sun.

History of Space Exploration and Astronauts 6

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Describe how people sometimes tell stories about the moon and stars
- ✓ Explain that astronauts travel to outer space

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Describe the connection between the United States and the Soviet Union with respect to the Space Race (RI.1.3)
- ✓ Describe the way in which the Chinese launched early rockets (SL.1.4)
- ✓ Add drawings to descriptions of various types of rockets (SL.1.5)
- ✓ Prior to listening to "History of Space Exploration and Astronauts," orally predict what the read-aloud is about, and then compare the actual outcomes to predictions

Core Vocabulary

astronaut, *n.* A person who is trained to travel into space
Example: An astronaut has to train for many years before he or she travels in space.
Variation(s): astronauts

launch, *v.* To lift or push an object with force
Example: In the afternoon, they planned to launch the rocket into the air.
Variation(s): launches, launched, launching

rockets, *n.* Engines that power spacecraft, driving them through the air or space
Example: The rockets shot straight up into the air.
Variation(s): rocket

spacecraft, *n.* A vehicle for traveling beyond Earth's atmosphere
Example: A spacecraft has many strong layers to protect the astronauts as they travel to space.
Variation(s): rocket

technology, *n.* The practical use of new scientific discoveries
Example: My mom said that all telephones used to be connected by a wire to the wall, but that technology has changed a lot since then.
Variation(s): technologies

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**Making Predictions About the Read-Aloud**	Image Cards 3–6	10
	Purpose for Listening		
Presenting the Read-Aloud	**History of Space Exploration and Astronauts**	world map or globe	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Launch		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Student Choice**		20
	Astronomy Journals	journals from Lesson 1; drawing tools	

History of Space Exploration and Astronauts 6A

Introducing the Read-Aloud *10 minutes*

Making Predictions About the Read-Aloud

Review the previous read-aloud about the moon by asking students to tell you the facts they learned about the moon. Highlight the moon's rotation and its orbit around the earth. Remind students that the moon rotates and orbits the earth just as the earth rotates and orbits the sun. Then tell students that you will review the phases of the moon by showing them Image Cards and asking them to identify which phase of the moon is represented on each card. Show Image Card 3 (New Moon), Image Card 4 (Crescent Moon), Image Card 5 (Half Moon), and Image Card 6 (Full Moon), pausing after each to allow students to identify the phase.

Then read the title of today's read-aloud to students: "History of Space Exploration and Astronauts." Ask students to predict what the read-aloud will be about. Have them describe what *space exploration* might mean. How might people explore space? Then ask students if they know what an astronaut is. Define *astronaut* as someone who is trained to travel into space. Then ask students to predict how and when space travel might have begun, and what it was like for the first astronauts.

Purpose for Listening

Tell students to listen carefully to find out whether or not their predictions about space exploration are correct.

Presenting the Read-Aloud — **15** *minutes*

History of Space Exploration and Astronauts

Show image 6A-1: Ladder to the moon

Ever since they first gazed up at the stars, people have always wondered if it was possible—and what it would be like—to travel into outer space. For most of human history, the idea of traveling into space was considered to be impossible. Space, most people thought, was out of reach, and there was no way humans would ever be able to go there. Still, this did not keep people from using their imaginations and coming up with creative ideas for space travel.

Show image 6A-2: Rockets

The Chinese invented the first **rockets**[1] hundreds of years ago using gunpowder—the same type of explosive used to fire guns and cannons. Lighting the gunpowder would **launch** the rocket[2] into the air. It was not until about one hundred years ago that scientists started to make serious advances in rocket **technology.**[3]

1 engines that power spacecraft, driving them through the air

2 lifting or pushing it forcefully

3 or started to apply the discoveries they made in rocket science.

Show image 6A-3: Newspaper about early space travel

By the 1950s,[4] rocket technology had improved to the point that people began to think seriously about space travel and exploration. Back then, there was a nation called the Soviet Union, which no longer exists today, but which consisted of Russia and other countries near Russia.[5] At the time, the United States was the only other nation in the world as large or as strong as the Soviet Union.[6] The leaders of the Soviet Union and the United States each wanted to show the world that theirs was the more powerful country by being the first to launch a rocket into outer space.

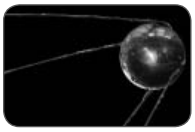
4 probably around the time your grandparents were born or just a little bit before then

5 [Point to Russia on a world map or globe.]

6 [Point to the United States on the world map or globe.]

Show image 6A-4: Rocket launch

This photo shows scientists in the United States launching the first rocket from Cape Canaveral, Florida, in 1950. This was just a test to see whether this type of rocket engine worked. This was the first of hundreds of rockets to be launched from Cape Canaveral.



Show image 6A-5: Sputnik 1

The Soviet Union succeeded in putting the first man-made object in orbit on October 4, 1957, by launching a satellite called Sputnik 1. A satellite is any object that moves in a constant orbit around another object in space. [7]

Sputnik 1 was carried into space aboard a rocket and then released. [8] It orbited Earth for several months before reentering the atmosphere and burning up. [9]

After the success of Sputnik 1, the "Space Race" between the United States and the Soviet Union had begun. [10] Each country wanted to prove that it had a better space program than the other country. For several years, the Soviet Union continued to lead in the Space Race. The leaders and people of each country took the Space Race very seriously; it was not a game, but a true matter of national pride. [11]

7 Some satellites teach us about space by taking photographs.

8 It didn't have an engine like a rocket, so it couldn't get into space by itself.

9 That's what happens to meteors that hit the earth's atmosphere, too.

10 It wasn't a real race with a start and finish line, but both countries wanted to be the first to go to space.

11 *National pride* means good feelings about your country, or patriotism. The word *pride* here means the feeling of happiness you get when you do something good. The word *pride* can also refer to a group of lions.

Show image 6A-6: Explorer launch

The United States developed a space program called the National Aeronautics and Space Administration, or NASA for short. The scientists at NASA hurried to try to catch up to the progress the Soviets had made. A few months after the Soviet Union launched Sputnik 1, NASA scientists in the United States launched a satellite of their own, Explorer 1, pictured here. [12]

12 [Point to satellite in image.]

Show image 6A-7: Yuri Gagarin

The Space Race continued at a heated pace into 1961, [13] when Soviet Yuri Gagarin became the first person to go into space and

13 So both countries were trying hard to win for eleven years.

return safely. This picture of Gagarin was taken on the way to the launch pad for his historic journey. You can bet that he was feeling very nervous at that point. [14]

14 Why might he be nervous?

Show image 6A-8: Alan Shepard

The Americans were close behind. A couple of months after Gagarin made his famous flight, a man named Alan Shepard became the first American to travel into space. This picture was taken shortly before Shepard boarded the Freedom 7 **spacecraft.** [15] Notice that, like Gagarin, Shepard was wearing a helmet and a special suit. Space travelers need special gear like this in order to survive the extreme conditions of outer space, where there is no air, and where the temperatures can be both incredibly hot and incredibly cold. [16]

15 A spacecraft is a vehicle used for traveling beyond Earth's atmosphere.

16 There's air inside the suit so astronauts can breathe.

Show image 6A-9: Rescuing Shepard

Returning from outer space is just as dangerous as launching into outer space. [17] This photo shows the Freedom 7, Alan Shepard's ship, after his flight. Shepard is inside that little capsule! [18] When his flight was finished, the capsule reentered the atmosphere and a parachute opened to lower it gently to Earth. Shepard landed in the ocean, as planned, and the capsule floated there until a helicopter came to recover him.

17 because you crash into the atmosphere on the way back, like meteors do

18 a small, closed space that keeps a pilot or astronaut safe when traveling or landing

Show image 6A-10: Astronauts training

Space travelers like Alan Shepard are called **astronauts**. The word *astronaut* comes from two Greek words: *astro,* meaning "star"; and *naut,* meaning "sail." So, an astronaut is a "star sailor." [19] Although being an astronaut can certainly be one of the most interesting jobs in the world, it is by no means an easy job.

19 or a person who is trained to travel into space

Astronauts spend years in training to prepare for journeys into outer space. Astronauts must be healthy and strong because space travel can be very difficult. Astronauts are stuffed into tiny spaces and launched into space in a rocket powered by thousands of gallons of powerful fuel. It is scary and it is uncomfortable, but astronauts put up with it.

This picture shows astronauts undergoing training. These Apollo 17 astronauts are learning to use equipment for their mission.

Early NASA astronauts also spent hours and hours running in place on treadmills, soaking their feet in ice water, and undergoing a number of other difficult, painful tests intended to make them tough. They had to be tough to be astronauts.

Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — 10 minutes

1. *Evaluative* Were your predictions about the topic of the read-aloud correct? (Answers may vary.)
2. *Literal* When rockets launch, we usually say, "Blast off!" In the read-aloud today, you heard that the Chinese invented rockets. How did the Chinese launch these first rockets? (by lighting gunpowder; by making an explosion) Why does saying "blast off" make sense? (*blast* means explode)
3. *Inferential* In the 1950s, the Soviet Union and the United States competed to see who could go to space first. What did we call this competition? (The Space Race)
4. *Inferential* The Soviet Union was the first country to send an object into space: the satellite, Sputnik 1. How did they get it into space? (They launched a rocket carrying it.)
5. *Inferential* The United States wanted to catch up to the Soviet Union, so they started the NASA program and launched a satellite into space, too. Then both countries launched something else, even more important, into space. What did they send next? (people; astronauts)
6. *Literal* What is an astronaut? (a person who travels in space)
7. *Inferential* You heard that being one of the first astronauts was not an easy job. What were some of the challenges astronauts faced? (Training was difficult, such as treadmill and ice water tests. Space travel was unknown and risky.)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Think Pair Share:* Would you have wanted to be one of the first astronauts to go up in space? Why or why not? (Answers may vary.)

8. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these remaining questions.]

Word Work: Launch

***5** minutes*

1. In the read-aloud you heard, "Lighting the gunpowder would *launch* the rocket into the air."
2. Say the word *launch* with me.
3. *Launch* means to lift or push an object with force.
4. I pretend my table is a runway when I launch my paper airplane into the air.
5. Tell about an object that you can launch. Try to use the word *launch* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "You can launch a _____."]
6. What's the word we've been talking about?

Use a *Dramatization* activity for follow-up. Directions: Let's pretend that our bodies are real rockets. First, make sure that there is room around you. Then crouch down on the ground. I will count down from ten and when I say, "Blast off," launch your rocket into the air without hitting any other rockets. Ready? Ok, here we go! 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, Blast off!

Complete Remainder of the Lesson Later in the Day

History of Space Exploration and Astronauts 6B

Extensions — *20 minutes*

Student Choice

Ask students which read-aloud they have heard recently that they would like to hear again. Also, ask them to try to express what they liked about this read-aloud. If necessary, reread the titles of recent read-alouds to refresh students' memories. You may also want to choose one yourself.

Reread the text that is selected. Feel free to pause at different places in the read-aloud this time and talk about vocabulary and information that you did not discuss previously during the read-aloud.

After the read-aloud, ask students if they noticed anything new or different during the second reading that they did not notice during the first reading. Remember to repeat and expand upon each response using richer and more complex language, including, if possible, any read-aloud vocabulary.

Astronomy Journals

Remind students that they have been pretending to be astronomers by recording what they learn and observe in their astronomy journals. Distribute the journals, and remind students that so far they have drawn the sky during the day and the sky at dusk.

Explain that astronomers are only one kind of scientist involved in learning about space. Remind students that they have learned about astronauts, scientists who are trained to travel into space to collect and study information there. Tell students that there is another type of scientist responsible for getting astronauts into space where they can do their work. These scientists are called engineers, and they are responsible for designing and building spacecraft. They must figure out how to launch spacecraft into space and design vehicles that will keep astronauts safe as they

travel through space. Tell students that today they will pretend to be engineers and design spacecraft for astronauts to use to explore space.

On the third page of their journals, direct students to design and draw a sketch of a spacecraft for astronauts to travel in. Remind students that a sketch is quickly drawn, and does not include many colors or details. You may want to turn the Flip Book to image 6A-2 in case there are students who are having difficulty beginning their sketches. Have students identify and label the objects in their pictures using the letter-sound correspondences learned thus far. As students work, circulate around the room, encouraging the use of read-aloud vocabulary by asking them to talk about their spacecraft and how they will launch. Then ask students to name their spacecraft and write these names below the sketches of their spacecraft.

- Above and Beyond: For students who are able to do so, have them write a complete sentence about their spacecraft.

