

APX-5 Learning About Space

Associated with session "Moon Craters."



Learning Objectives for Students:

- Describe the objects in the solar system (e.g., sun, Earth and other planets, moon) and their features (e.g., size, temperature).
- $_{\odot}$ Describe the phases of the Moon and what causes them.
- $_{\odot}$ Identify craters on the Moon and describe how they form.
- $_{\odot}$ Explain that stars appear to move because the Earth rotates on its axis.



Applicable Standards:

NCCC	
NGSS	I. NM Science Content Standards, Benchmarks, and Performance Standards
	Strand II: Content of Science
	Standard III (Earth and Space Science): Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.
	K-4 Benchmark I: Know the structure of the solar system and the objects in the universe.
	 Grade 2 Performance Standards 1. Observe that the phase of the moon appears a little different every day but looks the same again after about four weeks. 2. Observe that some objects in the night sky are brighter than others. 3. Explain that the sun is a star.
	 Grade 3 Performance Standards 1. Describe the objects in the solar system (e.g., sun, Earth and other planets, moon) and their features (e.g., size, temperature). 2. Describe the relationships among the objects in the solar system (e.g., relative distances, orbital motions). 3. Observe that the pattern of starts stays the same as they appear to move across the sky nightly. 4. Observe that different constellations can be seen in different seasons. 5. Know that telescopes enhance the appearance of some distant objects in the sky (e.g., the moon, planets).



CCSS,	Literature							
READING	Grade 2 RL.2.1 Ask and answer such questions as <i>who, what,</i> <i>where, when, why,</i> and <i>how</i> to demonstrate understanding of key details in a text. RL.2.2 Recount stories, including fables and folktales from diverse cultures, and determine their central							
	message, lesson, or moral. (Como la luna recobro su forma)							
	Grade 3 RL.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.							
	RL.3.2 Recount stories, including fables, folktales, and myths from diverse cultures; determine message, lesson, or moral and explain how it is conveyed through key details in the text.							
	Informational Text							
	Grade 2 RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to.							
	RI.2.2 Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the text.							
	RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.							
	RI.2.4 Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.							
	RI.2.5 Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.							



CCSS,	Informational Text						
READING							
	Grade 3						
	RI.3.1 Ask and answer questions to demonstrate						
	understanding of a text, referring explicitly to the text as						
	the basis for the answers.						
	RI.3.2 Determine the main idea of a text; recount the key						
	details and explain now they support the main idea.						
	RI.3.3 Describe the relationship between a series of						
	historical events, scientific ideas or concepts, or steps in						
	technical procedures in a text, using language that						
	pertains to time, sequence, and cause/effect.						
	RI.3.4 Determine the meaning of general academic and						
	domain-specific words and phrases in a text relevant to a						
	RL3.5 Use text features and search tools (e.g., key words,						
	sidebars, hyperlinks) to locate information relevant to a						
	given topic efficiently.						
	RI.3.6 Distinguish their own point of view from that of the						
	author of a text.						
	RI37 Use information gained from illustrations (e.g.						
	mans photographs) and the words in a text to						
	demonstrate understanding of the text (e.g., where, when						
	why, and how key events occur).						



CCSS.	Grade 2							
WRITING	W 2 1 Write oninion pieces in which they introduce the							
WINING .	topic or book they are writing about state on opinion							
	topic of book they are writing about, state an opinion,							
	supply reasons that support the opinion, use linking words							
	(e.g., because, and, also) to connect opinion and reasons,							
	and provide a concluding statement or section.							
	W.2.2 Write informative/explanatory texts in which they							
	introduce a topic use facts and definitions to develop							
	noints and provide a concluding statement or section							
	W 2 3 Write parratives in which they recount a well-							
	elaborated event or short sequence of events include							
	detaile to departible actions, thoughto, and facilings, upo							
	details to describe actions, thoughts, and reenings, use							
	temporal words to signal event order, and provide a sense							
	of closure.							
	W.2.5 With guidance and support from adults and peers,							
	focus on a topic and strengthen writing as needed by							
	revising and editing.							



