

Expository
Text

Stargazing

by
Rachel Hayward

Mc
Graw
Hill

PAIRED
READ

Orion the Hunter

STRATEGIES & SKILLS

Comprehension

Strategy: Ask and Answer
Questions

Skill: Cause and Effect

Vocabulary Strategy

Paragraph Clues

Vocabulary

astronomers, crescent, phases,
rotates, series, sliver, specific,
telescope

Content Standards

Science

Earth and Space Science

Word Count: 1,127**

Photography Credit: John Carleton/Flickr/Getty Images (tl) Brand X Pictures/PunchStock

**The total word count is based on words in the running text and headings only. Numerals and words in captions, labels, diagrams, charts, and sidebars are not included.



Essential Question

How do you explain what you see in the sky?

Stargazing

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Chapter 1


Ancient Views of the Skies

For thousands of years, people have looked up at the stars. They made maps of the stars and told stories about what they saw in the sky.

The Lascaux (*la-SOH*) caves in France have cave paintings. They were painted during the Stone Age. Some scientists think the paintings are maps of the stars.

Scientists think these animals actually represent patterns of stars





The Milky Way looks like a cloudy band of stars.

People from ancient times also told stories to explain what they saw. The Shoshone tell a story about how the stars of the Milky Way came to be in the sky.

Once, a bear climbed a snowy mountain. Ice stuck to his fur. The bear reached the top of the mountain. He leaped out into the sky. The bear ran through the sky, and ice fell off his fur. The ice became the stars of the Milky Way.

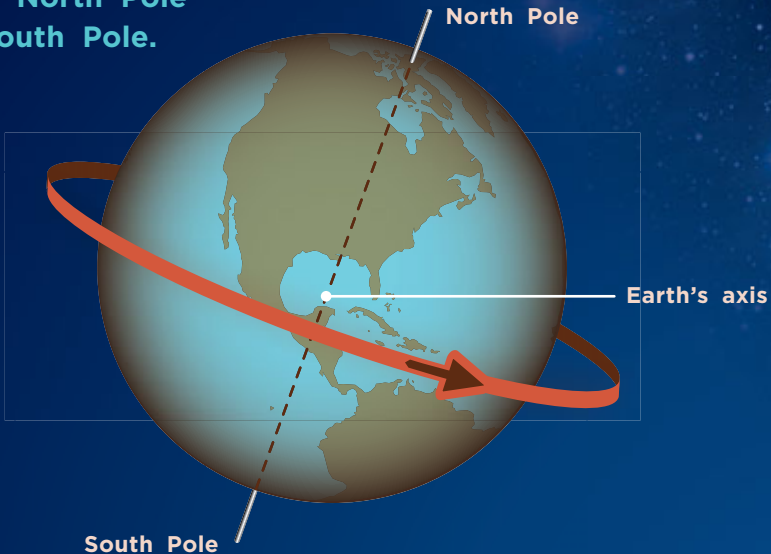
Earth on the Move

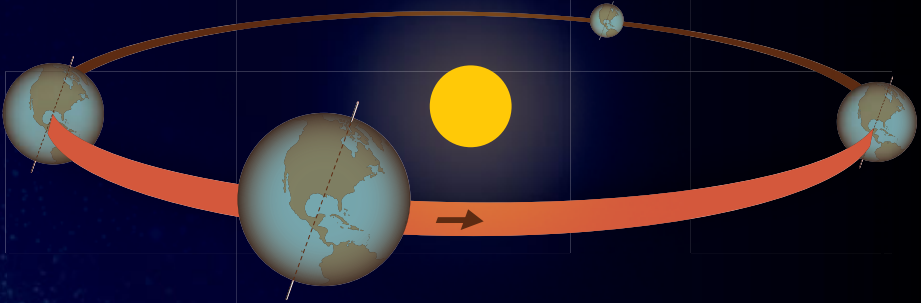
Some ancient people thought that a roof covered Earth. They thought that the stars were light shining through holes in the roof.

Later, astronomers thought that the sun and stars moved around Earth. But they were wrong. It is Earth that moves.

Imagine that Earth is a basketball. Then imagine that you could push a thin pole through the center of the ball. That pole is just like Earth's **axis**. The North Pole is at the top of Earth's axis. The South Pole is at the bottom.

Earth's axis runs from the North Pole to the South Pole.





Earth orbits the sun.

Earth rotates, or turns, around its axis. It makes one turn each day (24 hours).

Earth also **orbits** the sun. It takes one year (365 days) for Earth to travel around the sun.

Imagine you spin the Earth basketball on your fingertip. Now imagine that the basketball hoop is the sun. Walk around the basketball hoop with the Earth basketball spinning on your fingertip. Each lap you make is one year.