Exploration of the Moon 7

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Explain that the moon orbits the earth
- ✓ Explain that astronauts travel to outer space
- ✓ Describe the landing on the moon by American astronauts
- ✓ Explain the importance of the first trip to the moon

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Describe the connection between unmanned and manned missions to the moon (RI.1.3)
- ✓ Make personal connections to the concerns the first astronauts may have felt before heading in to space, and about what they would see, do, or feel if they went to the moon as an astronaut (W.1.8)
- ✓ With assistance, categorize and organize information about what would be seen and experienced on the surface of the moon (W.1.8)
- ✓ Ask questions to clarify directions for an activity in which students are creating a sketch and written statement about what they might do, see, or feel if they went to the moon (SL.1.3)

- ✓ Describe the moon with relevant details, expressing ideas and feelings clearly (SL.1.4)
- ✓ Add drawings to descriptions of the moon to clarify the concepts (SL.1.5)
- ✓ Use possessive pronouns orally

Core Vocabulary

determined, *adj.* Committed to or focused on a decision or a goal
Example: I walked fast because I was determined to get to school on time.
Variation(s): none

disaster, *n.* A sudden and terrible event that is very unpleasant
Example: The tornado was a disaster for our town.
Variation(s): disasters

historic, *adj.* Famous or important in history (events of the past)
Example: The day the thirteen colonies signed the Declaration of Independence was a historic day.
Variation(s): none

missions, *n.* Tasks assigned to achieve set goals
Example: My dad gave us all a job to do to clean up the house and said we needed to complete our missions before we could play.
Variation(s): mission

nervously, *adv.* Doing something in a worried or slightly frightened way
Example: My grandmother watched my football game nervously because she was afraid I would get hurt.
Variation(s): none

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**Personal Connections**		10
	Purpose for Listening		
Presenting the Read-Aloud	**Exploration of the Moon**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Determined		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Astronomy Journals**	journals from Lesson 1; drawing tools	20
	Syntactic Awareness Activity: Possessive Pronouns *my, your, his, her, our, their*		

Exploration of the Moon 7A

Introducing the Read-Aloud *10 minutes*

Personal Connections

Review the previous read-aloud about space exploration and the first astronauts. Emphasize that the first astronauts didn't land anywhere in space. They were launched into space, orbited the earth, and landed back on Earth. Remind students that in other read-alouds, they learned that the sun and other stars are too far away and too hot to visit. Ask, "What is the one celestial body that is close enough to Earth to visit, and made of rock instead of gas?" (the moon) Explain that today's read-aloud will teach them about the first astronauts ever to visit the moon.

Emphasize that traveling to the moon for the first time required astronauts to be brave. Ask students if they remember learning in Core Knowledge Language Arts in Kindergarten about Christopher Columbus and the time he traveled to the New World for the first time. If so, ask students what made Columbus brave for going on his journey. Point out that today it might not seem very brave to cross an ocean in a ship. But, unlike Columbus, if we wanted to cross the ocean we could ask people who have done it before what it was like. Being one of the first meant that Christopher Columbus had many questions that he couldn't answer, such as:

- Would his ships be strong enough for the voyage?
- What dangers would he face on his trip over the ocean? (The crew worried about sea monsters and falling off the edge of the world.)
- Would he actually get to Asia, his goal? (In fact, he didn't get to Asia after all.)

In much the same way, the first people to go to the moon didn't have anyone to ask what it would be like. Ask students to imagine what concerns or fears the first astronauts may have felt before going into space. Some concerns may have been:

- Would their spacecraft be able to handle the trip?
- What dangers would they face on their trip through space?
- Would they actually get to the moon?
- What would they discover if they did land on the moon?

Ask students to think about whether or not they would have decided to travel to the moon, knowing some of these unanswered questions.

Purpose for Listening

Tell students to listen carefully to identify steps scientists took to find out what the trip would be like before sending the astronauts to the moon. Additionally, tell students to listen and find out who won the Space Race to the moon.

Presenting the Read-Aloud — *15 minutes*

Exploration of the Moon

Show image 7A-1: JFK [1]

In 1961, the president of the United States, John F. Kennedy, announced that the United States would send astronauts to the moon within ten years. This seemed impossible to many people, but President Kennedy and the NASA scientists were **determined** to succeed. [2] Thus, they started the Apollo Program in order to send people to the moon. But there was a lot of work to be done before anyone could get anywhere near the moon. [3]

1 This was the president of the United States many years ago. Who is the current president of the United States?

2 They were committed to making it happen.

3 They didn't have much information about what it would be like to visit.

Show image 7A-2: Surveyor 1

Surveyor 1 was the first spacecraft Americans sent to the moon, but it was an unmanned spacecraft, that is, a spacecraft without any people aboard. The purpose of Surveyor 1 was to survey [4] the moon's surface. It carried equipment to study the land, temperature, and other things NASA scientists needed to know before sending people to the moon. [5]

4 or study

5 This would help them answer questions about what they would discover when they landed.

Show image 7A-3: Apollo 4 launch

The Apollo program involved many **missions.** [6] The first mission, Apollo 1, was a **disaster.** [7] The spacecraft caught on fire before they had a chance to launch it. After that, however, the Apollo scientists had better success. First, there were unmanned missions to test various rockets and systems. [8] This beautiful picture shows Apollo 4, an unmanned mission to test a rocket engine. This is the type of engine that would eventually carry men to the moon.

6 or jobs that needed to be done to accomplish what they wanted to do

7 A disaster is a sudden event that is unpleasant.

8 These missions would help answer questions about whether their spacecraft could handle the trip.

Show image 7A-4: Apollo 7 crew

Next came manned missions, [9] but these astronauts did not get to go to the moon. Instead, they were practicing and testing equipment to make sure everything would work properly. This photo shows the crew of the Apollo 7 mission.

9 or missions with people

Show image 7A-5: Apollo 11 crew

Finally, on July 16, 1969, Apollo 11 was launched from the Kennedy Space Center in Florida. There were three astronauts aboard:[10] Neil Armstrong, Michael Collins, and Buzz Aldrin. This picture was taken shortly before they went on their **historic** mission.[11]

It took four days for Apollo 11 to travel the 239,000 miles from Earth to the moon.[12] During the launch, the astronauts were sitting in the very top of the rocket. Once it reached outer space, the part they were in broke off from the rocket and continued on toward the moon. The rocket was not needed once the ship reached outer space.[13]

10 [Point to the three astronauts in the center of this image.]

11 It was historic because it was important and many people would remember it for many years.

12 Does that sound like a long time? You heard in an earlier read-aloud that it would take thousands of years to travel to some stars.

13 The rocket's job was done after it launched the spacecraft beyond the earth's atmosphere.

Show image 7A-6: Eagle in orbit

Michael Collins was the pilot for the command module, which drove the lunar module close to the moon but did not actually land there. The lunar module, called the Eagle, was attached to the command module during the journey from Earth to the moon.[14] Once they got close enough to the moon, however, the Eagle broke off from the command module and landed on the surface.[15] The Eagle orbited the moon as Buzz Aldrin and Neil Armstrong prepared to descend[16] and land on the surface.

14 In fact, the word *lunar* is used to describe anything that is related to the moon.

15 So the spacecraft had three parts at launch, but only the lunar module [point to the picture] actually landed on the moon.

16 or go down

Show image 7A-7: Mission control[17]

Meanwhile, as the Eagle approached the surface, hundreds of scientists back at mission control were watching their computers **nervously**[18] to make sure everything went as planned. There is little room for error[19] in space travel. The NASA scientists monitored every single part of the ship, making sure every fuse and wire were working properly.

17 This is mission control, where NASA scientists on the ground talk to and help astronauts in space.

18 or worried about what might happen

19 or mistakes

Show image 7A-8: TV news broadcast

At the same time, people all over America were glued to their television sets,[20] also nervously waiting to see what would happen. The Eagle was equipped with television cameras, so

20 watching the news

everyone back home could see and hear everything that was happening 239,000 miles away on the moon! The moon landing excited people all over the world.[21]

21 Remember the "Space Race" with the Soviet Union? The United States was the first country in the world to send people to the moon.

Show image 7A-9: The Eagle has landed

It took longer than expected, but finally Neil Armstrong announced the famous words, "The Eagle has landed." Great sighs of relief and cheers went up from mission control and in living rooms across America.

Show image 7A-10: Armstrong stepping onto the moon

Next, Neil Armstrong prepared to leave the Eagle and step out onto the moon. This picture shows what Americans back home saw on their television sets. As you can see, the picture was not very clear, but if you look closely you can see Armstrong about to set foot on the moon's surface.

Armstrong stepped down and landed on the fine, soft dust of the moon's surface. With his first step he said, "That's one small step for man, one giant leap for mankind." What did Neil Armstrong mean?[22] He meant that he himself had taken a small step—from the Eagle's ladder onto the moon—but that step represented a huge leap in terms of the advances humans had made by landing on the moon.

22 [Pause for responses.]

Show image 7A-11: Buzz Aldrin

Buzz Aldrin followed Armstrong down the ladder. Both astronauts wore special spacesuits designed to endure the harsh temperatures on the moon's surface.

The astronauts conducted experiments to help future astronauts and scientists. The first thing they noticed was their mobility, or how easy it was to walk and move around. The moon has very little gravity compared to Earth. Here on Earth, when you jump up you come straight back down—not so on the moon. When you hop on the moon, you stay up for a few seconds and come down rather slowly.[23]

23 Can you imagine hopping up in the air and staying up there for a bit? Imagine how far you could jump!

Show image 7A-12: The flag

The astronauts collected samples of the moon's dust and rocks. Then they planted an American flag in the moon's soil.[24] They had prepared the flag beforehand by inserting wires in it so that it would be firm and appear to be waving, even though there is no wind on the moon.

24 Explorers often planted flags to claim the new land for their home countries. Columbus planted the Spanish flag when he landed in the New World.

Five more Apollo missions landed successfully on the moon after that first mission. In the end, the Apollo astronauts brought back a total of 842 pounds of moon rocks. Many of these rocks are on display in museums around the world.

Apollo 17, launched in 1972, was the last mission to reach the moon. Nobody has returned to the moon since. That is bound to change as humans continue to explore outer space.[25]

25 [If additional manned lunar missions have occurred since 1972, mention them here.]

Discussing the Read-Aloud — ***15*** *minutes*

Comprehension Questions — **10** *minutes*

1. *Literal* You heard in today's read-aloud that President Kennedy, the president of the United States, was determined to do something within just ten years. What goal did he set? (to send people to the moon)

2. *Inferential* An unmanned mission is a task to be completed on a spacecraft with no people on it. Why did NASA send unmanned missions to the moon before manned ones? (to first make sure that it was safe for people) What were the purposes of these unmanned missions? (to study the temperature and surface of the moon; test the rockets and equipment) Before the unmanned missions, how did astronomers get most of their information about the moon? (telescopes)

3. You learned that the Apollo 11 spacecraft had three parts: the rocket, the command module, and the lunar module (or Eagle).
    a. *Literal* Which part launched it into space? (rocket)
    b. *Literal* Which part held the pilot who orbited the moon without landing? (command module)
    c. *Literal* Which part landed on the moon? (the lunar module, also called the Eagle)
4. *Evaluative* You learned that scientists at mission control and people at home were nervous and excited as they watched the spacecraft approach the moon. Why do you think they were nervous? (worried something would go wrong) Why do you think they were excited? (The first person on the moon was big news.)
5. *Inferential* In another read-aloud, you learned that gravity is a force that pulls one object to another. The moon has very little gravity. What did the low gravity mean for the astronauts when they walked on the moon? (They hopped and stayed up in the air for a few seconds.)
6. *Evaluative* You learned that astronauts brought back over 842 pounds of moon rocks. Why do you think they brought back so many rocks from the moon? (to study them, and to find out what they're made of)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative* ***Think Pair Share:*** Neil Armstrong stepped off the ladder and said, "That's one small step for man, one giant leap for mankind." In the read-aloud, we heard that humans made a giant leap by sending people to the moon. Why do you think this was a big accomplishment? (Answers may vary.)

Word Work: Determined *5 minutes*

1. In the read-aloud you heard, "President Kennedy and the NASA scientists were *determined* to succeed [in sending astronauts to the moon]."
2. Say the word *determined* with me.
3. *Determined* means committed to a decision or a plan of action.
4. I am determined to do well in school.
5. Tell about something you are determined to do. Try to use the word *determined* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "I am determined to . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: Listen to the following sentences people might say. If you think the person talking is determined to succeed, say, "He is determined." If you think the person talking is not determined, say, "He is not determined."

1. I will keep on trying until I get it. (He is determined.)
2. It's too hard; forget it. (He is not determined.)
3. I will never give up. (He is determined.)
4. It doesn't matter that much to me. (He is not determined.)
5. I will achieve my goal. (He is determined.)