CCSS,	Grade 3
WRITING	W.3.1 Write opinion pieces on topics or texts, supporting a
	point of view with reasons.
	W.3.1.A Introduce the topic or text they are writing
	about, state an opinion, and create an organizational
	structure that lists reasons.
	W.3.1.B Provide reasons that support the opinion.
	W.3.1.C Use linking words and phrases (e.g., because.
	therefore, since, for example) to connect opinion and
	reasons
	W 3.1 D Provide a concluding statement or section
	W 3.2 Write informative/explanatory texts to examine a
	topic and convey ideas and information clearly
	W 3.2 A Introduce a topic and group related information
	together: include illustrations when useful to aiding
	comprehension
	W 3.2 B Develop the topic with facts definitions and
	details
	W 3.2 C Use linking words and phrases (e.g. also
	another and more but) to connect ideas within
	categories of information
	W 3 2 D Provide a concluding statement or section
	W.3.3 Write narratives to develop real or imagined
	experiences or events using effective technique.
	descriptive details, and clear event sequences.
	W 3.3 A Establish a situation and introduce a narrator
	and/or characters: organize an event sequence that
	unfolds naturally.
	W.3.3 C Use temporal words and phrases to signal
	event order
	W.3.4 With guidance and support from adults. produce
	writing in which the development and organization are
	appropriate to task and purpose.



CCSS, MATH	Grade 2 NBT.B.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
	MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.
	Grade 3 NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
	OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division
	MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.



Unit Overview

Day 1

Assessing student prior knowledge: KLEW chart Class discussion/online discussion thread: Solar system facts Home/School Connection: family interview

Day 2

Planet song: "Planets song for kids/Solar System Song" (available in Epic) Read aloud: <u>The Planets</u> by Gail Gibbons (available in Epic) Math: Writing equations equal to 8 (8 to represent the 8 planets)

Day 3

Students fill in a planet facts table using The Planets and the Planet song

Day 4

Informative writing about a planet Math: Favorite Planet Bar Graph

Day 5

Read aloud: <u>The Moon</u> by Gail Gibbons (available in Epic) Moon Milestones Timeline Home/School Connection: Choice of differentiated activities

Day 6

At home investigation: Phases of the Moon

Day 7

At home investigation: Craters on the Moon

Day 8

Read aloud: <u>How the Moon Regained Her Shape</u> by Janet Ruth Heller (available in Spanish in Epic) Independent reading: <u>How the Moon Regained Her Shape</u> Sequence of events Home/School Connection: Family interview-legends about the Moon

Day 9

Narrative Writing: Students write and illustrate their own legend

Day 10

Read aloud: <u>The Stars (Journey Through Space)</u> Independent reading: reread <u>The Stars (Journey Through Space)</u> Vocabulary words: list in alphabetical order; define & illustrate



Day 11

The Stars (Journey Through Space): Follow a star activity

Day 12

Solar System Project: Project Choice Board

Vocabulary

The table below outlines the academic vocabulary that will be used on specific days of this unit. This vocabulary can be posted in a traditional word wall format in the classroom or in an online word wall. An online word wall can be easily created as a simple Google document that can be shared with students or it can take the form of a word cloud. Wordcloud.com is a free online word cloud generator that allows users to create a word cloud with their own vocabulary list

<u>https://www.wordclouds.com/</u>.You can modify the font, the font color and the shape of the word cloud to make it more appealing for students. Provide students with the link to the online word cloud so they can refer to it during independent assignments.