STOP AND CHECK

How did people in ancient times explain the stars?

Chapter 2

Sky Maps and Calendars

Ancient people didn't understand how Earth moved, but they knew how to use the stars to navigate.

A Guiding Star

On land, people used landmarks such as mountains and rivers to find their way. On the ocean, sailors used the series of things they saw in the sky, as well as maps, to navigate.

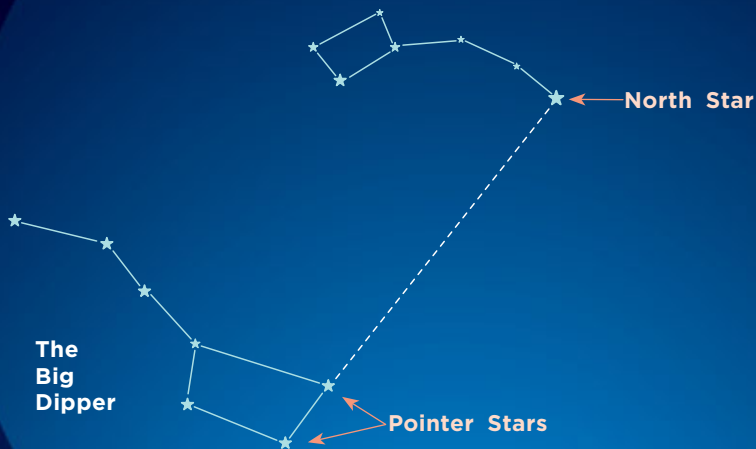
The rising and setting sun showed east and west. The **position** of the stars helped sailors find their way at night. They found one star that doesn't seem to move. It is the North Star, or polestar.



Sailors used maps
and the stars to
navigate at night.

The North Star sits almost right above Earth's northern axis. This is why it doesn't seem to move. Earth's axis doesn't move. Earth rotates around its axis.

For thousands of years, people used the North Star to find the direction of north. Sailors have used it to guide them across oceans.



Finding the North Star

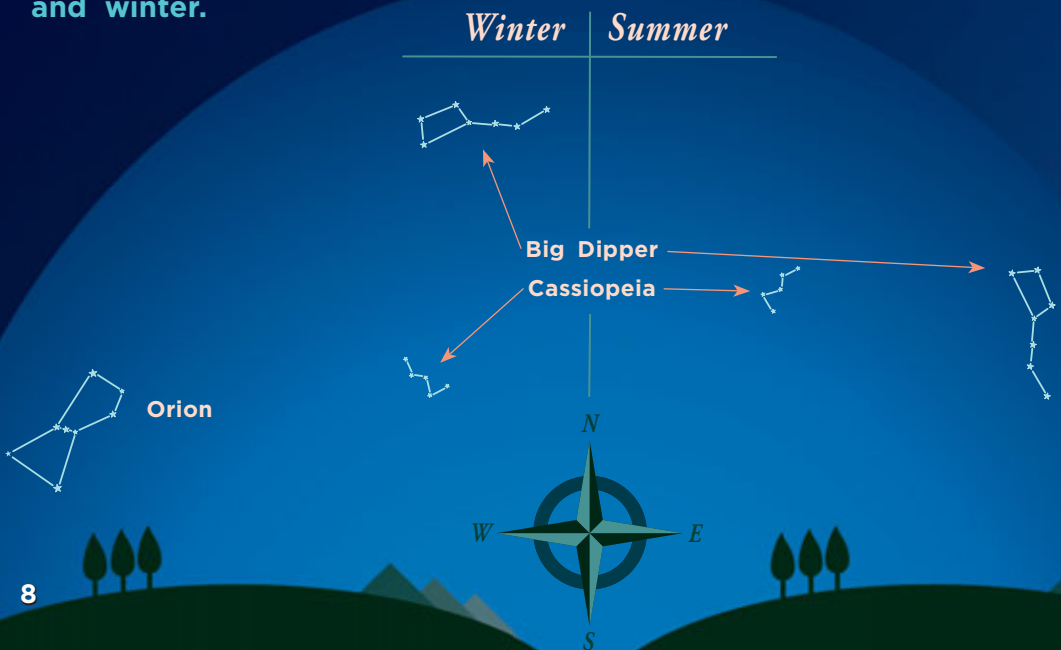
The Pointer Stars can help you find the North Star. They are part of the Big Dipper. The Pointer Stars sit at the end of the ladle. Draw an imaginary line in the sky to connect. Then continue the line and you will find the North Star.