Complete Remainder of the Lesson Later in the Day

Exploration of the Moon 7B

Extensions — *20 minutes*

Astronomy Journals

Tell students that, so far, they pretended to be astronomers and engineers when completing their astronomy journals. Explain that today they will complete their journals by pretending to be astronauts. First, direct students to draw a sketch of themselves in an astronaut's suit and helmet on the moon's surface. Remind them that a sketch is quickly drawn, and does not include many colors or details. Then direct students to write a sentence about what they might do or see or feel if they actually went to the moon as an astronaut, using the following sentence structure: "If I went to the moon, I would . . ." Remind them that as they write they will use the letter-sound correspondences learned thus far.

Before students begin, say, "Asking questions is one way to make sure everyone knows what to do. Think of a question you can ask your neighbor about the directions I have just given you. For example, you could ask, 'What should we do first?' Turn to your neighbor, and ask your own question now. I will call on several of you to share your questions with the class."

Remind students that they can use the information they learned about the moon and astronauts in the three most recent read-alouds to complete their sketches and sentences. As students work, circulate around the room, encouraging the use of read-aloud vocabulary in their sentences. You may want to require that advanced writers write an additional sentence, and you may want to use dictation for students who need additional assistance.

Syntactic Awareness Activity: Possessive Pronouns *my, your, his, her, our, their*

The purpose of these syntactic activities is to help students understand the direct connection between grammatical structures

and the meaning of text. These syntactic activities should be used in conjunction with the complex text presented in the read-alouds.

Note: There may be variations in the sentences created by your class. Allow for these variations, and restate students' sentences so that they are grammatical.

Teacher Model and Group Practice

1. We use ***possessive pronouns*** to replace words that identify to whom things belong.
2. [Tell students that you will read pairs of sentences to them. Students should listen carefully to hear what the words ***my, your, his, her, our, their*** replace in each sentence pair. Whenever you see a person's name in brackets, please replace that name with the name of a student or co-teacher in your class.

Possessive Pronoun	Sentence 1	Sentence 2	Replacement
My	[Point to yourself and use your name as you say the sentence.] [Ms. Gilbert's] watch is blue.	***My*** watch is blue.	The word ***my*** replaces [Ms. Gilbert's].
*Now, you try: Work with your neighbor to create a sentence to describe something that belongs to you, using the word **my.** Use this sentence starter to help you begin: "**My** _____ is..."*			
Your	[Point to a student close by and use their name as you say the sentence.] [Aida's] shirt is red.	***Your*** shirt is red.	The word ***your*** replaces [Aida's].
*Now, you try: Work with your neighbor to create a sentence to describe something that belongs to your neighbor, using the word **your.** Use this sentence starter to help you begin: "**Your** _____ is..."*			
His	[Speak to the student close by and tell him or her about a male student in the classroom.] [Enrique's] hair is brown.	***His*** hair is brown.	The word ***his*** replaces [Enrique's].
*Now, you try: Work with your neighbor to create a sentence to describe something that belongs to a male student, using the word **his.** Use this sentence starter to help you begin: "**His** _____ is..."*			
Her	[Speak to the student close by and tell him or her about a female student in the classroom.] [Marletty's] eyes are brown.	***Her*** eyes are brown.	The word ***her*** replaces [Marletty's].
*Now, you try: Work with your neighbor to create a sentence to describe something that belongs to a female student, using the word **her.** Use this sentence starter to help you begin: "**Her** _____ is..."*			
Our	[Gesture to everyone in the classroom, including yourself, and use your name.] [Ms. Gilbert's and Aida's and Enrique's and Marletty's] classroom is a fun place!	***Our*** classroom is a fun place.	The word ***our*** replaces [Ms. Gilbert's and Aida's and Enrique's and Marletty's].
*Now, you try: Work with your neighbor to create a sentence to describe something that belongs to a group to which you belong, using the word **our.** Use this sentence starter to help you begin: "**Our** _____ is..."*			
Their	[Speak to the student close by and talk about two students in the classroom.] [Aida's] and [Enrique's] shoes are black.	***Their*** shoes are black.	The word ***their*** replaces [Aida's and Enrique's].
*Now, you try: Work with your neighbor to create a sentence to describe something that belongs to a group to which you don't belong, using the word **their.** Use this sentence starter to help you begin: "**Their** _____ is..."*			

Authentic Text-Based

I am going to read a letter that contains many of the words we just practiced. Please stand up or raise your hand when you hear me say one of those words. Remember, the words we just practiced are *my*, *your*, *his*, *her*, *our*, and *their*. [Acknowledge students for correctly identifying the possessive pronouns in the read-aloud.]

Dear First Graders,

***Our** fifth-grade class is studying astronomy, too, just like **your** class. **My** favorite part of the astronomy unit has been learning about astronauts and all of **their** fantastic adventures. You might like to hear about Sally Ride, a famous astronaut. In 1983, she became the first woman to travel in space. She even used a robot arm to fix a satellite while in space! Later, Sally wrote children's books to encourage girls and boys to study science and space travel. Thanks to **her** hard work, kids all over are excited about space and science and know that they, too, can travel in space one day if they work hard and stay focused on **their** goals!*

Happy learning,

Josefa

The Solar System, Part I

8

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Explain that the sun is a source of energy, light, and heat
- ✓ Classify the sun as a star
- ✓ Identify Earth as a planet and our home
- ✓ Identify the earth's rotation or spin as the cause of day and night
- ✓ Explain that Earth orbits the sun
- ✓ Explain that our solar system includes the sun and the planets that orbit around it
- ✓ Indicate that there are eight planets in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune)

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Describe the connection between the sun and the first inner planets (RI.1.3)
- ✓ Describe an illustration of the moon and use pictures and detail in "The Solar System, Part I" to describe the read-aloud's key ideas (RI.1.7)
- ✓ Compare and contrast Mercury, Venus, Earth, and Mars (RI.1.9)
- ✓ With assistance, categorize and organize information about Mercury, Venus, Earth, and Mars (W.1.8)

- ✓ Ask and answer *what* questions orally, requiring literal recall and understanding of the details or facts from "The Solar System, Part I" (SL.1.2)
- ✓ Accurately apply the meanings of the antonyms *abundant* and *scarce* (L.1.5a)
- ✓ Prior to listening to "The Solar System, Part I," identify orally what they know and have learned about the difference between planets and stars

Core Vocabulary

abundant, *adj.* Plentiful; more than enough
Example: The farmers celebrated their abundant harvest with a town fair.
Variation(s): none

accomplish, *v.* To achieve something
Example: We can accomplish our goal of winning the game if we work together.
Variation(s): accomplishes, accomplished, accomplishing

inner, *adj.* Close to the center; the inside of something
Example: The inner circles of the spider's web were smaller than the outer circles.
Variation(s): none

solar, *adj.* Related to the sun
Example: My mom has a solar-powered wristwatch that works by soaking up the rays of the sun.
Variation(s): none

unique, *adj.* One of a kind
Example: Each person in the world is different from any other person, so we say that each person is unique.
Variation(s): none

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Purpose for Listening		
Presenting the Read-Aloud	**The Solar System, Part I**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Abundant		5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**Planets Chart**	Image Cards 1, 7–9; chart paper, chalkboard, or whiteboard [This exercise requires advance preparation.]	20
	Multiple Meaning Word Activity: Color	Poster 4M (Color)	

The Solar System, Part I

8A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Tell students that for the next two days they will learn about several planets. Remind students that they learned that a planet is different from a star. Ask students if they remember how a planet differs from a star. (Unlike a star, a planet does not provide its own light, but revolves around a star which generates light and heat.)

Tell students that they have already learned about one planet and the star it revolves around. Ask, "Which planet and star have we already learned about?" (the earth and the sun) Then ask students if they have ever heard the names of any other planets. Tell students to turn to a neighbor and talk for a minute, telling everything he or she knows about planets. Then have the partner talk for a minute as well. Encourage pairs to share some of the ideas they discussed about planets.

Purpose for Listening

Tell students that after the read-aloud, you will be completing a chart with information about all the planets they learn about today. Tell students to listen carefully for facts about each planet, especially facts about how each planet is unique or different from the others.

Presenting the Read-Aloud — **15** *minutes*

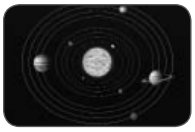
The Solar System, Part I

Show image 8A-1: People stargazing

For thousands of years, stargazers have known that the sun, moon, and stars are not the only celestial bodies in the night skies above Earth. Ancient stargazers recognized that there are other planets up there, as well.[1] What they did not know is that these planets, like Earth, revolve around the sun. Astronomers now know of eight major planets, including Earth, that revolve around the sun.[2] In addition, there are a number of dwarf planets—or little planets.

1 Remember that a planet is a large celestial body that revolves around a star for light and heat.

2 The other day, you heard the word *major* and its antonym, or opposite, *minor.* What does the word *major* mean? (big or important)



Show image 8A-2: Diagram of the solar system

The word ***solar*** is used to describe something that is related to the sun. For example, solar energy refers to the heat and light that come from the sun. Planets and other celestial bodies that orbit the sun make up what is known as the solar system.[3]

This diagram shows the eight major planets in our solar system. About the only thing these eight planets have in common is the fact that they all orbit the same sun on their own special path. Beyond that, each planet is unique.[4] The first four planets you will learn about are called the **inner** planets:[5] Mercury, Venus, Earth, and Mars.

3 So what do we call the sun and the planets that orbit it? What does the word *lunar* refer to? (the moon)

4 one of a kind and different from any other

5 or the ones near the center of the solar system

Show image 8A-3: Mercury

Mercury is the closest planet to the sun and the smallest of the eight major planets in the solar system.[6] Mercury can be seen from Earth, but it is hard to spot. You can only see it in the early morning or early evening.

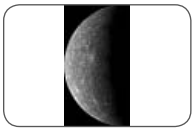
Most of the planets in the solar system are named after Roman gods and goddesses.[7] The planet Mercury is named after the Roman god Mercury. In mythology, the god Mercury was very fast, so it makes sense that this planet is named after him. It takes

6 Being the smallest and closest to the sun makes Mercury unique.

7 Remember when you learned about constellations? Their names also came from Greek and Roman myths.

just eighty-eight Earth days for Mercury to complete a revolution around the sun, so it is a quick little planet.[8] Unlike Earth, Mercury does not rotate much. It spins on its axis just one and a half times during its revolution around the sun.

8 Remember that Earth takes 365 days to orbit the sun. So if Mercury only takes eighty-eight days, which planet is faster?



Show image 8A-4: Close-up of Mercury[9]

9 Describe what you see in this close-up picture of Mercury.

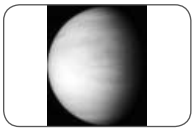
At first glance, you might notice that Mercury looks a lot like our moon with its rocky, heavily cratered surface. Mercury has some of the largest known crater impacts in the solar system, meaning that it has taken a real beating from some very large meteors. In fact, some craters are about fifty miles wide.

10 Like they do to our moon, meteors just crash right into Mercury's surface, making the craters.

Mercury has no atmosphere to protect it like Earth does.[10] And because it is so close to the sun, the surface of Mercury is very, very hot or very, very cold. Temperatures on the surface facing the sun can range anywhere from 300 degrees to nearly 1400 degrees Fahrenheit[11] while the surface facing away from the sun can be as low as 350 degrees below zero.[12]

11 On Earth, we consider ninety degrees Fahrenheit to be hot.

12 Thirty-two degrees Fahrenheit is the temperature at which water freezes on Earth.



Show image 8A-5: Venus

Venus is the second planet from the sun. It is named after the Roman goddess of love. Aside from the sun and the moon, Venus is the brightest celestial object that you can see from Earth.[13]

13 Being the brightest object in our night sky makes Venus unique.

It takes Venus roughly 225 Earth days to revolve around the sun. However, like Mercury, Venus does not rotate on its axis very fast. In fact, Venus actually rotates in the opposite direction that Earth does.