Unit Vocabulary					
Day 1	solar system				
Days 2, 3, 4	planet, moon, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, dwarf planet, star, orbit, atmosphere, gas, solid, clouds, inner planets, outer planets, asteroid belt, gravity, Milky Way, astronaut, telescope, NASA				
Days 5, 6, 7, 8, 9	moon, natural satellite, man-made satellite, phases, new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, last quarter, waxing crescent				
Days 9, 10, 11	star, constellation, telescope				



Resources

<u>The Planets</u> by Gail Gibbons (available in Epic) <u>The Moon Book</u> by Gail Gibbons (available in Epic) <u>The Moon in a Month</u> by Tracy Nelson Maurer (also available in Spanish in Epic: <u>La</u> <u>Luna en un mes</u>) <u>How the Moon Regained Her Shape</u> by Janet Ruth Heller (also available in spanish in Epic: <u>Como la Luna recobró su forma</u>) <u>The Stars (Journey through space)</u> by Jeff Wimbush (available in Epic) Planets song for kids (several available in Epic)



Day 1. What do students know about our solar system?

Assessing student prior knowledge

Every student has some knowledge of our solar system. Ask students to record their personal observations and questions about our solar system in a KLEW chart. A student created KLEW chart is an excellent formative measure for ascertaining a student's prior knowledge and for guiding your instruction. Since this is the introductory activity to this unit of study, ask students to skip the L (What have I learned about our solar system?) column of the chart. Students should revisit their KLEW chart throughout the unit and as a culminating activity to document their learning.

K	L	E	W
		(What evidence do	
		I have to	
(What do I know	(What have I	demonstrate what I	(What am I
about our solar	learned about our	know about our	wondering about
system?)	solar system?)	solar system?)	our solar system?)

*This chart can be printed and given to students or inserted as a PDF file into a Seesaw assignment.

Class discussion

Create a discussion thread in your online learning platform about our solar system. Ask students to post one fact that they know about the solar system in the discussion thread.

Home/School Connection

Ask students to interview one or two family members and ask them about what they know about the solar system. Give students a choice of summarizing their findings in a 5 sentence paragraph or drawing what their family members know about the solar system.



Day 2. Planet Song, Read Aloud, Number of the Day Math Assignment

Planet Song

Begin this day with a song about the planets. Several songs about the planets are available in Epic. The "Planets song for kids/Solar System Song" in Epic takes students on a journey through our solar system. Each planet presents itself and states important facts about itself. Ask students to listen to the song and pay attention to the graphics. Students can refer back to this song during independent study time. You can refer back to this song throughout the unit and ask students to sing the song as a group or they can volunteer to sing the part of a planet.

Discuss the following with your class before listening to the song about the planets to activate prior student knowledge:

Our solar system is part of a galaxy called The Milky Way Galaxy and consists of 8 planets along with other space material orbiting our home star, the Sun. The 8 planets in our solar system are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Read aloud: The Planets by Gail Gibbons

Assign <u>The Planets</u> by Gail Gibbons in Epic. You can read the book to the students as they follow along. Since students can access the book in Epic they can refer back to the book during independent study.

Begin an online word wall or word cloud. Wordcloud.com is a free online word cloud generator that allows users to create a word cloud with their own vocabulary list <u>https://www.wordclouds.com/</u>. You can modify the font, the font color and the shape of the word cloud to make it more appealing for students. Provide students with the link to the online word cloud so they can refer to it during independent assignments.

Ask students to reread <u>The Planets</u> and answer the following questions. These questions can be printed and given to students or inserted as a PDF file into a Seesaw assignment. For differentiation, you can ask students to only answer half of the questions.



Day 2, continued

The Planets by Gail Gibbons: 20 Questions

Read The Planets in Epic. Answer the following questions with a complete sentence. Write the page number of the page in <u>The Planets</u> where you found the answer. The first question is answered for you as an example.

