

Grade 3

Unit 5

Our Solar System and Beyond: Astronomy

Activity Book

ISBN 979-8-89180-839-3

© 2015 The Core Knowledge Foundation and its licensors
www.coreknowledge.org

Revised and additional material
© 2026 Amplify Education, Inc. and its licensors
www.amplify.com

All Rights Reserved.

Core Knowledge Language Arts and CKLA are trademarks
of the Core Knowledge Foundation.

Trademarks and trade names are shown in this book
strictly for illustrative and educational purposes and are
the property of their respective owners. References herein
should not be regarded as affecting the validity of said
trademarks and trade names.

Printed in the USA
01 LSC 2024

NAME: _____

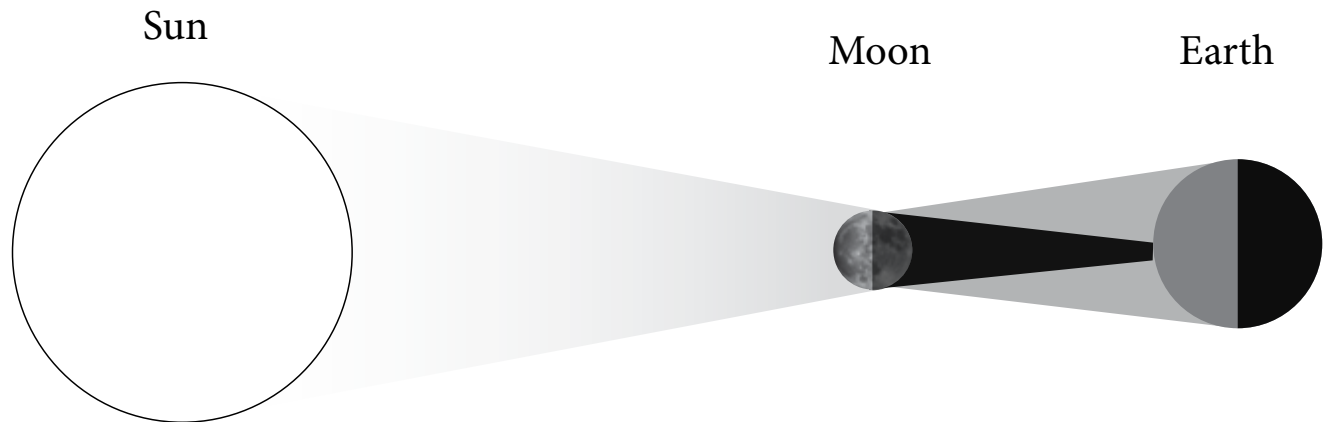
DATE: _____

1.1

Activity Page

A Solar Eclipse

Read the statements and look at the diagram. Sequence the events of a solar eclipse in the correct order.



- ___ The moon's shadow falls somewhere on the surface of Earth.
- ___ In its orbit around Earth, the moon passes between the sun and Earth.
- ___ A shadow forms behind the moon.
- ___ The sun's light shines on half of Planet Earth.
- ___ The moon blocks some of the sunlight that is shining on Earth.

NAME: _____

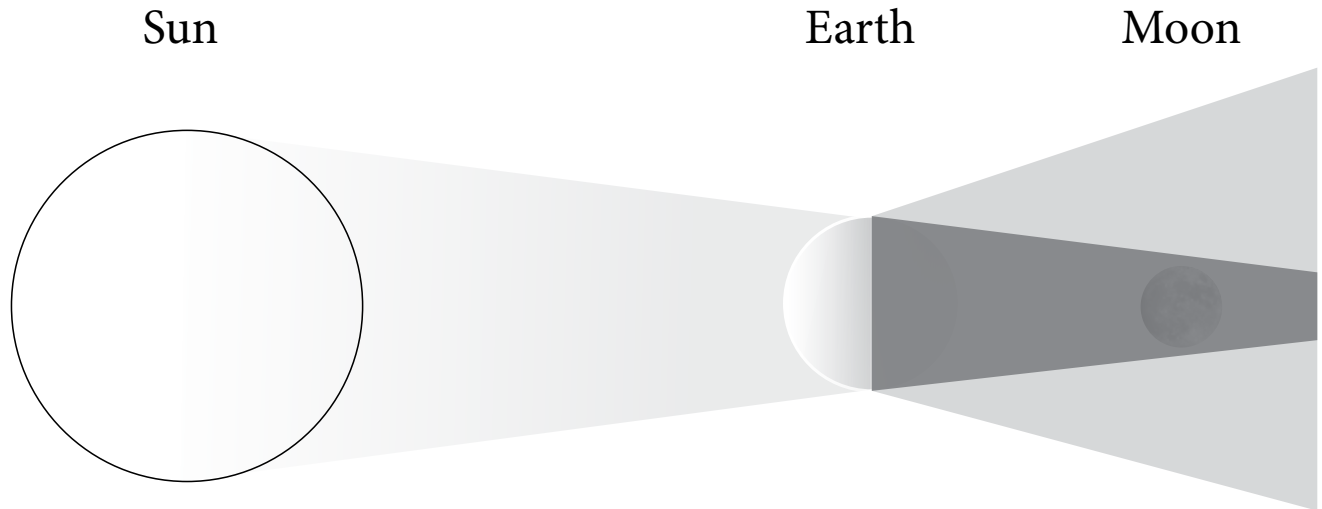
DATE: _____

1.2

Activity Page

A Lunar Eclipse

Read the statements and look at the diagram. Sequence the events of a lunar eclipse in the correct order.



- ___ Earth's shadow crosses the face of the moon, and the moon appears darkened as we view it from Earth.
- ___ The moon reflects the sunlight so that we see a bright moon from Earth.
- ___ Earth passes between the sun and the moon.
- ___ The sun's light shines on the moon.
- ___ Earth blocks some or all of the sunlight that is shining on the moon.

NAME: _____

DATE: _____

1.3

Activity Page

The Sun, Earth, and Our Solar System

1. What two types of energy does the sun provide?

- A. The sun provides electrical and wind energy.
- B. The sun provides heat and light energy.
- C. The sun provides light and electrical energy.
- D. The sun provides water and heat energy.

page _____

2. How many days does it take for the Earth to orbit the sun?

- A. It takes about 78 days for the Earth to orbit the sun.
- B. It takes about 439 days for the Earth to orbit the sun.
- C. It takes about 365 days for the Earth to orbit the sun.
- D. It takes about 149 days for the Earth to orbit the sun.

page _____

3. How long does it take for the Earth to make a full rotation on its axis?

- A. It takes 24 hours for the Earth to make a full rotation on its axis.
- B. It takes 3 days for the Earth to make a full rotation on its axis.
- C. It takes 365 days for the Earth to make a full rotation on its axis.
- D. It takes 24 days for the Earth to make a full rotation on its axis.

page _____

4. What creates the energy that the sun gives off?
- A. The sun's gases create the energy that the sun gives off.
 - B. Light and heat from other stars create the energy that the sun gives off.
 - C. Absorbing energy from the eight planets creates the energy that the sun gives off.
 - D. Running into objects in space creates the energy that the sun gives off.

page _____

5. What is the solar system?

page _____

NAME: _____

DATE: _____

2.1

Activity Page

The Moon

If a statement is true, write “true” on the line. If a statement is false, write “false” on the line.