Show image 8A-6: Venus viewed from Earth[14]

14 [Point to Venus in the image.] What else do you see in this image? (the moon)

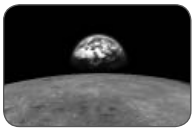
Venus is sometimes referred to as the "morning star" or the "evening star" because it often appears as a bright object in the evening sky or as a bright object in the morning sky. Venus is also known as Earth's sister planet because it is the closest planet to Earth, and the two planets are roughly the same size.[15]

15 Being a sister planet to Earth is another fact unique to Venus.

Beyond that, however, Earth and Venus have very little in common. Venus's atmosphere consists of a very thick layer of

clouds, so it is difficult for astronomers to study its surface. We do know, however, that the surface is very hot and dry. Venus's thick, cloudy atmosphere traps much of the sun's energy, meaning temperatures on the planet can soar to above 800 degrees Fahrenheit! [16]

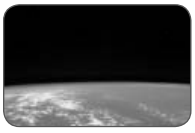
16 That's really hot! You also learned the word *atmosphere* when we first started studying astronomy. What does *atmosphere* mean? (the bubble of gas that surrounds a planet)



Show image 8A-7: Earth from moon [17]

You should recognize the planet in this photo. It's your home planet, Earth, the third planet from the sun. Earth is the only planet that does not take its name from a Roman or Greek god. The word *earth* is an ancient word that originally meant "ground." When the word *earth* was invented, the people living here did not even know that it was a planet. This photo was taken by the astronauts of the Apollo 8 mission. They did not get to land on the moon, but they flew around it.

17 What are the first two planets we've learned about so far? Hint: the smallest and first planet closest to the sun (Mercury); the brightest and second-closest planet to the sun (Venus).

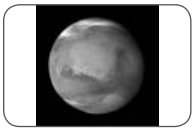


Show image 8A-8: Earth's surface

One of the most important factors that sets Earth apart from other planets is the **abundant** supply of water. [18] Water is essential for life; without water, there could not be any living things like people, plants, or animals. Although some other celestial bodies in our solar system have *some* water, Earth is the only planet whose surface is *mostly* liquid water. Earth is also the only planet with an abundance of oxygen in the air, and oxygen is also essential for life. [19]

18 That means there is more than enough or plenty of water.

19 Its supply of water and oxygen makes Earth unique. So after Mercury and Venus comes planet Earth, where we live.



Show image 8A-9: Mars

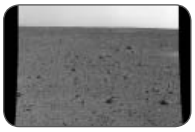
Mars is the fourth planet from the sun. Mars is named after the Roman god of war. Mars is often referred to as the Red Planet because of its color. [20] You can see Mars from Earth, and even without a telescope you can identify it by its reddish tint.

The farther you get from the sun, the colder it is and the longer it takes to complete a revolution, or make one trip around the sun. It takes Mars 687 Earth days to revolve around the sun. It is interesting, though, that Mars rotates on its axis at about the same speed as Earth.

20 Its red color makes Mars unique. Here the word *color* means the tone you see when you look at something, such as red, blue, or green. The word *color* can also mean to draw or fill in a picture with crayons, markers, or pencils.

Show image 8A-10: Phobos

Mars has two moons, but they are small and oddly shaped. One of them is pictured here. Astronomers believe that these moons are actually large asteroids, or space rocks, that became trapped in orbit as they passed by Mars billions of years ago.



Show image 8A-11: Mars surface

Because Mars is relatively close to Earth, astronomers from NASA have been able to send several spacecraft to explore that planet. NASA has sent several unmanned spacecraft to orbit Mars. NASA has also managed to send several small robotic vehicles, called rovers, to explore Mars's surface. The photo you see here is the first color photo ever taken on another planet! It was snapped by the Spirit Exploration Rover. Most of the rocky surface of Mars is covered in a layer of rust, which is a reddish-brown color. The rust explains why Mars appears to be red.

NASA scientists hope to be able to send astronauts to Mars, but it may be many, many years before technology exists that might allow them to **accomplish** this.[21] Perhaps, if you decide to be an astronaut when you grow up, you will be the first person to set foot on Mars. It will not be easy to put a person on Mars, but people used to think it was impossible to go to the moon, too.[22]

21 or achieve this goal

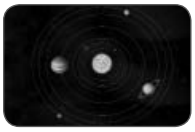
22 Mars is also unique because it is a celestial body we might be able to visit one day.

Discussing the Read-Aloud — 15 *minutes*

Comprehension Questions — 10 *minutes*

1. *Literal* You heard that the word *solar* means something related to the sun. What is the solar system? (group of planets and other celestial bodies that orbit the sun)

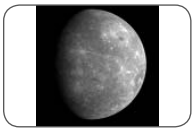
2. *Inferential* How many planets are in our solar system? (eight) What do all the planets have in common? (They orbit the sun.) You heard that orbiting the sun is the only thing all eight planets have in common. What does this mean? (Orbiting the sun is the only way in which they are the same; in other ways they are all unique or very different from one another.)



Show image 8A-2: Diagram of the solar system

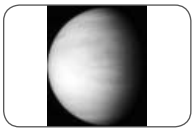
3. Ask the following questions:

   - *Inferential* You learned that all eight planets orbit the sun. Why don't they bump into each other? (They all have their own path, or orbit.)
   - *Inferential* You learned that the first four planets are Mercury, Venus, Earth, and Mars. Why are they called the inner planets? (They are closest to the sun.)
   - *Literal* A planet's year is how long it takes the planet to orbit the sun. Which planet has the shortest year, meaning it takes the shortest time to go around the sun? (Mercury)
   - *Evaluative* Which planet do you think has the longest year, meaning it takes the longest time to go around the sun? [Point to the outer planets in succession until students identify the outermost one.]



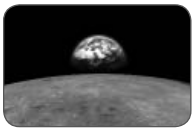
Show image 8A-3: Mercury

4. *Literal* This is the first planet in the solar system, known for being the smallest and the closest to the sun. What is the name of this planet? (Mercury)



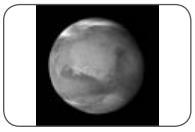
Show image 8A-5: Venus

5. *Literal* This is the second planet in the solar system, known for being the brightest planet as seen from Earth. What is the name of this planet? (Venus)



Show image 8A-7: Earth from moon

6. *Inferential* This is the third planet in the solar system, known for having lots of water, oxygen, and life. The third planet is the most important one to us. What is the name of this planet? (Earth) Why is it most important to us? (We live on it.)



Show image 8A-9: Mars

7. *Literal* This is the fourth planet in the solar system, known as the Red Planet. What is the name of this planet? (Mars)

[Please continue to model the *Question? Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

8. *What? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. We learned about four planets today: Mercury, Venus, Earth, and Mars. Think of a question you can ask your neighbor about the read-aloud that starts with the word *what*. For example, you could ask, "What is the name of the planet with a lot of water?" Turn to your neighbor and ask your *what* question. Listen to your neighbor's response. Then your neighbor will ask a new *what* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.

Word Work: Abundant *5 minutes*

1. In today's read-aloud you heard, "One of the most important factors that sets Earth apart from other planets is the *abundant* supply of water."
2. Say the word *abundant* with me.
3. When you say something is abundant, you mean you have more than enough of it; a plentiful amount.
4. When there is a lot of rain and good soil, farmers expect an abundant crop.
5. Do you have an abundant supply of anything? Try to use the word *abundant* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "I have an abundant supply of _____."]
6. What's the word we've been talking about?

Use an *Antonyms* activity for follow-up. Directions: You know that *abundant* means having more than enough of something, or having plenty of it. The opposite of *abundant* is *scarce*, which means not having enough of something, or having very little. Listen to the following examples. If I describe an amount that is plentiful, say, "That is abundant." If I describe an amount that is very little, say, "That is scarce."

1. the amount of stars in the sky (That is abundant.)
2. the amount of rain in the desert (That is scarce.)
3. the amount of light from the sun (That is abundant.)
4. the amount of grains of sand on the beach (That is abundant.)
5. the amount of the moon you can see when it is a crescent moon (That is scarce.)

Complete Remainder of the Lesson Later in the Day

The Solar System, Part I

8B

Extensions

20 *minutes*

Planets Chart

Teach students the following solar system song to help them remember the planets learned thus far, sung to the tune of "Oh My Darling, Clementine":

Do you know the solar system?

It's our home in outer space.

Planets orbit round the sun, while

It shines brightly in one place.

First is Mercury, small and speedy,

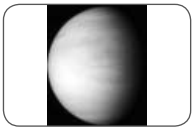
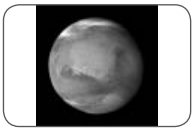
Second, Venus, shining bright.

Third is Earth, a home for people.

Fourth is Mars, a rusty sight.

Tell students that together you will be making a chart of all the planets in our solar system. Explain that you will write down two facts they learned today about each of the first four planets: Mercury, Venus, Earth, and Mars. Then you will complete the chart with the rest of the planets during the next lesson.

On chart paper, a chalkboard, or a whiteboard, draw the following chart, completing the first column and adding Image Cards to the second column. Elicit two facts from students about each planet, and add them to the chart. You may want to turn back to the images in the read-aloud to help students recall facts for each planet. Sample responses are included below:

Position and Name	Image Card Number		Fact 1	Fact 2
1) Mercury		*7*	*craters*	*smallest planet*
2) Venus		*8*	*sister to Earth*	*brightest planet in the sky*
3) Earth		*1*	*covered in water*	*oxygen supports life*
4) Mars		*9*	*red*	*we may visit one day*

Multiple Meaning Word Activity

Associated Phrase: Color

1. [Show Poster 4M (Color)] In the read-aloud you heard, "Mars is often referred to as the Red Planet because of its *color*." [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
2. *Color* can also mean something else. *Color* can also mean to draw or fill in a picture with crayons, markers, or colored pencils. [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
3. [Point to the image of the rainbow.] With your partner, talk about what you think of when you see this kind of color. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this type of color, I think of red, blue, green, yellow, etc.)
4. [Point to the image of the child coloring.] With your partner, talk about what you think of when you see this kind of color. I will call on a few partners to share what they came up with. Try to answer in complete sentences. (When I see this type of color, I think of crayons, a picture, having fun, etc.)

The Solar System, Part II 9

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Identify the earth's rotation or spin as the cause of day and night
- ✓ Explain that Earth orbits the sun
- ✓ Explain that our solar system includes the sun and the planets that orbit around it
- ✓ Indicate that there are eight planets in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune)
- ✓ Classify Pluto as a dwarf planet

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ Describe the connection between the sun and the reason the last four planets are referred to as the outer planets (RI.1.3)
- ✓ With assistance, categorize and organize information about the eight planets (W.1.8)
- ✓ Describe what is unique about each of the eight planets with relevant details, expressing ideas and feelings clearly (SL.1.4)
- ✓ Prior to listening to "The Solar System, Part II," identify orally what they know about the four inner planets

Core Vocabulary

categorize, *v.* Sort or put into a group with other similar objects
Example: My teacher asked me to categorize this stack of books as fiction or nonfiction for our classroom library.
Variation(s): categorizes, categorized, categorizing

debris, *n.* The pieces left over when something is destroyed or broken
Example: When I dropped my plate of food, I had to clean up the mess while my dad swept up the debris from the broken plate.
Variation(s): none

outer, *adj.* Far from the center; the outside of something
Example: The outer part of the earth's surface is the part we live on.
Variation(s): none

probes, *n.* Tools designed to collect information in outer space and send it back to Earth
Example: Probes have collected a lot of information about the surface of Mars.
Variation(s): probe

violent, *adj.* Dangerously rough
Example: When I was wrestling with my brother and he got hurt, my mom said we were being too violent.
Variation(s): none

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Planets Chart	10
	Purpose for Listening		
Presenting the Read-Aloud	**The Solar System, Part II**		15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Categorize	Image Cards 1, 7–13	5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**The Solar System**	Instructional Master 9B–1	20
	Planets Chart	Planets Chart; Image Cards 1, 7–13	

The Solar System, Part II 9A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Ask students, "What are the names of the four planets you learned about in the last read-aloud?" (Mercury, Venus, Earth, and Mars)

Sing with students the following solar system song to help them review the first four major planets discussed in yesterday's read-aloud, and one fact about each planet. The song is sung to the tune of "Oh My Darling, Clementine":

Do you know the solar system?

It's our home in outer space.

Planets orbit round the sun, while

It shines brightly in one place.

First is Mercury, small and speedy,

Second, Venus, shining bright.

Third is Earth, a home for people.

Fourth is Mars, a rusty sight.

Continue the review by rereading the Planets Chart that was developed in the previous lesson. Ask, "Why are these planets called the inner planets?" (they are closest to the sun) Remind students that there are eight planets in the solar system, meaning that there are four planets left to learn about today. Explain that the planets they will learn about today are called the outer planets.

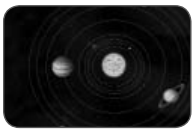
Ask students if they have heard of any additional planets besides the ones they learned about in the previous read-aloud. Then ask students to predict where the outer planets might be located

and what they might be like. Ask students how they might be different from the inner planets they learned about in the previous read-aloud.

Purpose for Listening

Tell students to listen carefully to learn the name of each planet and what makes it unique, so they can add these facts to the Planets Chart.