- 1. What do we call a scientist who studies the planets and the stars? A scientist that studies the planets and the stars is an astronomer. I found this answer on page 30.
- 2. Why can we see the planets in space?
- 3. How many planets are there in our solar system?
- 4. What does the word 'solar' mean?
- 5. What is the path that a planet follows around the Sun called?
- 6. What instrument do people use to see faraway planets like Uranus and Neptune?
- 7. What is the planet closest to the Sun?
- 8. What is the smallest planet?
- 9. What is the biggest planet?
- 10. Which planets have rings?
- 11. What is the second planet from the Sun?
- 12. Why is Venus bright?
- 13. How far is Earth from the Sun?
- 14. How many days does it take for Earth to complete one orbit around the Sun?
- 15. What is a Moon?
- 16.Why is Mars red?
- 17. How many moons does Jupiter have?
- 18. Which planet has the largest rings?
- 19. What is the seventh planet from the Sun?
- 20. Why does Neptune appear to be blue?



Day 2, continued

Math Assignment (Number of the Day): Equations that are equal to the number 8 (to reinforce the concept that there are 8 planets in our solar system)

- Reinforce that our solar system has 8 planets by highlighting the number 8 in a math assignment. For this assignment, tell students that 8 is the number of the day. Ask students to write 15 equations that are equal to the number 8.
- Review the definition of an equation and a number sentence.
- Second grade students can write addition and subtraction equations. This
 assignment allows for differentiation as well as formative assessment. Some
 students may be working with basic addition and subtraction facts, one and
 two digit numbers. Some may be ready to write addition and subtraction
 equations with three digit numbers.
- Third grade students can write addition and subtraction equations, multiplication equations and may be ready to try basic division equations. Some students may be working with basic addition and subtraction facts while others may be ready to write addition and subtraction equations with three digit or four digit numbers. Third graders may also be willing to try multiplication and division equations depending on the time of the instructional year.
- This can be used as a diagnostic assessment throughout the year to analyze student error patterns to help guide your small group intervention instruction.

Example equations for 2nd grade students		
On grade level equations		Challenge Equations
2 + 6 = 8	10 - 2 = 8	98 - 90 = 8
7 + 1 = 8	12 - 4 = 8	108 - 100 = 8
5 + 3 = 8	11 - 3 = 8	158 - 150 = 8



Day 2, continued

Example equations for 3rd grade students		
On grade level equations		Challenge Equations
4 + 4 = 8	100 - 92 = 8	160 ÷ 20 = 8
12 - 4 = 8	16÷2 =8	958 - 950 = 8
58 - 50 = 8	8 ÷ 1 = 8	1058 - 1052 = 8



Day 3. Planet facts table

- Discuss facts about each individual planet with students. Refer to <u>The Planets</u> by Gail Gibbons and to the planet song that students listened to on Day 2. Encourage students to reread the book and listen to the song again in Epic. Both are excellent sources of information for this assignment.
- Instruct students to select three planets and fill in the following table with facts about the three planets.

Our Solar System: Planet Facts						
Planet Name	Numerical order from the Sun (Example: Mars is the fourth planet from the Sun.)	How far is this planet from the Sun? (miles)	What is the temperature of this planet (hot, cold or just right for life)?	How many moons does this planet have?	How many days does it take to complete one orbit around the Sun?	What makes this planet different from the other planets?

*This chart can be printed and given to students or inserted as a PDF file into a Seesaw assignment.



Day 4. Informative Writing and Bar Graph Math Assignment

Informative Writing

- Ask students to refer to the table that they filled out on Day 3 with facts about 3 planets. Instruct them to select one planet and write an informative text about that planet.
- Students must write at least one five-sentence paragraph about the planet they selected. Remind students to write complete sentences and to be mindful of punctuation and spelling.
- Provide a word bank for students to scaffold the use of academic language in their writing. Student's writing should have at least 8 of the words from the word bank.

Informative Writing Word Bank					
moon	days	orbit	atmosphere	surface	temperature
rings	miles	gases	solar system	rocky	life

Math assignment: Class discussion question and favorite planet bar graph

- Set up a discussion with this question: Which is your favorite planet? This can be a whole group discussion in class or can be set up as a discussion in an online learning platform. The online discussion can be set up to allow students to view all responses.
- Ask students to use tally marks to record how many times a particular planet is selected and then use their data to make a bar graph of the favorite planets.
- The "Which is your favorite planet?" tally mark table and bar graph can be printed and given to students or inserted as a PDF file into a Seesaw assignment.