1. The moon gives off light of its own just like the sun.

page _____

2. The moon orbits around Earth.

page _____

3. It takes 24 hours for the moon to orbit around Earth.

page _____

4. Solar eclipses happen much more often than eclipses of the moon.

page _____

NAME: _____

DATE: _____

2.2

Activity Page

Compare and Contrast—Our Solar System

Video

Read-Aloud

Write a summary about how the video and the Read-Aloud were most similar:

NAME: _____

DATE: _____

2.2
CONTINUED

Activity Page

Compare and Contrast—Our Solar System

Video

Read-Aloud

Write a summary about how the video and the Read-Aloud were most similar:

NAME: _____

DATE: _____

2.3

Activity Page

Conjunction *because*

Draw two lines under the word because to show it is a conjunction. Decide which of the two simple sentences happened first and write the word Cause over top of it. Decide which simple sentence happened second and write the word Effect over top of it. Answer the questions in complete sentences.

Cause

Effect

Because my friend looked so sad, we all tried to cheer him up.

Why did we try to cheer up my friend?

We all tried to cheer him up because he looked so sad.

1. Susan read that book three times because it was so thrilling.

Why did Susan read that book three times?

2. Because his pen ran out of ink, Ben needed to get another one.

Why did Ben need to get another pen?

3. Dad picked up my baby sister because she was crying and crying.

Why did Dad pick up my baby sister?

NAME: _____

DATE: _____

2.3
CONTINUED

Activity Page

Conjunction so

Match the sentences by writing the number of the cause in the blank that identifies the appropriate effect. Rewrite the sentences below, inserting the conjunction so. Remember to add correct capitalization and punctuation.

Causes

1. The book was very exciting.
2. The puppy was very tired.
3. The weather was rainy.
4. Grandma lost her glasses.

Effects

- _____ We played inside.
- _____ We helped her look for them.
- _____ It took a long nap.
- _____ Randy read it three times.

1. _____

2. _____

3. _____

4. _____

- A. *Read the two simple sentences.*
- B. *Decide which happened first and write the word Cause over top of it.*
- C. *Decide which happened second and write the word Effect over top of it.*
- D. *Add the conjunction so before the simple sentence that happens second and is the effect.*
- E. *Then, write them as a compound sentence including the conjunction so.*

Example: I forgot to clean up my room. I wasn't allowed to go out to play.

Cause	Effect
<i>I forgot to clean up my room, so I wasn't allowed to go out to play.</i>	

1. Chocolate is my favorite flavor of ice cream. I asked for it for dessert.

2. Tom enjoys Uncle Steve's company very much. He invited Uncle Steve to go out to a movie.

3. The little girl said hello. Her neighbor said hello back.

NAME: _____

DATE: _____

3.1

Activity Page

Main Idea in Paragraphs

After reading the selection, reread to find the main idea of three of the paragraphs. Then, write a summary of the selection from the three main ideas.

Title:		
What is the main idea?	What is the main idea?	What is the main idea?

Summary

NAME: _____

DATE: _____

3.2

Activity Page

Blank Busters

jellyfish	germy	digest	fringe
nudging	ridge	exchange	eject
budget	lodging	gymnasium	jewel
bridging	dodge	average	fudge
giraffe			
Challenge Word: <i>answer</i> Challenge Word: <i>great/grate</i> Content Word: <i>Jupiter</i>			

Fill in the blanks in the sentences below with one of the spelling words in the chart. Only if needed, add a suffix to the end of a word in order for the sentence to make sense: -s, -ed, -ing, -er, or -ly.

1. The stained sink was dirty and _____.
2. The normal or _____ size of _____ in the ocean is about five inches.
3. The long-necked _____ at the zoo looks like a giant to a short student.
4. My stomach is _____ the yummy _____ that my grandmother made.

5. In the school's _____ students made a huge replica of the planets in our solar system, and our class made _____.
6. The _____ around the collar of your jacket looks just _____.
7. My little brother kept _____ me with his elbow so I would look at all of the sparkly _____ in the glass case.
8. Our group was _____ from the game because the referee said we were cheating.
9. Asking questions and _____ them are opposites.

Write three sentences using spelling words of your choice that were not used in the first ten sentences. Make sure to use correct capitalization and punctuation. You may use the Challenge Words or Content Word in your sentences.

1. _____

2. _____

3. _____

NAME: _____

DATE: _____

4.1

Activity Page

Main Idea in Paragraphs

After reading the selection, reread to find the main idea of three of the paragraphs. Then, write a summary of the selection from the three main ideas.

Title:		
What is the main idea?	What is the main idea?	What is the main idea?

Summary

NAME: _____

DATE: _____

4.2

Activity Page

-ful: Suffix Meaning “full of”

The left-hand side of the table contains words that use the suffix you have been studying. Use the blanks on the right side to record additional words that use the same suffix. Make sure to include the definition for the new words you brainstorm.

careful —(adjective) full of effort to do something correctly or safely	
fearful —(adjective) full of the feeling that something bad will happen	
hopeful —(adjective) full of the feeling of wanting something to happen and thinking it will	
painful —(adjective) full of suffering caused by injury, illness, or sadness	

Write the correct word to complete each sentence.

hopeful	careful	fearful	painful	powerful
---------	---------	---------	---------	----------

1. I had a _____ blister on my foot from walking a long distance in my new shoes.
2. Grandma told us to be _____ when we walked on the icy sidewalk so we wouldn't fall.
3. The _____ kitten hid under the couch when the thunderstorm came through with lots of noises and flashes.
4. The _____ motor in the boat allowed the boat to move quickly even with so many people in it.

5. Write your own sentence using the one word left in the box.

NAME: _____

DATE: _____

4.3

Activity Page

–less: Suffix Meaning “lacking”

careless —(adjective) lacking the effort to do something correctly or safely	
powerless —(adjective) lacking the strength or authority to do something	
fearless —(adjective) lacking the feeling that something bad will happen	
hopeless —(adjective) lacking the feeling of wanting something to happen and thinking it will	

Write the correct word to complete each sentence.

powerless	careless	painless	hopeless	fearless
-----------	----------	----------	----------	----------

1. He smiled and had a _____ look in his eye as he climbed the ladder up to the high dive platform for the first time.
2. Steven made a _____ mistake on his math test because he didn't check over his answers before turning in the test.
3. Katie had the _____ thought that she would never finish writing her paper in time for the due date.
4. The _____ lawn mower needed more gas to start up again.

5. Write your own sentence using the one word left in the box.

NAME: _____

DATE: _____

5.1

Activity Page

Spelling Assessment

As your teacher calls out the words, write them under the correct header.

'j' > /j/

'dge' > /j/

'g' > /j/

'dg' > /j/

'ge' > /j/

Challenge Word: _____

Challenge Word: _____

Challenge Word: _____

Content Word: _____

DATE: _____

Activity Page

Write a paragraph explaining the differences between meteors, meteoroids, and meteorites. Be sure to use correct spelling, capitalization, and punctuation. You may draw a triple Venn diagram on the back of this page to help you before you begin writing.

[illegible]

NAME: _____

DATE: _____

5.3

Activity Page

Building Sentences with the Conjunction so

Add adjectives and adverbs to the first set of rows. Add simple sentences to the second set of rows to answer the question what happened because. Choose from your list to create two new, more interesting sentences using the conjunction so to connect the two simple sentences.