Presenting the Read-Aloud — *15 minutes*



The Solar System, Part II

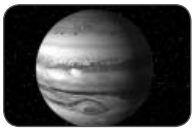
Show image 9A-1: Solar system diagram

In the last read-aloud you learned about the four inner planets of our solar system: Mercury, Venus, Earth, and Mars. Now you will learn about the **outer** planets—Jupiter, Saturn, Uranus, and Neptune, as well as the famous dwarf planet, Pluto. [1]

1 These planets are farthest from the sun, on the outside part of the solar system.

The first important difference between the inner planets and the outer planets is that the inner planets are all made up of rocks and metals, whereas the outer planets are made of different types of gases. [2]

2 You learned about gases when we began our study of astronomy. What are gases?



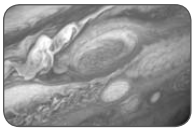
Show image 9A-2: Jupiter

The planet Jupiter is the fifth planet from the sun. In Roman mythology, Jupiter was the king of the gods—the strongest and most powerful of all. The largest planet in our solar system is named after him. [3] Jupiter is so big that you could stuff about 1300 planet Earths inside of it.

3 Being the largest planet makes Jupiter unique.

It takes Jupiter nearly twelve Earth years to make one revolution around the sun. However, Jupiter rotates on its axis faster than any other planet in the solar system. This massive planet rotates all the way around on its axis in less than ten hours. Jupiter is made mostly of hydrogen and other gases. Because of its fast rotation and the mixing of its gases, Jupiter is an extremely **violent,** [4] stormy place.

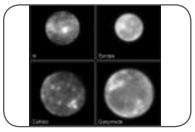
4 a dangerously rough



Show image 9A-3: Red spot

The best-known feature on Jupiter is its large, red spot. This spot is actually a massive storm. [5] The storm is so big that you could fit three planet Earths inside of it! Jupiter can be seen with the naked eye from Earth, and sometimes you can see its red spot with an ordinary telescope.

5 This stormy, red spot makes Jupiter unique, and it helps us remember what the planet looks like.



Show image 9A-4: Jupiter's moons

There are at least sixty-three moons in orbit around Jupiter.[6] Most of them are very small. However, four of these moons are well-known. They were all discovered first by the famous astronomer Galileo. These are easily visible with a pair of binoculars. Each is interesting in its own way, particularly Europa, the small one in the upper right.[7]

Europa is slightly smaller than our own moon, and yet—for many astronomers—it is one of the most fascinating celestial bodies in the solar system. Europa's surface is covered in ice, and its atmosphere contains a lot of oxygen. Many astronomers believe that beneath Europa's ice there is an ocean of liquid water. This means that maybe—just *maybe*—there is some form of life on this distant little moon.[8]

6 How many moons do you see from Earth? Jupiter has sixty-three moons going around it!

7 [Point to Europa.]

8 So far, the only place in the solar system that we know has life is our own planet Earth.

Show image 9A-5: Saturn

The next planet in the solar system is Saturn, the sixth planet from the sun. It is the second-largest planet in the solar system, although it is much smaller than Jupiter. Saturn is famous for its rings. It is not the only planet with rings, but no other planet has rings like Saturn's.[9] This incredible photo was taken by an unmanned orbiter in 2004.

Saturn has several layers with different types of clouds, and it is quite stormy, though not as stormy as its neighbor Jupiter.[10] Because it is so far from the sun, it takes Saturn nearly thirty Earth years to make one complete orbit. Different parts of Saturn rotate at different speeds, but for the most part Saturn rotates on its axis very quickly, taking a little over ten hours to complete one rotation.

9 Its rings make Saturn unique and easy to recognize.

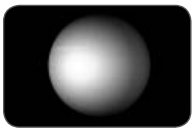
10 These layers and clouds are part of the planet. Remember, outer planets are made of gases. What are inner planets made of?

Show image 9A-6: The rings, close-up

The rings of Saturn are always moving around the planet. They are made up mainly of ice and a few other types of materials. The rings are basically huge collections of dust with some larger chunks here and there. Nobody is sure how the rings got there. Some astronomers believe the rings formed when one of Saturn's

moons exploded and the **debris**[11] became trapped in orbit. Others say the material in the rings is left over from the time when Saturn was formed billions of years ago. You can see Saturn from Earth during certain times of the year, and with an ordinary telescope you can see the rings.

11 or broken pieces



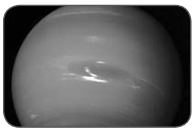
Show image 9A-7: Uranus

The seventh planet, Uranus, has the coldest atmosphere of any planet in the solar system.[12] Because it is so far from the sun, it takes Uranus eighty-four Earth years to make one complete orbit. Uranus is made of hydrogen, but its atmosphere also contains a lot of ice and other substances not found on Jupiter or Saturn. Uranus is named after a Greek god of the sky, making it the only planet other than Earth that is not named after a Roman god. Although it is possible to see Uranus from Earth with the naked eye, you really have to know where and when to look for it because it appears very dim, or not very bright, from here on Earth.

12 Its cold atmosphere makes Uranus unique.

Uranus has one very special characteristic: it rotates on its side! You can't see it in this image, but in comparison to Earth and the other planets, Uranus's axis is sideways, as though someone turned the planet on its side.[13]

13 Lying on its side makes Uranus unique.



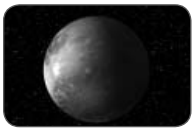
Show image 9A-8: Neptune

The planet Neptune is the eighth and final major planet in the solar system. In Roman mythology, Neptune was the god of the sea, so this is a fitting name, given the planet's beautiful, blue color.[14] Astronomers still do not know exactly why Neptune is blue, and it will probably be a while before they figure it out. That is because Neptune is nearly three billion miles from the sun, making it very difficult and expensive to send unmanned **probes** to explore it.[15]

14 Its blue color and its distance from the sun make Neptune unique. What was the red planet you heard about yesterday? (Mars)

15 Probes are tools designed to collect information in outer space and send it back to Earth.

It takes Neptune nearly 165 Earth years to orbit the sun. The planet is never visible to the naked eye from Earth, and you will need a fairly powerful telescope to get a good view of its beautiful color.



Show image 9A-9: Pluto

Not so very long ago, students in school were taught that there were nine planets in the solar system, including Pluto. In fact, ever since Pluto was discovered in 1930, it has been considered a planet. However, in 2006, astronomers decided to **categorize** Pluto as a dwarf planet, one of several such bodies in our solar system. [16]

16 They decided to sort planets into two groups: dwarf, meaning "little"; and regular. Categorizing Pluto as a dwarf planet means they put Pluto in the dwarf planet group.

In Roman mythology, Pluto was the god of the underworld, a dark and dreary place. This is a good name for such a cold and distant dwarf planet. Pluto is about four billion miles from the sun, so it is extremely cold and dark out there. The planet is made almost entirely of frozen nitrogen. Nitrogen is a type of gas. It takes Pluto about 243 Earth years to orbit the sun.

We have a lot to learn about Pluto and other celestial bodies in the outer reaches of the solar system, but it is not easy to explore this area. For now, this is about the best photo we have of Pluto, and it was taken from three billion miles away by a special spacecraft called the Hubble Space Telescope. So far, Pluto remains unexplored. A special probe was launched toward Pluto in the year 2003, but it will not reach the planet until 2015. [17]

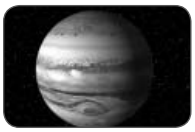
17 What do probes do?

Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — *10 minutes*

1. *Inferential* In the previous read-aloud, you learned that there are four inner planets, closest to the sun: Mercury, Venus, Earth, and Mars. In this read-aloud, we learned that Jupiter, Saturn, Uranus, and Neptune are outer planets. What makes them outer planets? (They are farthest away from the sun, on the outside borders of the solar system.)

2. *Literal* You learned that the inner planets are all made of metal and rock. What are all the outer planets made of? (gases)

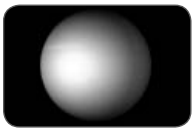


Show image 9A-2: Jupiter

3. *Literal* This is the fifth planet in the solar system, known for being the largest planet, and having a red spot and sixty-three moons. What is the name of this planet? (Jupiter)

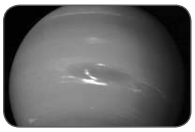
Show image 9A-5: Saturn

4. *Literal* This is the sixth planet in the solar system, known for the rings around it. What is the name of this planet? (Saturn)



Show image 9A-7: Uranus

5. *Literal* This is the seventh planet in the solar system, known for being the coldest planet and for rotating on its side. What is the name of this planet? (Uranus)



Show image 9A-8: Neptune

6. *Literal* This is the eighth or last planet in the solar system, known as the blue planet. What is the name of this planet? (Neptune)

[Please continue to model the *Think Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative* *Think Pair Share:* Astronomers believed for seventy-six years that Pluto was the ninth planet in our solar system. Astronomers found other celestial bodies in deep space that were like Pluto, and they came up with a new category that they called dwarf, or small, planet. Why do you think they took so long to make this change? (Pluto is so far away; we haven't learned much about deep space.)

Word Work: Categorize *5 minutes*

1. In the read-aloud we heard, "[A]stronomers decided to *categorize* Pluto as a dwarf planet."
2. Say the word *categorize* with me.
3. When you categorize something, you sort it or put it in a group with other things like it.
4. You might categorize your clothes by putting shirts in one drawer of your dresser and pants in another.
5. Pretend you had a collection of colorful buttons in different shapes and sizes. What is one way you could categorize them? Try to use the word *categorize* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "I could categorize the buttons by . . . "])
6. What's the word we've been talking about?

Use an *Image Card* activity for follow-up. Take Image Cards 1 and 7–13 and show them to students. Then show Flip Book image 8A-2, the diagram of the solar system, and show students that the images on the Image Cards are of the same planets that are on the diagram. Write two category names on chart paper, a chalkboard, or a whiteboard: "Inner" and "Outer." Directions: We know that to categorize means to sort or put objects in groups based on what they have in common. Let's take these eight planet Image Cards and categorize them by inner planets (the ones you learned about yesterday that are closer to the sun) and outer planets (the ones you learned about today that are farther from the sun). We can use this diagram of the solar system if you forget where each planet goes. The groups we make will be called categories. Who would like to come up and categorize one of these planets, putting it in the right category? [Call on volunteers to sort the planets. During the activity, use the word *categorize* frequently and encourage each volunteer to use it in a sentence, such as "I categorized Mercury as an inner planet."]

Complete Remainder of the Lesson Later in the Day

The Solar System, Part II

9B

Extensions — *20 minutes*

The Solar System (Instructional Master 9B-1)

Give each student a copy of Instructional Master 9B-1. Explain that this is a worksheet about the solar system. Read the labels with students and discuss what the diagram shows. Guide students as needed to read and answer the questions. Invite students to color the diagram, reminding them that scientists often refer to Mars as "the red planet," Neptune as "the blue planet," and that Jupiter has a red spot on it.

Planets Chart

Sing with students the first two verses, and teach them the last two verses of the solar system song about all the planets, sung to the tune of "Oh My Darling, Clementine":

Do you know the solar system?

It's our home in outer space.

Planets orbit round the sun, while

It shines brightly in one place.

First is Mercury, small and speedy,

Second, Venus, shining bright.

Third is Earth, a home for people.

Fourth is Mars, a rusty sight.

Fifth is Jupiter, big and stormy.

Sixth is Saturn, with its rings.

Seventh, Uranus, is tilted.

Eighth is Neptune, ocean king.

Every planet is unique but

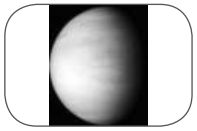
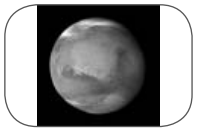
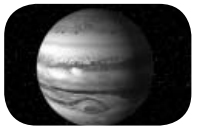
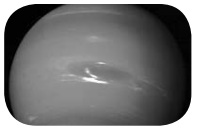
They all orbit 'round the sun.

I know all about the planets

But the Earth's my favorite one.

Tell students that today you will be completing the chart of the planets in our solar system. Remind students that you have already written down facts for the first four planets: Mercury, Venus, Earth, and Mars. Today you will write facts for the rest of the planets in the solar system.

On the chart from yesterday, add rows for the final four planets in the solar system. Point out that these four are known as the outer planets. Complete the first column, and add Image Cards to the second column. Elicit two facts from students about each planet, and add them to the chart. You may want to turn back to the images in the read-aloud to help students recall facts for each planet. Sample responses are included as follows:

Position and Name	Image Card Number		Fact 1	Fact 2
1) Mercury		7	*craters*	*smallest planet*
2) Venus		*8*	*sister to Earth*	*brightest planet in the sky*
3) Earth		*1*	*covered in water*	*oxygen supports life*
4) Mars		*9*	*red*	*we may visit one day*
5) Jupiter		10	*stormy, has red spot*	*largest (with 63 moons)*
6) Saturn		*11*	*rings*	*has lots of layers of clouds*
7) Uranus		*12*	*coldest atmosphere*	*lies on its side*
8) Neptune		*13*	*blue*	*farthest from sun*

Domain Review

DR

Note to Teacher

You should spend one day reviewing and reinforcing the material in this domain. You may have students do any combination of the activities provided, in either whole group or small group settings.