The Passage of Time

People noticed that specific stars appear in the sky at the same time each year. This is because we see a different part of the sky as Earth moves.

Over time, people made star charts to show the position of the stars in the sky throughout the year. They also grouped the stars into **constellations**. It is easier to look for a constellation than a single star.

Constellations appear in different parts of the sky in summer and winter.





The Pleiades is a cluster of bright stars.

When certain stars appeared, some cultures knew it was a sign that it was time to plant or harvest their crops. There is a group of stars called Pleiades. The people in Hawaii knew that it was time to harvest their crops when Pleiades appeared.

People also used the moon to mark the passage of time. The moon takes almost a month to orbit Earth. As it moves, the moon seems to change shape. At first, it is a tiny sliver, then a bigger crescent, and then a round, full Moon. Then the cycle begins all over again. This is called the phases of the moon.

STOP AND CHECK

How did ancient people use the stars?

Chapter 3

Tools for Studying Space

People wanted to learn more about the stars and space. They invented tools to help them learn. These inventions helped people learn about the **universe**.

The First Telescope

One of the best tools for looking at the stars is the telescope. A scientist named Galileo used a telescope to study the moon, stars, and planets in the 1600s.

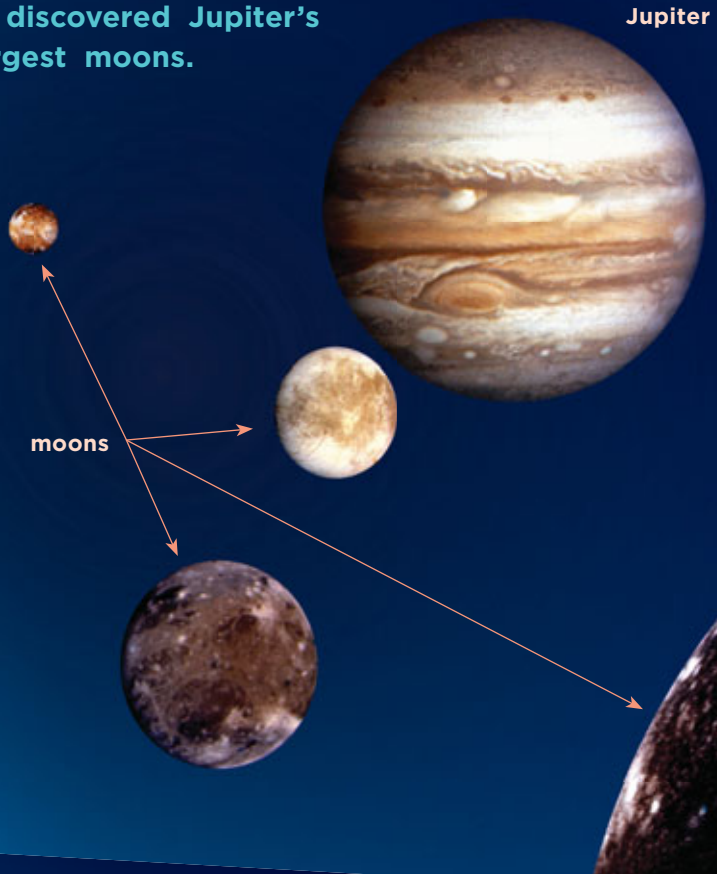
Galileo didn't invent the telescope, but he improved the way it worked. He built a telescope in 1609 that allowed him to see things that no one had seen before.

This telescope is like the one that Galileo used.



Galileo learned that the moon has mountains and valleys. He learned that the Milky Way is made up of lots of stars. He saw four moons orbiting the planet Jupiter.

Galileo discovered Jupiter's four largest moons.



Most importantly, Galileo proved that Earth orbits the sun. Galileo helped people understand more about Earth.

Modern Telescopes

The telescope is still a useful tool for studying space. Today's telescopes are much more powerful than Galileo's telescope.

The Hubble Space Telescope floats high above Earth. This gives us a much clearer view of the stars because we are not looking through Earth's atmosphere.

The atmosphere is the layer of gases around Earth. It is full of dust. It is harder to see the stars and planets through the atmosphere.



The Hubble Space Telescope orbits Earth.

The Hubble telescope sends pictures to astronomers on Earth. The pictures from the Hubble telescope have helped astronomers figure out the age of the universe. They now believe that the universe is about 13 to 14 billion years old.

This is an image of Saturn taken from the Hubble Space Telescope.