Starter Sentence: The girl sang.			
Adjectives to describe the girl	Adverbs to describe how	Adverbs to describe when	Adverbs to describe where
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.
Simple sentences that answer the question, “What happened because the girl sang?”			
1.			
2.			
3.			
4.			

New sentences:

1. _____

2. _____

Starter Sentence: My brother jumped.			
Adjectives to describe my brother	Adverbs to describe how	Adverbs to describe when	Adverbs to describe where
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.
Simple sentences that answer the question, “What happened because my brother jumped?”			
1.			
2.			
3.			
4.			

New sentences:

1.
2.

NAME: _____

DATE: _____

6.1

Activity Page

Galaxies and Stars

	Key ideas from the text
Pages 34–35	
Pages 36–37	
Pages 38–39	
Pages 40–41	

NAME: _____

DATE: _____

6.2

Activity Page

Galaxies and Stars

If a statement is true, write “true” on the line. If a statement is false, write “false” on the line.

1. The stars do not look like the sun because they are all a lot smaller than the sun. _____
page _____
2. Stars are similar in size, color, and brightness. _____
page _____
3. Other stars are balls of hot gas, just like the sun. _____
page _____
4. The Greek root *astron* means sky. _____
page _____
5. Our solar system is in the Andromeda Galaxy. _____
page _____

Answer the following question in complete sentences on the lines below.

6. What are some ways that stars can be different?

page(s) _____

7. Compare and contrast a solar system and a galaxy.

Our Solar System		Our Galaxy
	size?	
	location?	
	characteristics?	

NAME: _____

DATE: _____

6.3

Activity Page

Reading/Writing Choice Board

Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the numbers of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

1. Create a graphic organizer and compare and contrast two ideas in the text.	2. What is the main idea of the text? List three details from the text that support the main idea.	3. Write a sentence describing the author's purpose (persuade, inform, or entertain).
4. Write three questions you still have after reading the text.	5. Write a list of three new words you learned in the text as well as their definitions, and use them in a sentence.	6. Describe how one of the images in the chapter helps you to understand the text.
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words.	8. Write three new things that you learned from the text.	

NAME: _____

DATE: _____

6.4

Activity Page

Conjunctions *and* and *or*

Read both sentences in each item carefully, looking at the words in the sentence. Choose and write one conjunction (and, or) in the blank so that the sentence makes sense.

1. Saturday is going to be a busy day full of fun things to do. First, my aunt plans to take all of us to the library, _____ then we will go to get ice cream at my favorite ice cream shop. Yum!
2. My little sister had forgotten to make her bed. Father said to her, “Sandy, you must make your bed, _____ you will not be able to watch TV tonight.”

Read both sentences in each item carefully, looking closely at the conjunction and or or and other clue words in each sentence. Circle the choice that uses the conjunction correctly so that the sentence makes sense.

3. A. My sister wants to go shopping, and my brother wants to go too.
B. My sister wants to go shopping, or my brother wants to go too.
4. A. Sally could wake up early in the morning, or she could sleep late today.
B. Sally could wake up early in the morning, and she could sleep late today.
5. A. Pete’s favorite color is orange, or his favorite color is blue.
B. Pete’s favorite color is orange, and his favorite color is blue.
6. A. Aunt Dolly should go to the gas station, or she will run out of gas.
B. Aunt Dolly should go to the gas station, and she will run out of gas.

Choose the correct answer, looking closely at the conjunctions and or or.

7. A. Tim is going to play board games, or he is going to play basketball this weekend. He can't decide which one.
B. Tim is going to play board games, and he is going to play basketball this weekend. He can't decide which one.
8. A. She will feel better, or she will still be sick in the morning.
B. She will feel better, and she will still be sick in the morning.

Write compound sentences using the conjunctions and or or.

9. (and)

10. (or)

“Galaxies”

Isn't space amazing? The thing that may amaze you most is how much distance there is between the planets in our solar system. No wonder they call it space! Now that we have reached the edge of our solar system, do you want to see more closely what lies in the center? Before you can understand what lies beyond our solar system, you need to know a little more about what stars are. And the best place to start is with the star that lies at the center of our solar system that you see every day: our very own sun.

The sun is so much brighter and bigger than all the rest of the stars because we are so much closer to our star than we are to any other star. We only see our star, the sun, in the daytime because that's when we're facing it. And when the sun lights up our skies, it is so bright that we can't usually see any other stars in the daytime.

You can tell just by looking that there is no way a spaceship could land on the sun—it's a big mass of incredibly hot gas! There's no solid surface to land on. The sun, like all stars, is made mostly of a gas called hydrogen. Hydrogen atoms in the center of the sun crash into each other under intense heat and pressure. The hydrogen **atoms fuse**, or join together, to form another gas called helium, and this fusion releases energy you can see and feel in the form of light and heat. So, hydrogen turning into helium produces vast amounts of energy, and is what causes the sun to shine.

The amount of heat and light being produced by a star determines its color. The surface of our sun is about ten thousand degrees Fahrenheit, not nearly as hot as the inside of the star! Even though ten thousand degrees Fahrenheit is

really hot compared to boiling water, our sun is still only considered a medium-hot, yellow star. Some stars are even hotter and some are not as hot as our sun. In fact, our sun is not as hot as it used to be.

Scientists believe that all stars are made of more or less the same things: hydrogen, helium, and smaller amounts of other basic substances. But just because stars are made from huge amounts of hydrogen and helium doesn't mean that all stars are the same—they aren't. The amount of substance or mass that makes up each star can vary. And the substances that make up some stars are more packed together than in others.

Stars have different ages, too. Some stars in the universe were literally just born yesterday, and some—like the sun—are believed to be billions of years old. But our sun is not at the end of its life either; many scientists believe our sun still has **billions** of years yet to live! So stars can be very different from each other.

Our sun seems large to us, and it is. In fact, it's so large that more than one million Earths could fit inside it! That's a lot of Earths—and just one Earth is pretty big. But believe it or not, our sun is small compared to many other stars. There are stars in the universe that are two thousand times as big as the sun! Our sun seems very bright to us, and it is. But there are stars that are more than four million times as bright! Even so, there are stars that are smaller than our sun and some that are less bright. So you see, stars can differ in size, mass, color, brightness, temperature, and age. But the one thing that most stars have in common is that they exist in groups called galaxies.

Do you remember how we defined our solar system as a neighborhood of planets, asteroids, and other objects in orbit around a star? Well, a galaxy

NAME: _____

DATE: _____

7.1
CONTINUED

Activity Page

is a **cluster** of many stars that orbit around together as an even bigger neighborhood—like a country. So, a galaxy is basically a gigantic country of stars. But all galaxies are not the same; they come in many shapes and sizes. Some galaxies are **spiral**. Some galaxies are elliptical in shape. Still other galaxies are **irregular** in shape, with no particular pattern.

The galaxy that our solar system is in is called the **Milky Way Galaxy**, which is a **spiral** galaxy. When you are standing on Earth you are in the **Milky Way Galaxy**. If you look up into the sky on a very clear, dark night away from the lights of a city, you can see a narrow band of thousands of stars going through the sky. When you look at this cloudy-looking band, you are looking into the thickest, densest part of the **Milky Way**. The ancient Greeks called this band of stars the Milky Circle, and the ancient Romans called it the Milky Road. But guess what? When you stand outside of the Milky Way and look at it, it looks like a **spiral**.