Core Content Objectives Addressed in This Domain

Students will:

- ✓ Recognize the sun in the sky
- ✓ Explain that the sun, moon, and stars are located in outer space
- ✓ Explain that the sun is a source of energy, light, and heat
- ✓ Classify the sun as a star
- ✓ Identify Earth as a planet and our home
- ✓ Identify the earth's rotation, or spin, as the cause of day and night
- ✓ Explain that other parts of the world experience nighttime while we have daytime
- ✓ Explain sunrise and sunset
- ✓ Describe stars as large, although they appear small in the night sky
- ✓ Describe stars as hot, distant, and made of gas
- ✓ Explain that astronomers study the moon and stars using telescopes
- ✓ Describe how people sometimes tell stories about the moon and stars
- ✓ Explain what a constellation is
- ✓ Identify the Big Dipper and the North Star
- ✓ Identify the four phases of the moon—new, crescent, half, full
- ✓ Explain that the moon orbits the earth
- ✓ Explain that astronauts travel to outer space

- ✓ Describe the landing on the moon by American astronauts
- ✓ Explain the importance of the first trip to the moon
- ✓ Explain that our solar system includes the sun and the planets that orbit around it
- ✓ Indicate that there are eight planets in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune)
- ✓ Classify Pluto as a dwarf planet

Review Activities

Image Review

Show the Flip Book images from any read-aloud again, and have students retell the read-aloud using the images.

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read a trade book to review a particular event or concept; refer to the books listed in the Introduction. You may also choose to have students select a read-aloud to be heard again.

Key Vocabulary Brainstorming

Materials: Chart paper, chalkboard, or whiteboard

Give students a key domain concept or vocabulary word such as *astronaut* or *planet*. Have them brainstorm everything that comes to mind when they hear the word, such as *rocket, helmet, spacesuit,* etc. Record their responses on chart paper, a chalkboard, or a whiteboard for reference.

Image Card Review

Materials: Planet Image Cards (1, 7–13)

Hold the planet Image Cards in your hand, fanned out like a deck of cards. Ask a student to choose a card but not show it to anyone else in the class. The student must then give a clue about the picture s/he is holding. For example, for Saturn, a student may

say, “This planet has rings.” The rest of the class will guess what planet is being described. Proceed to another card when the correct answer has been given.

Class Book

Materials: Drawing paper; drawing tools

Tell the class or a group of students that they are going to make a class book to review what they have learned about space exploration or about the planets. Have students brainstorm important facts about one of these two topics. Have each student choose one idea to draw a picture of and then write a caption for the picture. Bind the pages to make a book to put in the class library for students to read again and again.

Riddles for Core Content

Ask students riddles such as the following to review core content:

- I am the planet closest to the sun. Which planet am I? (Mercury)
- I used to be the ninth planet, but now I am categorized as a dwarf planet. Which celestial body am I? (Pluto)
- We are the outer planets, Jupiter, Saturn, Uranus, and Neptune. What are we made up of? (gas)
- I orbit around the earth. What am I? (the moon)

Sequencing the Moon’s Phases

Remind students that they learned that we can see different amounts of the moon depending on where it is in orbit and how much sunlight is reflecting off it. Remind students that the moon has four phases: new, crescent, half, and full. Then have four volunteers act out the phases of the moon. For a new moon, have a student hold his or her arms close to his or her body. For a crescent moon, have a second student put his or her arms overhead with elbows close together. For a half moon, have another student put one arm straight up and meet it with the other curved arm, reducing the space between the two arms to half. For a full moon, have a fourth student make a large circle with his or her arms overhead. See if students can order themselves from left to right as follows: new, crescent, half, and full.

Domain Assessment

DA

This domain assessment evaluates each student's retention of domain and academic vocabulary words and the core content targeted in *Astronomy.* The results should guide review and remediation the following day.

There are two parts to this assessment. You may choose to do the parts in more than one sitting if you feel this is more appropriate for your students. Part I (vocabulary assessment) is divided into two sections: the first assesses domain-related vocabulary, and the second assesses academic vocabulary. Part II of the assessment address the core content targeted in *Astronomy.*

Part I (Instructional Master DA-1)

Directions: I am going to say a sentence using a word you have heard in the read-alouds. First I will say the word, and then I will use it in a sentence. If I use the word correctly in my sentence, circle the smiling face. If I do not use the word correctly in my sentence, circle the frowning face. I will say each sentence two times. Let's do number one together.

1. **Atmosphere:** The earth's atmosphere is the part that is far, far away from Earth and contains the moon. (frowning face)
2. **Gravity:** When you throw a ball into the air, the earth's gravity brings it back to the ground. (smiling face)
3. **Orbit:** The earth travels in an orbit around the sun. (smiling face)
4. **Planet:** A planet is a large object that provides its own light and heat. (frowning face)
5. **Meteor:** A meteor is a rock that flies through outer space. (smiling face)
6. **Telescopes:** Scientists use telescopes to look at tiny objects such as bugs. (frowning face)

7. **Constellations:** If you look up in the night sky, you might see constellations, or groups of stars, that look like pictures. (smiling face)
8. **Astronaut:** An astronaut is someone who travels in outer space. (smiling face)
9. **Launch:** Many scientists work together to launch rockets into space. (smiling face)
10. **Solar:** Things associated with the moon are called solar. (frowning face)

Directions: I am going to read more sentences using other words you have heard in the read-alouds. If I use the word correctly in my sentence, circle the smiling face. If I do not use the word correctly in my sentence, circle the frowning face. I will say each sentence two times.

11. **Ancient:** This new bicycle is considered ancient. (frowning face)
12. **Appearance:** Someone who cares about their appearance would make sure their face is clean and their hair is combed. (smiling face)
13. **Determined:** A student who is determined to get good grades would do all his homework and do his best in class. (smiling face)
14. **Categorize:** When you have a lot of information to learn, it helps to categorize it, or put in into a chart to help you remember it. (smiling face)
15. **Major:** *Major* means small or unimportant. (frowning face)

Part II (Instructional Master DA-2)

Directions: Listen to the following sentences about celestial bodies. Next to the number of the sentence I read, you will notice four names. You will notice that the first three names are always the same. Let's read them together: "sun, moon, Earth." You will also notice that the last name is usually different. I will read the four choices to you after I read each sentence. Circle the name of the appropriate celestial body being talked about in each sentence:

1. I am the source of light and heat for the whole solar system. (sun)
2. I am the planet on which we live. (Earth)
3. I revolve around the earth. (moon)
4. I am known as the "Red Planet," and astronauts may be able to visit me one day. (Mars)
5. I am the largest planet and have a big red spot, which is actually a storm. (Jupiter)
6. I am a star. (sun)
7. I was visited by astronauts from Earth. (moon)
8. I am the smallest planet and closest to the sun. (Mercury)
9. I am the planet with big, beautiful rings. (Saturn)
10. I am the only planet we know about with enough water and oxygen to support life. (Earth)
11. I am the star that allows life to survive on Earth. (sun)
12. People call me Earth's sister planet and the brightest planet, and I can be seen in Earth's sky. (Venus)
13. I lie on my side and I'm the only planet not named after a Roman god. (Uranus)
14. I am a blue planet and the farthest from the sun. (Neptune)
15. I have phases named after how much you see of me: new, crescent, half, and full. (moon)

Culminating Activities

CA

Please use this final day to address class results of the Domain Assessment. Based on the results of the Domain Assessment and students' Tens scores, you may wish to use this class time to provide remediation opportunities that target specific areas of weakness for individual students, small groups, or the whole class.

Alternatively, you may also choose to use this class time to extend or enrich students' experience with domain knowledge. A number of enrichment activities are provided below in order to provide students with opportunities to enliven their experiences with domain concepts.

Remediation

You may choose to regroup students according to particular areas of weakness, as indicated from Domain Assessment results and students' Tens scores.

Remediation opportunities include:

- targeting Review Activities
- revisiting lesson Extensions
- rereading and discussing select read-alouds
- reading the corresponding lesson in the *Supplemental Guide,* if available

Enrichment

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read an additional trade book to review a particular event or concept; refer to the books listed in the Introduction. You may also choose to have students select a read-aloud to be heard again.

Relative Distances in the Solar System

Materials: Masking tape; measuring tape

Take the students outside or to a large indoor space, such as a hallway. Write the word "sun" on a piece of masking tape or paper, and place it on the floor. Using the information in the chart below, mark out to scale the distances the eight planets are from the sun. This activity will reinforce the vast distances in space and will help students see why the inner and outer planets are broken into two groups. Depending upon how much space you have, you may want your unit of measure to be feet, so that Mercury is five inches from the sun, Venus is eight inches from the sun, Earth is one foot from the sun, etc. If your students are familiar with the metric system, a simpler unit of measure would be one meter.

Planet	*Distance from the Sun, Using Bode's Law*
Mercury	0.4
Venus	0.7
Earth	1.0
Mars	1.6
asteroid belt	2.8
Jupiter	5.2
Saturn	10.0
Uranus	19.6
Neptune	38.8

New Mnemonic for Planets

Materials: Writing paper, writing tools

Explain that one way people remember the names of the planets in order is to memorize a sentence with words that start with the same letters as the planets do. Explain, however, that many popular mnemonics were written when Pluto was still considered a planet. One example is, "My Very Educated Mother Just Served Us Nine Pizzas." As a group or individually, have students develop a new sentence for remembering the sequence of the eight

planets. You may want to provide students with the first initials in sequence: M, V, E, M, J, S, U, and N.

You Were There: In Outer Space

Have students pretend that they were one of the first astronauts who traveled to space or to the moon, or that they were one of the hundreds of scientists at mission control. Ask students to describe what they saw and heard. For example, for the first walk on the moon, students may talk about the four days it took to travel there; landing on the fine, soft dust of the moon's surface; what they might say once there; etc. Consider also extending this activity by adding group or independent writing opportunities associated with the "You Were There" concept. For example, ask students to pretend they are newspaper reporters describing the moon landing and write a group news article describing the event.

For Teacher Reference Only:

Copies of *Tell It Again! Workbook*

Directions:

Write your name on the blank line.

Lesson 1: Sketch your observations of the sky in daytime.

Lesson 3: Sketch what the sky looks like at dusk.

Lesson 7: Sketch a spacecraft of your own design.

Lesson 8: Sketch yourself as an astronaut.

1B-1

My Astronomy Journal

Name _____

By _____

1B-2

Dear Family Member,

Over the next few weeks, your child will be learning about astronomy. Your child will learn about the sun, the moon, the stars, and the eight planets in our solar system. Your child will also learn about space exploration, including the first astronauts to land on the moon.

In the next few days, we will focus our study of astronomy on the sun, the moon, and the stars. The most powerful way you can help support your child's learning about astronomy is to take him or her outside to observe the sky. Below are some suggestions for ways you can make his/her study of astronomy even more meaningful and fun, and some words s/he is learning that relate to each activity.

1. Sunrise or Sunset

Your child is learning that the earth orbits or revolves around the sun. S/he is also learning that even though it looks like the sun moves across the sky each day, it is actually the earth spinning on its axis that causes day and night. Your child will learn about the earth's atmosphere, and how it causes the sky to change colors, especially at sunrise and sunset. Go outside with your child at dawn to observe the sunrise, or at dusk to observe the sunset.

Words to use: *dusk, dawn, atmosphere, revolve, horizon*

2. Stargazing

In a few days your child will learn about the stars and the constellations. Take your child out in the evening to observe the stars. The Big and Little Dipper are part of the Big Bear constellation. S/he will learn to recognize the dippers and Polaris (the North Star). Together with your child, try to identify these groups of stars in the night sky. You may wish to obtain a book from the library on constellations to guide your observations.

Words to use: *constellation, star, telescope, outer space, meteor*

3. Phases of the Moon

Your child will learn about the moon and how it orbits the earth, reflecting the sun's light. S/he will also learn to recognize its four phases: the new moon, the crescent moon, the half moon, and the full moon. Look for the moon every few days and talk with your child about how much of it is visible in the sky.

Words to use: *crescent, full, reflecting, orbit, craters, man in the moon*

4. Read Aloud Each Day

It is very important that you read to your child each day. The local library has many books on astronomy and a list of books and other resources relevant to this topic is attached to this letter.