Planet	Tally Marks
Mercury	
Venus	
Earth	
Mars	
Jupiter	
Saturn	
Uranus	
Neptune	

Which is your favorite planet?





Day 5. The Moon: Read aloud, Moon Milestones Timeline, Homework

The Moon Book by Gail Gibbons read aloud

- Ask students what they know about the Moon.
- Tell students that the Moon is Earth's natural satellite.
- Read The Moon Book by Gail Gibbons in Epic. Students follow along.
- Tell students to pay special attention to page 30 Moon Milestones. Tell students that they will make a timeline of Moon Milestones. Ask students to select 5 Moon Milestones and fill in the timeline template. This timeline can be printed and given to students or inserted as a PDF file into a Seesaw assignment. Students can also make a list, in chronological order, of 5 important Moon events.

Moon Milestones Timeline





Home/School Connection (Allow students to choose one or two for the week.)

- Ask your family what they know about the Moon, sketch/write what you learn.
- Find an image of the Moon. Draw the Moon. Include the details you see on the surface of the Moon.
- Go outside and observe the Moon. Draw what you see. Write two complete sentences to describe what you observe.





Day 6. At home investigation: Phases of the Moon

- Read <u>The Moon in a Month</u> by Tracy Nelson in Epic (also available in Spanish, <u>La luna en un mes</u>). Students follow along.
- Discuss the phases of the Moon with your students. Ask them to create the phases of the Moon with materials they have at home.

Students can draw and label the phases of the Moon.



They can also use construction paper to make the phases of the Moon.





Students should create 8 Moon phases:

- 1. New Moon
- 2. Waxing Crescent
- 3. First Quarter (or Half) Moon
- 4. Waxing Gibbous
- 5. Full Moon
- 6. Waning Gibbous
- 7. Third Quarter Moon
- 8. Waning Crescent



Day 7. At home investigation: Craters on the Moon

Assign this 5 minute video to your students: <u>Moon Craters Investigation</u> (ctrl + click to follow the link). The video presents the concept of craters on the Moon and gives students instructions for carrying out their own investigation at home.

Materials: shoebox, sand, three different sized rocks, ruler

Investigation:

- 1. Fill the shoebox with sand. The sand should be about 3 inches deep. Use your ruler to measure how deep the sand is.
- 2. Smooth out the sand with your hand to create a flat surface.
- 3. Use your ruler to measure three feet above the sand.
- 4. Hold a rock three feet above the sand and drop it into the sand.
- 5. Observe what happens to the sand.
- 6. Repeat with the medium and the large rock. Record your observations.
- 7. Ask students what they observe once the rock hits the sand in the box. Make a table like the one below for students to fill in. Students record their observations after they drop each different sized rock into the sand.
- 8. Conduct a meaning making circle with your students to allow them to share their observations. Ask students to analyze the information in their tables. Lead the discussion starting with, what happened and why did this happen? Is there a pattern to how craters form?
 - Do larger objects make deeper craters?

Do smaller objects make craters that are more shallow?

- How did the craters on the Moon form? (Asteroids hit the surface of the Moon
- to form the <u>craters.</u>)



Object	Size (small, medium, largest)	Describe what happened and why you think it happened	Drawing of the crater	Size of the crater (inches)
Rock 1				
Rock 2				
Rock 3				

*This chart can be printed and given to students or inserted as a PDF file into a Seesaw assignment.



Day 8. Legend about the Moon

Read aloud and independent reading

- Begin by referring to page 31 Moon Legends and Stories in <u>The Moon Book</u> by Gail Gibbons. Tell students that humans have always been fascinated and puzzled by our Moon so there are many legends and stories about the Moon. Tell them that they will be reading a legend about the Moon.
- Assign <u>How the Moon Regained Her Shape</u> by Janet Ruth Heller in Epic. This book is also available in Spanish. It recounts the legend of how the Sun bullied the Moon and the Moon got so upset that it disappeared from the sky. The Moon's friends help her to regain her self-confidence and reappear in the sky. This book is also available in Spanish in Epic, <u>Como la luna recobró su forma</u>.
- Read the book with your students or assign it as independent reading. Differentiation: class read aloud, small group, independent reading
- Ask students to retell the legend in their own words. Alternatively, you can print or copy the following sentences and ask students to arrange the events in sequence as they happened in the story.