This is a view of a spiral galaxy like the **Milky Way**, looking down on it. Astronomers know what the Milky Way Galaxy looks like, but no person or spaceship has ever traveled outside of the Milky Way to take a picture of the whole galaxy. Scientists have figured out by using modern scientific instruments that the Milky Way is a **spiral** galaxy and looks very much like other **spiral** galaxies that we can take pictures of. As you can see, this spiral **galaxy** has a bright center, or hub, of many bright stars with star-studded arms swirling out from it amid clouds of gas.

How many stars do you think are in one galaxy? A single galaxy usually contains between one **billion** and a few hundred **billion** stars. And that's not even counting any planets or other objects that may be in orbit around all of

those **billions** of stars. In addition to **billions** of stars, galaxies also contain clouds of gas and pieces of dust which can eventually come together to form new stars.

And don't forget—galaxies also include the space in between the stars that are in it. There is a huge amount of space in space! Stars in the Milky Way Galaxy can be one hundred thousand **light-years** away from each other, or they can be five **light-years** away from each other, but most are somewhere in between.

A **light-year** is the distance that light travels in one year. Light travels at a speed of 186,282 miles per second. So one **light-year** is nearly six trillion miles! That's about six thousand billion miles. And you thought a **billion** was big! Well, as you can see, stars in the same galaxy are very far away from each other. Those are **astronomical** distances!

Astronomers use different kinds of powerful telescopes to see even more distant parts of the Milky Way Galaxy. Some of those telescopes are on Earth, and some are in orbit around Earth. And there are even a few telescopes zooming through our solar system.

Astronomers share their observations, their photographs, and the data they have gathered with each other—and luckily, with us, too. Even with all of our powerful equipment, there are still things in the Milky Way Galaxy—and beyond it—that no one has ever seen. Sometimes there is something in the way, like a star or another galaxy, and some things are still too far away even for our most powerful telescopes. There are more stars and galaxies in the universe than we can imagine!

NAME: _____

DATE: _____

7.1
CONTINUED

Activity Page

As you look out at the Milky Way, you may wonder about the other galaxies out there. One of the closest galaxies to our Milky Way Galaxy is called the Andromeda (/an*drom*eh*dah/) Galaxy. The Andromeda Galaxy is a **spiral** galaxy like our Milky Way. Even though Andromeda is the closest **spiral** galaxy to our galaxy, the Andromeda Galaxy is still very far away, and there is still much that remains unknown about it. Several other small **irregular** galaxies lie between the Milky Way Galaxy and the Andromeda Galaxy.

Now you know a lot more about our school's "space address." We live on the planet Earth. Earth is the third planet from the sun in our solar system, one of four small, rocky planets. Our solar system is just one planetary system located in one of the **spiral** arms of the Milky Way Galaxy.

You may be thinking about all of the other galaxies that exist besides our galaxy. There are **billions** of galaxies in the universe. Another **astronomical** number! "Wait," you may be thinking, "let me get this right."

"There are **billions** of galaxies . . . and all of them have billions of stars in them? Wow—that's so big I can't even get my mind around it!" The universe truly is an incredibly gigantic and vast place.

Glossary:

1. **astronomical**—really large; enormous in number, size, or distance
2. **atoms**—the tiny particles from which all substances are made
3. **cluster**—a number of things of the same kind that are together in a group
4. **fuse**—join together (fusion)
5. **irregular**—uneven; not regular in shape, size, or other characteristics
6. **light-years**—distance traveled by light over a period of years; a measure of length used in astronomy
7. **spiral**—curved in shape; gradually winding around a center point

NAME: _____

DATE: _____

7.2

Activity Page

Compare and Contrast Two Texts

Reading "Galaxies and Stars"	Read-Aloud "Galaxies"

Compare and Contrast Summary

Using your notes from the graphic organizer, write a paragraph about how the two texts are most similar and another paragraph about how they are different.

[illegible]

DATE: _____

Activity Page

Read-Aloud “Galaxies”

Compare and Contrast Summary

Using your notes from the graphic organizer, write a paragraph about how the two texts are most similar and another paragraph about how they are different.

[illegible]

NAME: _____

DATE: _____

7.3

Activity Page

Practice Conjunction so

Create an Effect to go with the Cause listed below, adding the conjunction so, to make a compound sentence. Draw two lines under so.

1. Today is Saturday _____

_____.

2. There is no school in summer _____

_____.

3. The merry-go-round was lots of fun _____

_____.

Create a Cause to go with the Effect listed below, adding the conjunction so, to make a compound sentence. Draw two lines under so.

1. _____

_____ the leaves dropped off of the trees.

2. _____

_____ we opened presents.

3. _____

_____ her aunt ran to answer the phone.

NAME: _____

DATE: _____

8.1

Activity Page

Exploring Space

1. What did Galileo discover with his telescope?
 - A. Galileo discovered Mars with his telescope.
 - B. Galileo discovered Jupiter with his telescope.
 - C. Galileo discovered four of Jupiter's moons with his telescope.
 - D. Galileo discovered the Andromeda Galaxy with his telescope.

page _____

2. What is the Hubble Telescope?
 - A. It is a telescope in an observatory in Texas.
 - B. It is a telescope launched into space by NASA.
 - C. It is Galileo's first telescope.
 - D. It is a large telescope NASA put on the moon.

page _____

3. Who was the first American astronaut to go into space?

page _____

4. Complete each sentence stem.

Earth's gravity is a challenge for rocket ships because _____

Earth's gravity is a challenge for rocket ships, but _____

Earth's gravity is a challenge for rocket ships, so _____

page _____

NAME: _____

DATE: _____

8.2

Activity Page

Triangle Connections

Using your notes and the glossary in your Student Reader, select three words we've studied in the unit so far and arrange them in a triangle shape. Then, connect the first word to the second word with a line and write on the line how the two words are connected. Next, draw a line from the second word to the third word and write on the line how those two words are connected. Finally, draw a line from the third word to the first word and write the connection.

First word:

Second word:

Third word:

NAME: _____

DATE: _____

8.3

Activity Page

Blank Busters

gnat	skinny	knotted	recently
flannel	knighted	nearby	understand
design	knobby	crewed	knowledge
channel	annoy	gnarly	knuckle
campaign			
Challenge Word: <i>very/vary</i> Challenge Word: <i>enough</i> Content Word: <i>astronomer</i>			

Fill in the blanks in the sentences below with one of the spelling words in the box. Only if needed, add a suffix to the end of a word in order for the sentence to make sense: -s, -ed, -ing, -er, or -ly.

1. The bothersome TV show was so _____ that I begged my family to change the _____.
2. My _____ silly uncle conducted a lavish _____ to be _____ Sir Uncle Fred!
3. Scientists called _____ study stars, planets, and satellites that are _____ by astronauts.
4. In the pasture is a tree that is so old that its branches are _____ and _____.

5. The _____ nightgowns were warm.
6. When the lights went out, I fumbled around in the dark and ran my _____ into a closed door.
7. Teachers make it so easy to _____ difficult topics and they love to fill our heads with _____.
8. I had searched for months but _____ discovered there is a library right around the corner which is _____ enough for me to walk to it.

Write three sentences using spelling words of your choice that were not used in the first ten sentences. Make sure to use correct capitalization and punctuation. You may use the Challenge Words or Content Word in your sentences.

1. _____

2. _____

3. _____

NAME: _____

DATE: _____

9.1

Activity Page

Spelling Assessment

As your teacher calls out the words, write them under the correct header.