Be sure to let your child know how much you enjoy hearing about what s/he has been learning at school.

1B-3

Name _____

Recommended Trade Books for Astronomy

1. *Astronomy* (DK Eyewitness Books), by Kristin Lippincott (DK Children, 2008) ISBN 978-0756637675
2. *Exploring the Solar System,* by Mary Kay Carson (Chicago Review Press, 2008) ISBN 978-1556527159
3. *Find the Constellations*, by H. A. Rey (Houghton Mifflin Books for Children, 2008) ISBN 978-0547131788
4. *Find Out About Astronomy,* by Robin Kerrod (Armadillo, 2012) ISBN 978-1843228684
5. *The Magic School Bus: Lost in the Solar System*, by Joanna Cole and illustrated by Bruce Degen (Scholastic Inc., 1992) ISBN 978-0590414296
6. *Midnight on the Moon (Magic Tree House, No. 8)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 1996) ISBN 978-0679863748
7. *The Moon Seems to Change*, by Franklyn M. Branley and illustrated by Barbara and Ed Emberley (HarperCollins, 1987) ISBN 978-0064450652
8. *National Geographic Readers: Planets,* by Elizabeth Carney (National Geographic Children's Books, 2012) ISBN 978-1426310362
9. *National Geographic Little Kids First Big Book of Space,* by Catherine D. Hughes and illustrated by David A. Aguilar (National Geographic Children's Books, 2012) ISBN 978-1426310140
10. *Once Upon a Starry Night: A Book of Constellations*, by Jacqueline Mitton and illustrated by Christina Balit (National Geographic Children's Books, 2009) ISBN 978-1426303913 (**Note:** This book's beautiful illustrations can help students imagine what the constellations look like when they look up at the stars. The myths/text, however, is not recommended for first grade.)
11. *Our Solar System*, by Seymour Simon (Collins, 2007) ISBN 978-0061140082
12. *Planets: A Solar System Stickerbook*, by Ellen Hasbrouck and illustrated by Scott McDougall (Little Simon, 2001) ISBN 978-0689844140

13. *Stargazers*, by Gail Gibbons (Holiday House, 1999) ISBN 978-0823415076
14. *Starry Sky,* by Kate Hayden (DK Children, 2006) ISBN 978-0756619596
15. *Sun Up*, Sun Down, by Gail Gibbons (Voyager Books, 1987) ISBN 978-0152827823
16. *What Makes Day and Night*, by Franklyn M. Branley and illustrated by Arthur Dorros (HarperCollins, 1986) ISBN 978-0064450508
17. *Wynken, Blynken, and Nod*, by Eugene W. Field and illustrated by Giselle Potter (Schwartz & Wade, 2008) ISBN 978-0375841965

Note: Please remember to tell students that not very long ago, students in school were taught that there were nine planets in the solar system, including Pluto. However, in 2006, astronomers decided to categorize Pluto as a dwarf planet, so there are now eight major planets. If you choose additional books to read aloud, be sure to include the phrase *dwarf planet* when referring to Pluto. Remember also that there are still many excellent astronomy books in print that classify Pluto as a planet, but are otherwise informative trade books.

Websites and Other Resources

Student Resources

1. Interactive Earth Rotation
   http://www.bbc.co.uk/schools/scienceclips/ages/9_10/earth_sun_moon.shtml
2. NASA Kids' Club
   http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html
3. National Geographic Space Activities and Photos
   http://kids.nationalgeographic.com/kids/photos/space-shuttles/#/columbia-launch-gpn-2000-000756_14481_600x450.jpg
4. PBS Game on Outer Space
   http://pbskids.org/martha/games/socksinspace/index.html

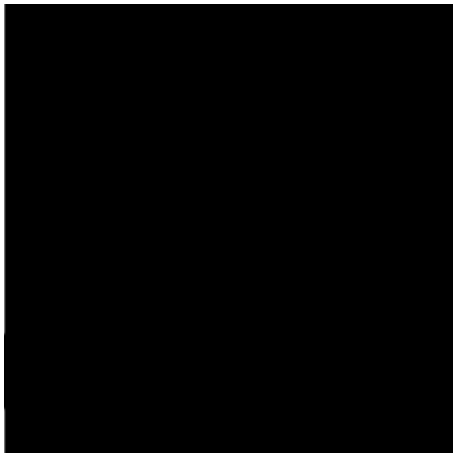
Family Resources

5. American Museum of Natural History Resources on Space
   http://www.amnh.org/content/search?SearchText=space&x=0&y=0
6. Photographs from the Hubble Space Telescope
   http://hubblesite.org/gallery/album/entire/npp/all/

5B-1

Name _____

Directions: The pictures show four different phases of the moon. Write the number "1" on the line below the new moon. Write the number "2" below the crescent moon. Write the number "3" below the half moon. Write the number "4" below the full moon.



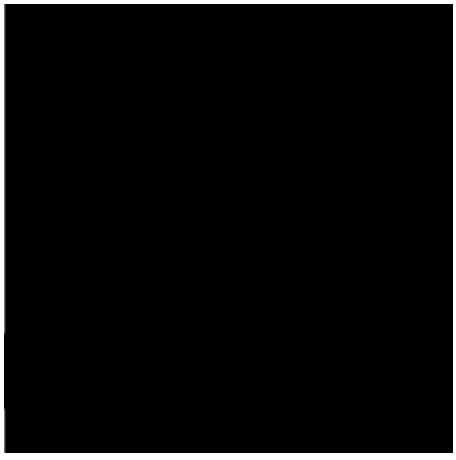
5B-1

Name **Answer Key**

Directions: The pictures show four different phases of the moon. Write the number "1" on the line below the new moon. Write the number "2" below the crescent moon. Write the number "3" below the half moon. Write the number "4" below the full moon.

2

3



1

4

5B-2

Dear Family Member,

Over the next few days, your child will be continuing his/her study of astronomy. Your child has now learned about the sun and the stars, and has begun to learn about the moon. In the next few days, our class will focus our study on space exploration and the planets in the solar system. The most powerful way you can help support your child's learning about astronomy is to continue taking him/her outside to observe the sky. Below are some additional suggestions for activities, and some words s/he is or will be learning that relate to each activity.

1. Name the Planets

Your child will be learning about the eight planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. S/he will also learn that Pluto was once considered a planet, but in 2006 was categorized as a dwarf planet. When you were in school, you may have learned a mnemonic to remember the names of the (then) nine planets, such as "My Very Educated Mother Just Served Us Nine Pizzas." Write a new mnemonic with your child to help him/her remember the list of eight names above.

2. Make a Model

Work with your child to use play dough or modeling clay to create models of the sun and the planets. Lay the models on a black piece of paper, and draw chalk lines to represent orbits. Alternatively, work with your child to paint or draw a diagram of the solar system on a piece of paper.

3. Planet Earth

Your child has learned that our home, Earth, is a planet that it is in constant motion. It is difficult to believe that we are living on a moving sphere when the land beneath our feet seems still and flat. Explore a globe with your child and help him/her understand that it represents the planet Earth. Locate the United States and other countries your child knows about. Talk about the poles and the axis. Observe how much of the planet is covered by the continents and how much is covered by the oceans.

4. Astronauts for a Day

Your child will learn about spacecraft and astronauts in the coming days. If the thought of space travel captures your child's imagination, pretend to be astronauts together. Dress up in spacesuits and helmets. Using furniture or boxes, assemble a

spacecraft. Countdown to launch, hurtle through space propelled by a rocket, and pretend to land on the moon or another planet.

5. Read Aloud Each Day

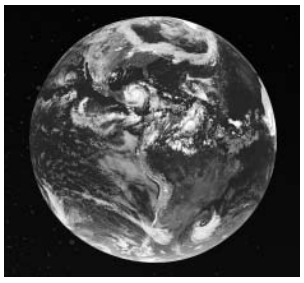
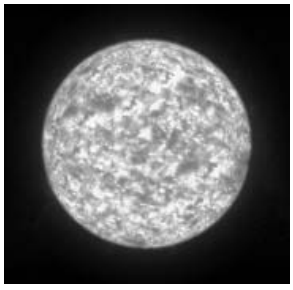
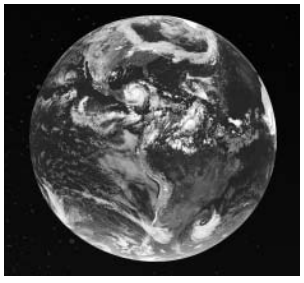
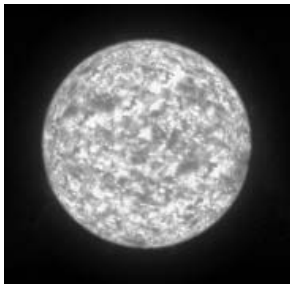
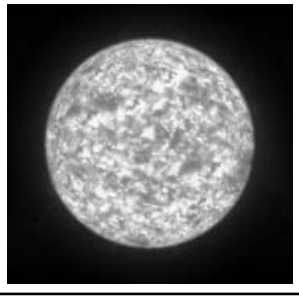
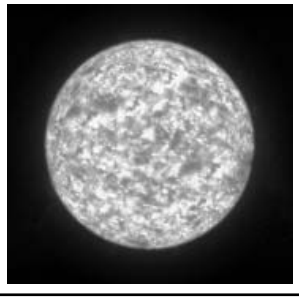
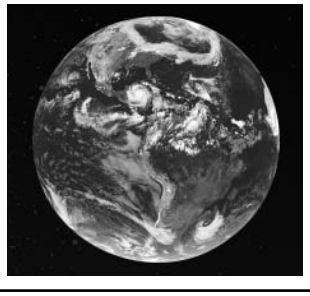
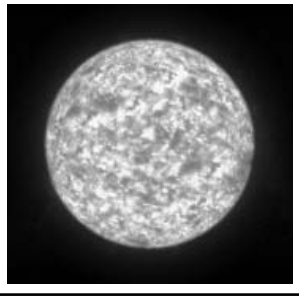
It is very important that you read to your child each day. Please refer to the list of books and other resources sent home with the previous family letter, recommending resources related to astronomy.

Be sure to let your child know how much you enjoy hearing about what s/he has been learning at school.

PP-1

Name _____

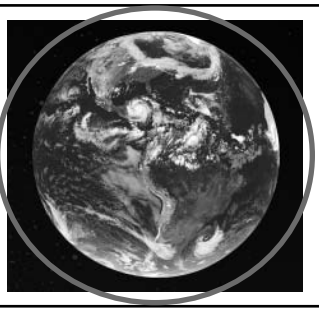
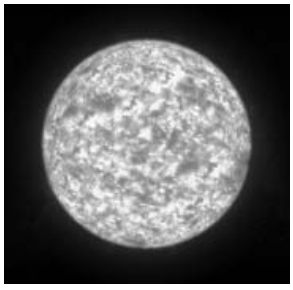
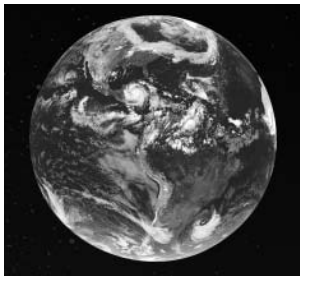
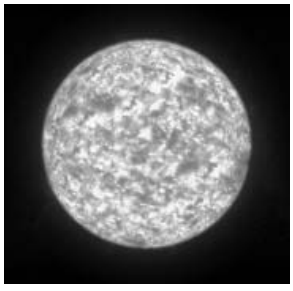
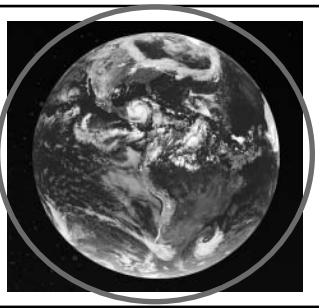
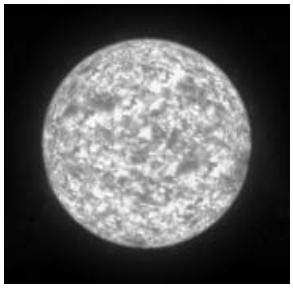
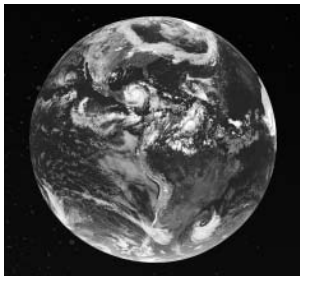
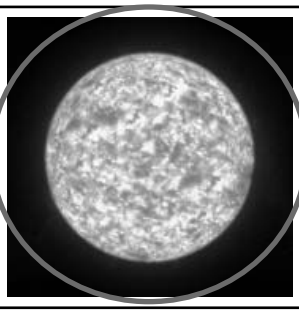
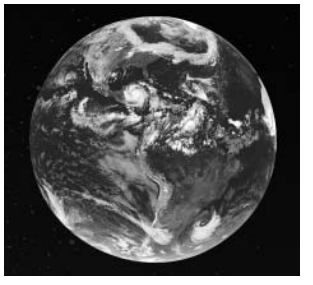
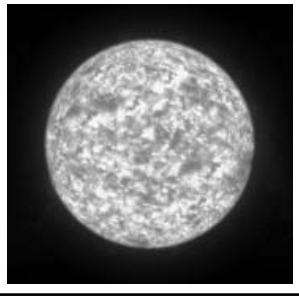
Directions: The pictures show the earth, the sun, and the moon. If what I read to you describes something about the earth, circle the first picture in the row. If what I read to you describes something about the sun, circle the second picture in the row. If what I read to you describes something about the moon, circle the last picture in the row.