NASA Space Telescope Science Institute (STScI)

The Hubble Space Telescope

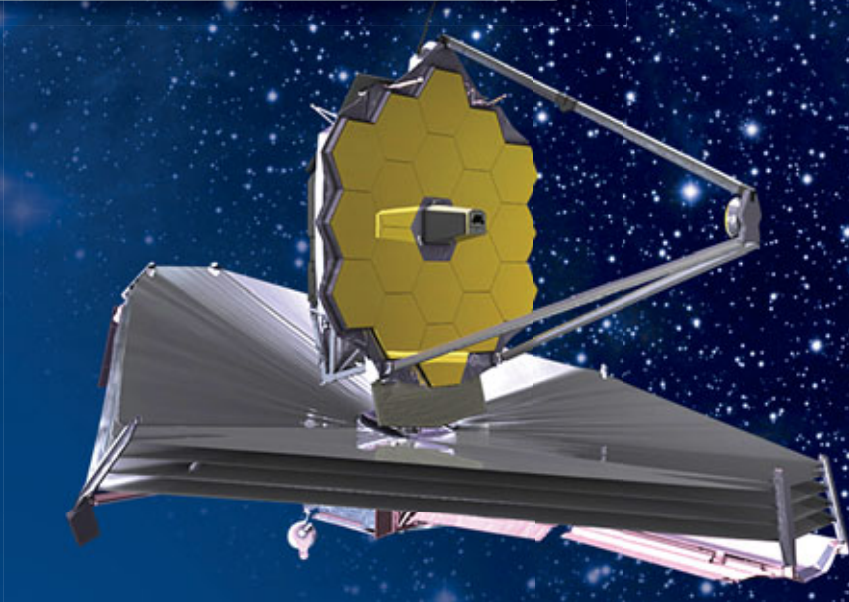
The Hubble telescope is almost 44 feet long and about 14 feet across at its widest point. It moves at about 5 miles per second. It orbits Earth once every 97 minutes.

There are plans for a new, bigger telescope called the James Webb Space Telescope. Scientists will be able to use this telescope to see even farther into space.

There are still many things to discover about our universe. We still stare up at the stars and wonder, just like the people who lived thousands of years ago.

STOP AND CHECK

What inventions have helped people learn more about the night sky?



The James Webb Space Telescope will be much more powerful than the Hubble.

Respond to Reading

Summarize

Summarize what you have learned about people and the night sky in *Stargazing*. Use your graphic organizer to help.

Cause → Effect
→
→
→
→

Text Evidence

1. What text features do you find in *Stargazing*? How do they help you understand the text better? **GENRE**
2. Why do some groups of stars only appear at certain times of the year? **CAUSE AND EFFECT**
3. What does *navigate* on page 6 mean? Use clues in the paragraph to figure out the meaning. **PARAGRAPH CLUES**
4. Write about how Galileo's improvements to the telescope helped people learn about the universe. Use details from the text in your answer. **WRITE ABOUT READING**

Compare Texts

Read about how the constellation Orion was created.

ORION THE HUNTER

There was once a big, strong man named Orion. Orion was a good hunter. He hunted with a sword and a club. Orion's two hunting dogs went with Orion everywhere.