‘nn’ > /n/

‘gn’ > /n/

‘n’ > /n/

‘kn’ > /n/

Challenge Word: _____

Challenge Word: _____

Challenge Word: _____

Content Word: _____

Dictated Sentences

1.
2.

“Gravity”

What exactly holds all of this stuff together in this huge universe? Why don't all these stars and planets just go flying off in any direction all over the universe? Why do they stick together in groups and clusters like solar systems and galaxies? These are excellent questions, and the answer is . . . **gravity**!

Gravity is an invisible **force** of attraction between objects. It's the **force** that holds galaxies and solar systems together. It's the **force** that keeps us firmly planted on planet Earth instead of flying off into space. It's the **force** that keeps Earth orbiting around the sun, and keeps the moon orbiting around Earth. You can't see **gravity** or touch it, but **gravity** is present between everything in the universe that has mass. Because of **gravity**, every single bit of **matter** in the universe pulls on every other piece of **matter** in the universe.

You and I exert a pull on each other, but because we have very little mass in our bodies compared to celestial bodies, our **gravitational pull** on each other is very small—so small we can't feel it at all.

Gravity depends greatly on mass . . . so what exactly is mass? Mass is just the amount of **matter** in an object. You and I are small compared to, say, a planet, or a star. We're made of less “stuff,” so our mass is much, much smaller. Mass is important when you are trying to understand **gravity**, because the larger the mass, the larger the **gravitational pull**. So objects with really large masses, like stars and planets, have a really big **gravitational pull** on other objects. And objects with really small masses, like you or me, have really small gravitational pulls on other objects—so small we don't even notice the pull

at all. The more mass an object has, the more **gravity**, or pull, it is capable of. Because Earth has so much mass compared to all of the things that are on the surface of the Earth, its surface **gravity** keeps the things on Earth from flying off into space. You, your house, your bed, a ball you throw up into the air—all of these things stay on Earth due to **gravity**! Even the Earth's atmosphere and the oxygen we breathe are held close to Earth by its **gravitational pull**!

Gravity also causes you to have weight when you stand on a scale! Earth's **gravity** pulls down on you. The more mass you have, the harder the pull, and the higher the numbers on the scale. Think about an astronaut who is standing on the moon. The astronaut stays on the surface of the moon because of the moon's **gravity**. If the astronaut stood on a scale on the moon, the astronaut's weight would be six times less than the weight of the same astronaut on a scale on Earth! So, a person who weighs sixty pounds on Earth would weigh only ten pounds on the moon—about the weight of a bag of flour—because the moon has less mass than Earth, and its **force of gravity** is not as strong.

But the astronaut does not get pulled off the moon and back through space to Earth! Earth still has a larger mass than the moon, and it still has a larger **gravitational pull** than the moon. But because the astronaut is far away from Earth and very close to the moon, the **gravitational pull** of the moon has the most effect. It keeps the astronaut on the moon.

That's another important thing to know about **gravity**—the distance between two objects affects the **gravitational pull** between them. Objects that are close to each other pull harder than objects that are farther away. The effect of an object's **gravitational pull** lessens as you get farther away from it. The sun has a lot more mass than Earth does. But the sun is also a lot farther away, and because we are

NAME: _____

DATE: _____

9.2
CONTINUED

Activity Page

on the surface of Earth, Earth's **gravity** has a much bigger effect on us, keeping us firmly on Earth—one of the many benefits of **gravity**!

The sun contains ninety-nine percent of all the mass in our solar system. Because the sun has more mass by far than anything else in the solar system, it also has more **gravity** than anything else in the solar system. The sun's **gravity**—or **force** of attraction—is so strong that it constantly pulls the planets toward it.

You may be wondering why the planets don't crash into the sun if the sun is pulling on them. Don't worry; that never happens because the planets are also moving really fast in their own orbits around the sun.

The combination of the planets' own speed and the sun's **gravitational pull** toward it is what keeps the planets constantly circling in orbit around the sun. It's a perfect balance—the planets continue in their predictable movements around the sun.

Sometimes **gravity** is so powerful that a **black hole** is formed: an object or area with an extremely strong **gravitational pull**. There are many **black holes** in space, and a **black hole's gravity** is so strong that once something gets close enough, nothing can escape its **gravitational pull**—not even light! Astronomers find **black holes** in space by noticing the movement of objects around them. You can't see **gravity**, but you can observe the way the **force** of **gravity** affects objects. Scientists are still learning about **black holes**, like many other things in outer space.

On a clear night we can often see the moon moving across our night sky. Have you ever been curious about why Earth has a moon? Many scientists

think that about four and a half billion years ago there was a massive collision between Earth and a very large asteroid. The information they have gathered shows that the moon may have formed from the leftover debris from this amazing impact. Earth's **gravity** was able to hold the moon in its orbit. There is a strong **gravitational pull** between Earth and the moon. The moon's **gravity** pulls on all of the things on the Earth—including people! But the Earth's **gravity** is strong enough to keep us on Earth.

The moon's **gravity** also pulls on Earth's oceans, but the Earth's **gravity** pulls back—and it's a good thing it's stronger! The moon's **gravity** is just strong enough that it can move the water on Earth enough to cause **tides** in the oceans. **Tides** cause the regular rise and fall of the ocean's waters. People can see the effects of **tides** if they are at the seashore.

High **tides** cause the waves to come high up on the beach, and when low **tides** occur, the waves don't come up as far. Low **tide** is a good time to walk the beach and look for shells and creatures that live in the sand.

So, yes, the powerful effects of **gravity** can explain a lot of interesting things in the universe—it's what holds our moon in orbit around Earth. It's what causes ocean **tides** on Earth day after day. **Gravity** is why we stay on Earth and why objects we throw into the air come back down. **Gravity** even helps create new stars and planets by helping pull together the gases and dust that form them. We can't see **gravity**, but we can see its effects all around us—on Earth, in our solar system, and throughout our galaxy!

NAME: _____

DATE: _____

9.2
CONTINUED

Activity Page

Glossary for “Gravity”

1. **gravity**—the force or pull created by the mass of objects in the universe toward each other
2. **force**—a pull or a push on an object or system
3. **matter**—the substances all objects on Earth are made of; all substances that take up space
4. **gravitational pull**—the force that draws all objects in the universe toward each other
5. **black hole**—an object or area in space that has such strong gravity that not even light can escape from it
6. **tides**—the periodic or regular rise and fall of the surface of large bodies of water on Earth that is caused by the interaction of the moon’s gravity with Earth

NAME: _____

DATE: _____

9.3

Activity Page

Gravity Experiment

Follow your teacher's directions for conducting the experiment. You will record your predictions, results, and conclusions on this page.

Objects dropped		My prediction	Result
Experiment number 1	Marble Paper		
Why did this happen?			
Experiment number 2			
Why did this happen?			

Objects dropped		My prediction	Result
Experiment number 3			
Why did this happen?			
Write a summary of the gravity experiment and what you learned:			

NAME: _____

DATE: _____

10.1

Activity Page

Grammar Review

Circle the sentence that is punctuated correctly.