	Earth	Sun	Moon
1.			
2.			
3.			
4.			
5.			

PP-1

Name **Answer Key**

Directions: The pictures show the earth, the sun, and the moon. If what I read to you describes something about the earth, circle the first picture in the row. If what I read to you describes something about the sun, circle the second picture in the row. If what I read to you describes something about the moon, circle the last picture in the row.

	Earth	Sun	Moon
1.			
2.			
3.			
4.			
5.			

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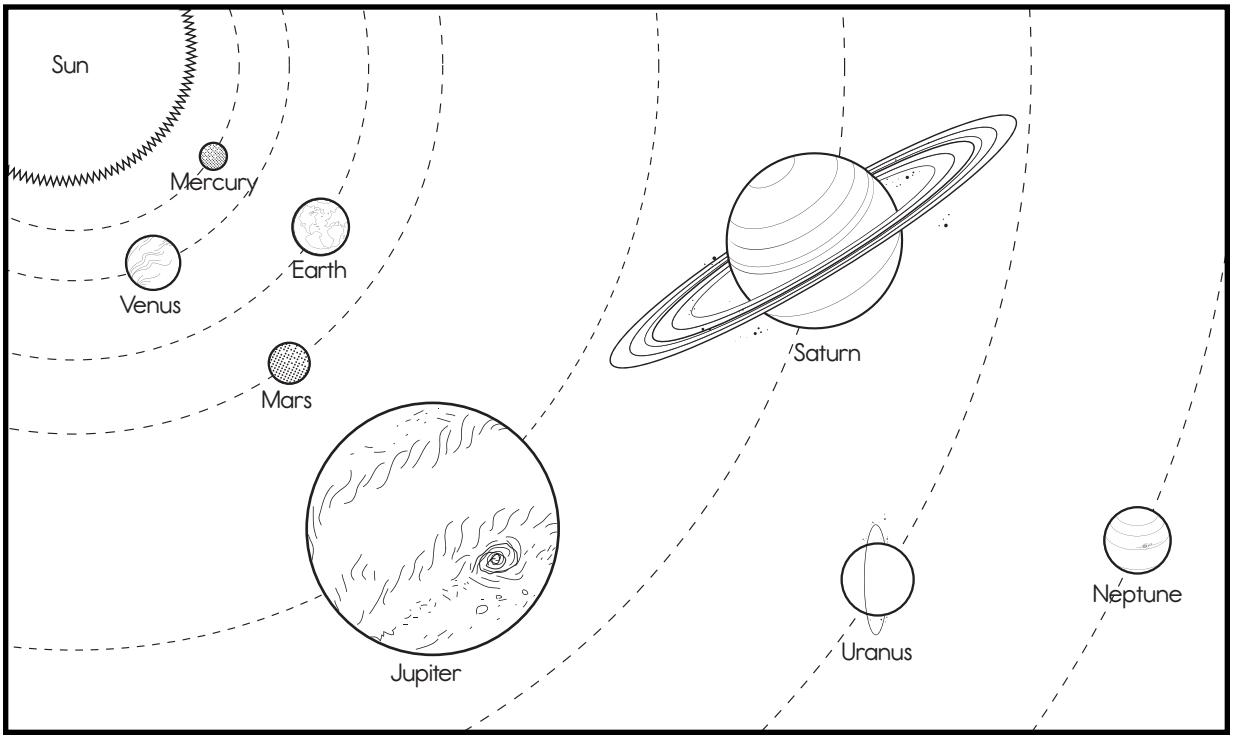
9B-1

Name _____

Directions: Read and answer each question appropriately using the diagram. You may wish to color the diagram to reflect what you know about the colors of certain planets in the solar system.



1. How many planets orbit the sun?

_____

2. Which planet is closest to the sun?

_____

3. Is Mars larger or smaller than Earth?

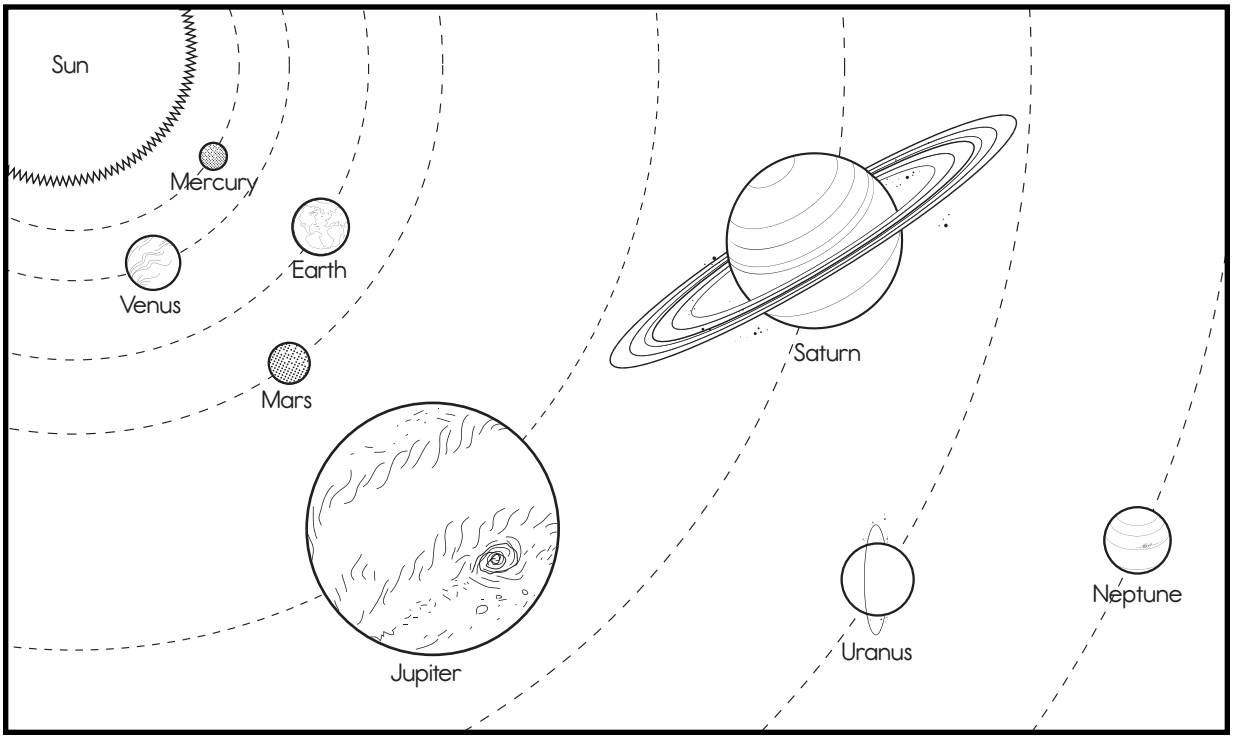
_____

4. Which planet has a few rings around it?

_____

9B-1

Name **Answer Key**



Directions: Read and answer each question appropriately using the diagram. You may wish to color the diagram to reflect what you know about the colors of certain planets in the solar system.

1. How many planets orbit the sun?

   eight

2. Which planet is closest to the sun?

   Mercury

3. Is Mars larger or smaller than Earth?

   smaller

4. Which planet has a few rings around it?

   Saturn

DA-1

Name _____

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

Directions: Listen to your teacher's instructions.

11.  

12.  

13.  

14.  

15.  

DA-1

Name _____ **Answer Key**

Directions: Listen to your teacher's instructions.

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

11.  

12.  

13.  

14.  

15.  

DA-2

Name _____

Directions: Listen to the following sentences about these celestial bodies. Next to the number of the sentence I have read, you will notice four names. You will notice that the first three names are always the same. Let's read them together: "sun, moon, Earth." You will also notice that the last name is usually different. I will read the four choices to you after I read each sentence. Circle the name of the appropriate celestial body being talked about in each sentence:

1.	Sun	Moon	Earth	Neptune
2.	Sun	Moon	Earth	Saturn
3.	Sun	Moon	Earth	Mercury
4.	Sun	Moon	Earth	Mars
5.	Sun	Moon	Earth	Jupiter
6.	Sun	Moon	Earth	Uranus
7.	Sun	Moon	Earth	Venus
8.	Sun	Moon	Earth	Mercury

9.	Sun	Moon	Earth	Saturn
10.	Sun	Moon	Earth	Jupiter
11.	Sun	Moon	Earth	Mars
12.	Sun	Moon	Earth	Venus
13.	Sun	Moon	Earth	Uranus
14.	Sun	Moon	Earth	Neptune
15.	Sun	Moon	Earth	Mercury

DA-2

Name **Answer Key**

Directions: Listen to the following sentences about these celestial bodies. Next to the number of the sentence I have read, you will notice four names. You will notice that the first three names are always the same. Let's read them together: "sun, moon, Earth." You will also notice that the last name is usually different. I will read the four choices to you after I read each sentence. Circle the name of the appropriate celestial body being talked about in each sentence:

1.	(Sun)	Moon	Earth	Neptune
2.	Sun	Moon	(Earth)	Saturn
3.	Sun	(Moon)	Earth	Mercury
4.	Sun	Moon	Earth	(Mars)
5.	Sun	Moon	Earth	(Jupiter)
6.	(Sun)	Moon	Earth	Uranus
7.	Sun	(Moon)	Earth	Venus
8.	Sun	Moon	Earth	(Mercury)

9.	Sun	Moon	Earth	**Saturn**
10.	Sun	Moon	**Earth**	Jupiter
11.	**Sun**	Moon	Earth	Mars
12.	Sun	Moon	Earth	**Venus**
13.	Sun	Moon	Earth	**Uranus**
14.	Sun	Moon	Earth	**Neptune**
15.	Sun	**Moon**	Earth	Mercury

Tens Recording Chart

Use this grid to record Tens scores. Refer to the Tens Conversion Chart that follows.

Name							

Tens Conversion Chart

Number Correct

Number of Questions	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	10																			
2	0	5	10																		
3	0	3	7	10																	
4	0	3	5	8	10																
5	0	2	4	6	8	10															
6	0	2	3	5	7	8	10														
7	0	1	3	4	6	7	9	10													
8	0	1	3	4	5	6	8	9	10												
9	0	1	2	3	4	6	7	8	9	10											
10	0	1	2	3	4	5	6	7	8	9	10										
11	0	1	2	3	4	5	5	6	7	8	9	10									
12	0	1	2	3	3	4	5	6	7	8	8	9	10								
13	0	1	2	2	3	4	5	5	6	7	8	8	9	10							
14	0	1	1	2	3	4	4	5	6	6	7	8	9	9	10						
15	0	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10					
16	0	1	1	2	3	3	4	4	5	6	6	7	8	8	9	9	10				
17	0	1	1	2	2	3	4	4	5	6	6	7	7	8	8	9	9	10			
18	0	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10		
19	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	
20	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10

Simply find the number of correct answers the student produced along the top of the chart and the number of total questions on the worksheet or activity along the left side. Then find the cell where the column and the row converge. This indicates the Tens score. By using the Tens Conversion Chart, you can easily convert any raw score, from 0 to 20, into a Tens score.

Please note that the Tens Conversion Chart was created to be used with assessments that have a defined number of items (such as written assessments). However, teachers are encouraged to use the Tens system to record informal observations as well. Observational Tens scores are based on your observations during class. It is suggested that you use the following basic rubric for recording observational Tens scores.

9–10	Student appears to have excellent understanding
7–8	Student appears to have good understanding
5–6	Student appears to have basic understanding
3–4	Student appears to be having difficulty understanding
1–2	Student appears to be having great difficulty understanding
0	Student appears to have no understanding/does not participate

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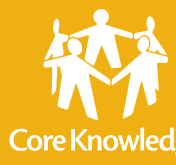

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