How the Moon Regained Her Shape: Sequence of Events

- 1. Now if someone hurts her feelings and she dwindles, she always remembers her friends and regains her strength and fullness.
- 2. Once the moon was round and full.
- 3. The moon visited Round Arms on Earth.
- 4. The moon felt better and regained her self-confidence.
- 5. Round Arms showed her how the people and animals loved and missed her.
- 6. One day she danced across the face of the sun and the sun yelled at her.
- 7. The moon danced and sang all the way back to her sky path.
- 8. The moon's feelings were hurt and she began to shrink until she was a sliver of her former self.

Home/School Connection (allow students to choose one assignment)

- Ask your family members to tell you any stories or legends that they were told as children about the moon. Write the story in your own words and draw a picture.
- Write and illustrate a poem about the Moon.



Day 9. Narrative Writing: How the Moon Regained Her Shape

- Start today by telling students that legends are cultural stories that are passed down by word of mouth from one generation to the next. Legends are often used to try to explain naturally occurring events. In this case, How the Moon Regained Her Shape "explains" why the moon changes phases throughout a month. Tell students that they will be writing their own legend.
- Ask students to write and illustrate their own story about:
 - \circ $\;$ Why the sun rises in the east and sets in the west.
 - Why clouds move through the sky.
 - Why the rivers flow into the sea.
 - Why do we hear thunder in the sky?
 - Why leaves turn different colors and then fall off the trees in autumn.
 - Why seasons change from spring to summer
 - Why zebras have black and white stripes
 - Why birds sing in the morning
- If time permits, you can plan time for a session of "Author's Chair" presentations to allow students to share their legends.



Day 10. The Stars (Journey Through Space): Read aloud, independent reading, vocabulary

Read aloud and independent reading

- Read <u>The Stars (Journey Through Space)</u> by Jeff Wimbush (available in Epic) with your students. Students follow along as you read.
- Start by previewing the book with your students. Review the text features of a nonfiction text.
- Ask students to pay attention to the important words in bold text.
- Assign this book for independent reading.

Vocabulary Words

- Give students the following list of vocabulary words from <u>The Stars (Journey</u> <u>Through Space</u>). Ask students to make a list of the vocabulary words in alphabetical order. If you are teaching a dual language class, you can also ask students to identify the words that are Spanish/English cognates.
- Ask students to choose four vocabulary words. Students need to write the definition of the word, write one complete sentence using the word and illustrate the word.

The Stars (Journey Through Space)		
light-year	clusters	constellation
gravity	galaxies	telescope
core	rotate	nebulas
axis	supernova	orbit



Day 11. The Stars (Journey Through Space): Follow a star activity

Are Stars Moving?

- Begin by referring to pages 14-15 in <u>The Stars (Journey Through Space)</u>. Start your discussion by asking: Are stars moving? Read page 14 with students. Explain that stars appear to move because the Earth rotates on its axis. Explain that Earth's rotation on its axis causes day and night.
- Introduce the "Follow a Star Activity" on page 15. This activity can be assigned throughout the week to allow students to follow a star for several nights and document their observations.
- Students need to:
 - Go out on a clear night and find a bright star that is low in the sky.
 - Draw a picture of where the star is, using a reference landmark such as a treetop or the top of a building.
 - Wait one or two hours. Go back to the same place you went to before and draw the star's location again. Remember to use the reference landmark. Did the star move?



Day 12. Solar System Project

Assign a solar system project as a final activity for this unit. Allow students one week to complete a project of their choice from the choice board below.