1. A. “she was so glad to see her friend remarked Sally.”
B. “She was so glad to see her friend,” remarked Sally.
C. “She was so glad to see her friend?” remarked Sally.
D. “She was so glad to see her friend, remarked Sally.”
2. A. “The tunnel was dark long and scary, said Ted.”
B. “The tunnel was dark, long, and scary,” said Ted.
C. “The tunnel was dark, long, and scary, said Ted.”
D. “The tunnel was dark long, and scary,” said Ted.
3. A. Mrs. Black asked “Do you have your reader open.”
B. Mrs. Black asked “Do you have your reader open?”
C. Mrs. Black asked? “Do you have your reader open.”
D. Mrs. Black asked, “Do you have your reader open?”

NAME: _____

DATE: _____

11.1

Activity Page

Compare and Contrast: Chapter 8 and Chapter 9

Chapter 9 "A Walk on the Moon"

Chapter 10 "What's it Like in Space?"

NAME: _____

DATE: _____

11.1
CONTINUED

Activity Page

Compare and Contrast: Chapter 8 and Chapter 9

Chapter 9 “A Walk on the Moon”

Chapter 10 “What’s it Like in Space?”

What is most similar about the two texts?

Suffix Review

Reminder:

- *-ous* means “full of”
- *-ive* means “relating to”
- *-ly* means “in a _____ way”
- *-ful* means “full of”
- *-less* means “lacking”

If the sentence shows an example of the correct meaning of the underlined word, write yes on the blank that follows. If the sentence does not show an example of the correct definition of the underlined word, write no.

1. Dana came up with an inventive way to hang art in her room and made the arrangement look like all the other rooms in the house. _____
2. I saw the hopeless look in my brother's eyes when I told him our sister was running late and we probably wouldn't make it to the movie tonight. _____
3. Dad keeps poisonous cleaning supplies locked up in the shed so no one can accidentally get into them and get sick. _____
4. He drove dangerously through the neighborhood, taking his time and slowing down when he saw people walking or riding bikes. _____
5. The principal appreciatively presented the teacher with her award, thanking her for her hard work and dedication. _____
6. I had a painful gash on my knee from falling on the playground that throbbed and ached. _____
7. At the craft store, she bought supplies to make a decorative frame to hang on a wall that needed some decoration. _____

8. His fearless attitude prevented him from trying new things since he was scared of almost everything. _____
9. We drove through the mountainous area and could see nothing but flat farmland all around. _____
10. Workers used the powerful crane to lift the steel beams high up to the top of the building to put them in. _____

Write a sentence for each word like the previous ones that you can answer with yes.

1. *creative*

2. *furiously*

3. *fearful*

NAME: _____

DATE: _____

12.1

Activity Page

The Space Shuttle

If a statement is true, write “true” on the line. If a statement is false, write “false” on the line.

1. A space shuttle only carries astronauts into space. _____
page _____
2. Booster rockets help space shuttles get off the ground and overcome Earth’s gravity to get into space. _____
page _____
3. The last space shuttle mission took place in July 2011. _____
page _____

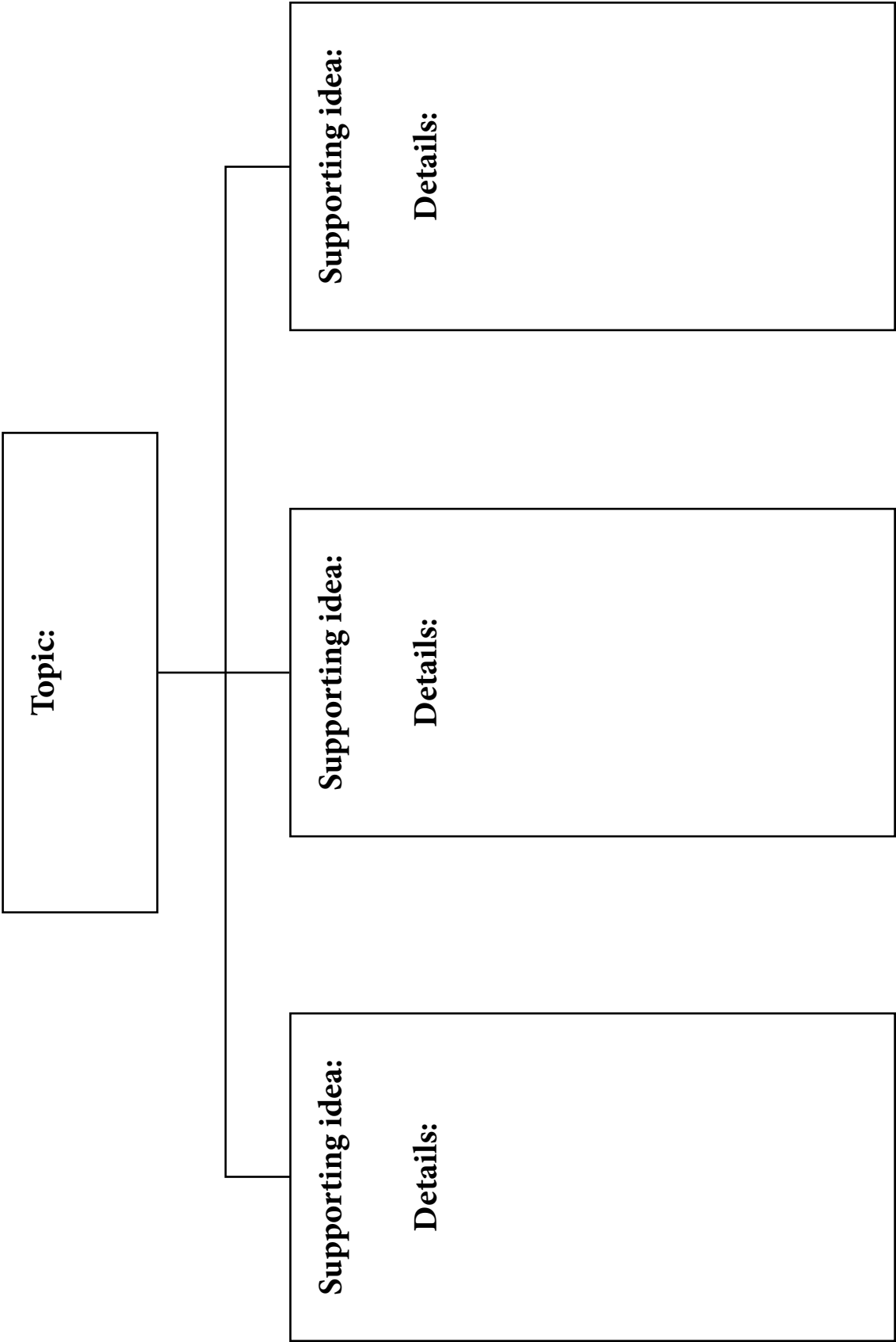
Answer the following questions on the lines provided.

4. How is a space shuttle different from the Apollo 11 spacecraft?

page(s) _____

Informative Writing Plan

Text Structure: Descriptive or Chronological (Time)



NAME: _____

DATE: _____

13.1

Activity Page

Third Grade Writing Rubric: Informative/Explanatory Writing

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

- Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.
- Develop the topic with facts, definitions, and details.
- Use linking words and phrases (e.g., also, another, and, more, but) to connect ideas within categories of information.
- Provide a concluding statement or section.