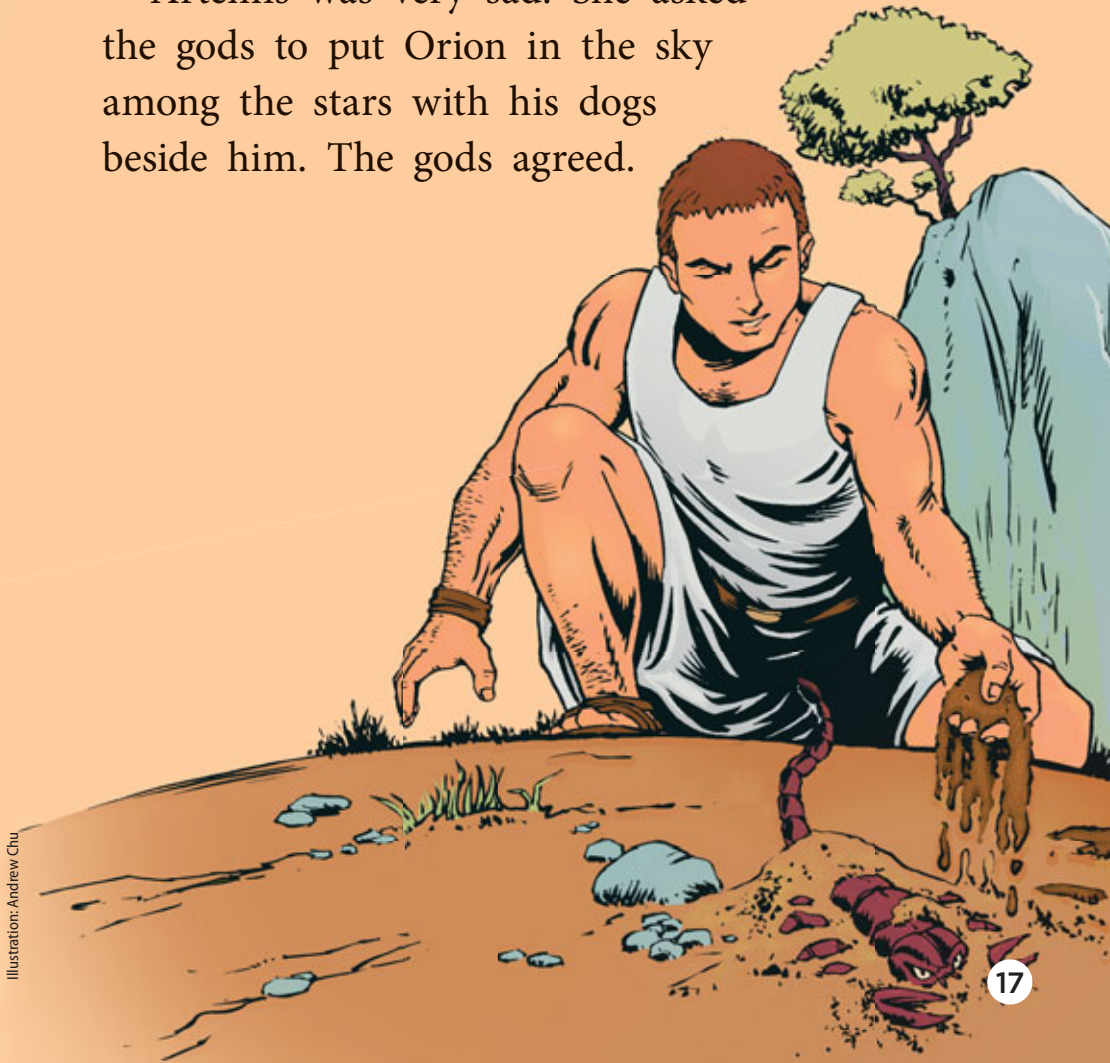
One day, Orion met another great hunter named Artemis. Artemis was tall and strong. She hunted with a bow and arrow. Artemis and Orion became good friends.

Artemis had a brother named Apollo. Apollo was Artemis's best friend. He became jealous of Orion.

Apollo decided to get rid of Orion. Apollo found a scorpion. He hid it in the sand.

Soon Orion came looking for Artemis. He stood on the scorpion. The scorpion stung Orion on the heel. Orion fell to the ground and died.

Artemis was very sad. She asked the gods to put Orion in the sky among the stars with his dogs beside him. The gods agreed.



Today you can see Orion in the night sky. He has a belt of three bright stars. You can also see the scorpion's stars.

The scorpion and Orion are never in the same part of the sky. Orion's stars disappear when the scorpion's stars rise. Orion has learned to watch out for the scorpion's sting!

Illustration: Andrew Chu



Make Connections

Why did Artemis ask the gods to place Orion in the sky? **ESSENTIAL QUESTION**

Compare the Shoshone explanation of the Milky Way in *Stargazing* with the myth *Orion the Hunter*. Why did people tell stories like these?

TEXT TO TEXT

Glossary

axis (*AK-suhs*) a straight line that an object revolves around (**page 4**)

constellation (*kahn-stuh-LAY-shuhn*) a group of stars that form patterns (**page 8**)

orbits (*AWR-bits*) moves in a circular path in space (**page 5**)

position (*puh-ZI-shuhn*) the area where an object is placed or found (**page 6**)

universe (*YEW-nuh-vuhrs*) everything that is in existence, from everything on and including Earth to all the planets, suns, and moons in space (**page 10**)

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Focus on Science

Purpose To describe what you see in the night sky

Procedure

Step 1

Research constellations using the library or the Internet. Select a constellation that is easy to see in the night sky.

.....

Step 2

Make a labeled diagram of the constellation. Label the things you see in the constellation.

.....

Step 3

Make up a story about how the constellation formed. Use what you know about myths and legends to help you.

.....

Step 4

Share your story and your diagram with the class.

Conclusion How did making your diagram connect to what you read in *Stargazing*?

Literature Circles

Nonfiction

Thinkmark

The Topic

What is *Stargazing* mostly about?

Text Structure

How does the author organize information in *Stargazing*?

Vocabulary

What are the key words in *Stargazing*?

How did you figure out what they mean?

Conclusions

What conclusions can you draw about what you see in the night sky?

Make Connections

What connections can you make between *Stargazing* and other things you know about space research?