	Advanced	Proficient	Basic
Ideas	The writing - examines a topic - develops the topic with a combination of relevant facts, accurate definitions, and concrete and specific details - makes connections between ideas - demonstrates awareness of audience and purpose	The writing - examines a topic - develops the topic with facts, definitions, and details	The writing does not do one or more of the following: - examine a topic - develop the topic with facts, definitions, and details
Organization	The writing - introduces a topic clearly and in an engaging fashion - groups related information together and explains connections between groups - includes illustrations that explain the ideas	The writing - introduces a topic - groups related information together - includes illustrations when useful - provides a concluding statement or section	The writing does not do one or more of the following: - introduce a topic - include illustrations when useful - provide a concluding statement or section

	Advanced	Proficient	Basic
	provides a concluding statement that connects the topic to a big question or the purpose for writing		
Conventions	The writing - uses linking words and phrases to connect ideas within categories of information - uses language to add subtlety through connotative meanings	The writing uses linking words and phrases to connect ideas within categories of information.	The writing does not use linking words and phrases to connect ideas within categories of information.

NAME: _____

DATE: _____

13.2

Activity Page

Singular Possessive Nouns

Rewrite each sentence, changing the group of words in parentheses to a singular possessive noun.

Example: (The light of the sun) is warm on my face.

The sun's light is warm on my face.

1. (The friend of my aunt) came to visit us.

2. (The car belonging to my friend) was hit by a truck.

3. (The phone call from his teacher) made his mother very happy.

4. (The cage belonging to the hamster) needed to be cleaned.

Write the singular possessive noun and what belongs to each singular possessive noun on the appropriate blanks.

Example: The boy's picture was hung in the front hall.

Singular Possessive Noun: boy's

What belongs to him/her/it? picture

1. Hank's skateboard is purple.

Singular Possessive Noun:

What belongs to him/her/it?

2. The giant's footsteps in the hall were thunderous.

Singular Possessive Noun:

What belongs to him/her/it?

3. The horse's mane blew in the wind as he ran around the track.

Singular Possessive Noun:

What belongs to him/her/it?

4. The artist's portrait was so realistic that I thought it would speak to me.

Singular Possessive Noun:

What belongs to him/her/it?

NAME: _____

DATE: _____

14.1

Activity Page

Spelling Assessment

As your teacher calls out the words, write them under the correct header.

/n/

/ae/

/s/

/k/

/j/

Challenge Word: _____

Challenge Word: _____

Content Word: _____

Dictated Sentences

1.
2.

NAME: _____

DATE: _____

14.2

Activity Page

Revision Checklist

Ask yourself these questions as you reread your writing and write yes or no. Then use these questions to help you revise.

1.	Do I have a good introduction?	
2.	Are there any parts that do not make sense?	
3.	Can I add descriptive words or details to help the reader picture what is happening?	
4.	Do my sentences flow well in this order?	
5.	Can I combine any of my sentences?	
6.	Do I have a good variety of sentence structures?	
7.	Do I use at least three clue words? (also, but, first, next, finally, for example, etc.)	
8.	Do I have a good conclusion?	
9.	Is this my best work?	

NAME: _____

DATE: _____

14.3

Activity Page

Read the story below and answer the questions.

Stargirl

“Wow!” said Billy Jones. “What an awesome ride!”

“Oh, no!” said Mrs. Jones. “I think I’m going to be sick!”

The Jones family had just come off The Gorgon, the new roller coaster in Mega Adventure Land.

Billy had enjoyed the ride. His mom had not. She felt dizzy and sick to her stomach.

“Are you really going to be sick, Mom?” Billy asked. He had never seen his mom get sick.

Meanwhile, Billy’s sister Jen was tapping away on her pocket calculator.

“I calculate that the g-force on that last plunge was about 3.5 g’s!” she said. “That’s three times the force of gravity on the surface of Earth! That’s roughly what the astronauts in the space shuttle experience during re-entry!”

Billy rolled his eyes. It was just like Jen to take an awesome ride and turn it into a science lesson.

Jen was nuts about science and especially about astronomy. She had read every astronomy book in the school library. She could tell you about the atmosphere of Venus, the rings of Saturn, and the Great Red Spot on Jupiter. She knew why Pluto was no longer counted as a planet. She knew everything about Apollo 11 and the moon landings. She had a big photograph of the first moon landing on her bedroom door. Below the photo, Jen had written, “One small

step for man, one giant leap for mankind.” Jen’s hero was Dr. Mae Jemison, a female astronaut, who went up in the space shuttle.

Jen already knew more about astronomy than either of her parents. Mr. and Mrs. Jones wanted to help her learn more, but they were not quite sure how to do it. That’s why Mr. Jones was so happy when he spotted the flyer.

“Beth!” he called out, as he came in. “Look at this!”

It was a blue flyer. Mr. Jones had found it at the bagel shop. It said, “Astronomy Camp!”

Mr. and Mrs. Jones studied the flyer. The camp would be held during the summer, on the campus of a college a few hours away. The flyer said the camp was for kids 12 to 17 years old.

“It’s perfect!” said Mr. Jones.

Mrs. Jones did not reply. A funny look came over her face.

“What?” asked Mr. Jones. He had seen that look before. “What’s the matter?”

“Jen is only twelve,” said Mrs. Jones.

“So?” said Mr. Jones. “It says right here the camp is for ages 12 to 17.”

“She’ll be the youngest one there!” said Mrs. Jones. “Plus, she’s never been away from home before! She might get scared.”

“Oh, nonsense!” said Mr. Jones. “She’ll be fine! This is right up her alley. She’s going to love it!”

NAME: _____

DATE: _____

14.3
CONTINUED

Activity Page

Six weeks later, Mr. and Mrs. Jones loaded up the car and drove Jen to astronomy camp. Although Mr. Jones was happy for Jen to go to astronomy camp, he had started to feel nervous about being away from his daughter for so long.

The camp director gave a welcome speech. It was a speech designed to make worried parents worry less. The speech made Mr. Jones feel better, but he was still worrying when he hugged Jen good-bye.

“Call me tonight!” he said. “Promise you will!”

“I will,” said Jen. “I promise.”

It was a long ride home. Mr. Jones missed Jen already. Every so often, he would call out, “My baby girl!”

By the time they got home, the sun had set, although if Jen had been there, she would have pointed out that the sun does not really rise and set. Earth rotates on its axis, and that’s what gives us days and nights.

Mrs. Jones parked the car and opened the door for her husband. Inside, she got him a glass of water and sat next to him on the couch.

“Why hasn’t she called?” Mr. Jones said, tearfully. Just then, the phone rang.

Mr. Jones grabbed the phone. “Are you okay?” he sobbed.

Jen did not hear her dad sobbing. She was too busy describing her first day at camp.

“It was so fun!” she said. “First we learned about comets. Did you know that Halley’s Comet is visible from Earth every 76 years? It will come around again in 2061. Then, we learned about galaxies and solar systems. Did you know that

there are millions of galaxies in the universe? Our professor, Dr. Phillips, is so cool! He told us that there are probably lots of solar systems out there that are a lot like our galaxy. That means they have a hot star at the center, like our sun, and some planets orbiting around . . .”

“Is she okay?” asked Mrs. Jones.

Mr. Jones nodded. Then, he held out the phone.

From the earpiece, Jen’s voice, overflowing with joy and excitement, drifted out into the air: “After lunch, we learned about the Hubble Space Telescope. It’s a telescope that floats up in space. . .”

Mr. and Mrs. Jones felt a tremendous sense of relief. They knew that their daughter was safe and happy—and getting smarter every day.

NAME: _____

DATE: _____

14.3
CONTINUED

Activity Page

1. Turn the dependent clause below into a complete sentence.

When the story begins, _____

2. List five things Jen knew about astronomy:

3. Why was it like Jen to take an awesome ride and turn it into a science lesson?

4. Arrange the events from the selection in order from one to five.
- _____ Jen called to tell her family about the first day of astronomy camp.
- _____ Jen's dad saw a flyer for astronomy camp and thought Jen would like it.
- _____ Jen calculated the g-force on the last plunge of the roller coaster ride.
- _____ Jen's dad called out, "My baby girl!" every so often.
- _____ Jen's family took her to astronomy camp.
5. Which of the following was not something Jen learned about during her first day at astronomy camp?
- A. The Hubble Space Telescope
 - B. The Big Bang
 - C. Galaxies
 - D. Halley's Comet

NAME: _____

DATE: _____

14.4

Activity Page

Fluency Assessment

The Hoba Meteorite

A meteorite is a rock from outer space. There are lots of rocks floating 14
around in space. If one of these rocks gets close to Earth, it will be attracted 30
by Earth's gravity. It will begin to move closer to Earth. As the rock gets 45
closer, Earth will exert a stronger and stronger gravitational pull on it. The 58
rock will start moving faster and faster. It will also heat up. Eventually, it 72
will turn into a special kind of fireball known as a meteor. 84

Many meteors burn up before they reach Earth. A few make it all the 98
way to our planet and smack into the ground. If a meteor reaches Earth, 113
we say it is a meteorite. 118

Someday you may see a meteor in the night sky. They are hard to see 133
during the day, but at night it is much easier. Some people refer to meteors 148
as "shooting stars." That's not quite the right term. Meteors are more like 161
rocks than stars. But they do look like falling stars when they come zipping 175
through the night sky. 179

More than 35,000 meteorites have been found on Earth. Some of 190
these are tiny pebbles. Others are large boulders. The Hoba meteorite 201
is the largest meteorite ever discovered on Earth. It weighs more than 213
60 tons. 215

The Hoba meteorite is in the African country of Namibia. It has 227
never been moved to a museum. It is still lying where it fell. That's mainly 242
because of its size. It would be very difficult to move. 253

The Hoba meteorite was discovered in 1920. A farmer was plowing 264
his fields with an ox. He heard a metallic scratching noise. Then, his plow 278
stopped suddenly. The farmer tried to dig around the rock and discovered 290
that it was huge. A scientist came to look at it. He concluded that it was 306
a meteorite. 308

Scientists think the Hoba meteorite fell to Earth about 80,000 years ago. 320
It is about 84% iron and 16% nickel. Thousands of tourists come to see it 335
each year. 337

NAME: _____

DATE: _____

14.4
CONTINUED

Activity Page

W.C.P.M. Calculation Worksheet

Student: _____

Date: _____

Story: *The Hoba Meteorite*

Total words: 337

Words

		Words Read in One Minute
—		Uncorrected Mistakes in One Minute
		W.C.P.M

Oral Reading Fluency Norms for Grade 3 from Hasbrouck and Tindal (2017)			
Percentile	Fall W.C.P.M.	Winter W.C.P.M.	Spring W.C.P.M.
90	134	161	166
75	104	137	139
50	83	97	112
25	59	79	91
10	40	62	63

Comprehension Questions Correct: ____ / 4	
Answers Correct	Level
4	Independent comprehension level
3	Instructional comprehension level
1-2	Frustration comprehension level
0	Intensive remediation warranted for this student

NAME: _____

DATE: _____

14.5

Activity Page

Plural Possessive Nouns

Rewrite each sentence, changing the group of words in parentheses to include a plural possessive noun.

Example: (The statues belonging to the sculptors) are very lifelike.

The sculptors' statues are very lifelike.

1. (The neighbors of my cousins) came to visit us.

2. (The bicycles belonging to my friends) are all brand new.

3. (The cards from well-wishers) made my brother feel very loved.

4. (The leashes belonging to my cats) should be replaced.

Write the plural possessive noun and what belongs to each plural possessive noun on the appropriate blanks.

Example: The boys' pictures were taped to the refrigerator.

Plural Possessive Noun: boys'

What belongs to them? pictures

1. The painters' spots to paint are near the ocean.

Plural Possessive Noun:

What belongs to them?

2. The magicians' tricks fooled all of us.

Plural Possessive Noun:

What belongs to them?

3. The kittens' ears all twitch when I open a can of cat food.

Plural Possessive Noun:

What belongs to them?

4. The plumbers' tools are shiny and new.

Plural Possessive Noun:

What belongs to them?

NAME: _____

DATE: _____

15.1

Activity Page

Read-Aloud: Mae Jemison

Complete the questions below while listening to the read-aloud.

1. Describe Jemison's mission as an astronaut.
2. Why is Mae Jemison famous?
3. NASA considers many applications for the astronaut program. What kinds of characteristics and skills do you think made Jemison a good candidate for NASA?

NAME: _____

DATE: _____

15.2

Activity Page

Dr. Mae Jemison

1. The events of Mae Jemison's life listed below are in the wrong order. Use the numbers 1–7 to put them in the right order.

_____ Joins the Peace Corps and goes to Africa

_____ Graduates from high school at the age of 16

_____ Becomes the first Black female astronaut to go into space

_____ Attends Stanford University

_____ Is one of 15 people chosen out of 2,000 applicants to be an astronaut

_____ Goes to medical school

_____ Retires from NASA and becomes a professor

NAME: _____

DATE: _____

16.1

Activity Page

Writing Project Reflection

Think about your experience taking notes, planning, writing, revising, and editing your informative piece on the day in the life of an astronaut. Write a response for each of the categories below:

Write three things you learned about an astronaut's life in space.

1.

2.

3.

Write two ways you improved your first draft about the day in the life of an astronaut.

1.

2.

What was the hardest part of the writing project for you? Why was it difficult and what did you learn from doing it?

Acknowledgements

We are grateful to the many contributors to CKLA over the years, including:

AmplifyCKLA

Amplify staff and contributors, who have worked on this edition of CKLA as well as prior editions of CKLA. This product reflects their expertise, passion, and dedication.



The Core Knowledge Foundation, which developed the first edition of CKLA over many years. This includes Core Knowledge Foundation staff as well as countless contributors, educators, and students who field-tested CKLA and provided invaluable feedback in its development.



Educators across the country who have provided essential feedback on previous editions of CKLA, helping us to make the program better for teachers and students.

Credits

Every effort has been taken to trace and acknowledge copyrights. The editors tender their apologies for any accidental infringement where copyright has proved untraceable. They would be pleased to insert the appropriate acknowledgment in any subsequent edition of this publication. Trademarks and trade names are shown in this publication for illustrative purposes only and are the property of their respective owners. The references to trademarks and trade names given herein do not affect their validity.

All photographs are used under license from Shutterstock, Inc. unless otherwise noted.

Illustrators and Image Sources

Cover: Amplify Staff, burashudaki/Shutterstock, Gregory H. Revera, NASA, Kjell Lindgren; 1.1: Shutterstock; Acknowledgements: Amplify Staff

Regarding the Shutterstock items listed above, please note: "No person or entity shall falsely represent, expressly or by way of reasonable implication, that the content herein was created by that person or entity, or any person other than the copyright holder(s) of that content."