

On Level



SCIENCE • GRADE 3

California Content Standards
Earth Sciences: 4.A
Earth Sciences: 4.B
Earth Sciences: 4.C
Earth Sciences: 4.D
Earth Sciences: 4.E

The Earth in Space

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The Earth in Space

California's Science Content Standards Met

GRADE 3 SCIENCE

EARTH SCIENCES: 4—Objects in the sky move in regular and predictable patterns. As a basis for understanding this concept:

- a. Students know the patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.
- b. Students know the way in which the Moon's appearance changes during the four-week lunar cycle.
- c. Students know telescopes magnify the appearance of some distant objects in the sky, including the Moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than the number that can be seen by the unaided eye.
- d. Students know that Earth is one of several planets that orbit the Sun and that the Moon orbits Earth.
- e. Students know the position of the Sun in the sky changes during the course of the day and from season to season.

GRADE 3 ENGLISH LANGUAGE ARTS

1.0 WORD ANALYSIS, FLUENCY, AND SYSTEMATIC VOCABULARY DEVELOPMENT

Vocabulary and Concept Development 1.4—Use knowledge of antonyms, synonyms, homophones, and homographs to determine the meanings of words.

Vocabulary and Concept Development 1.6—Use sentence and word context to find the meaning of unknown words.

2.0 READING COMPREHENSION

Comprehension and Analysis of Grade-Level-Appropriate Text 2.3—Demonstrate comprehension by identifying answers in the text.

Comprehension and Analysis of Grade-Level-Appropriate Text 2.6—Extract appropriate and significant information from the text, including problems and solutions.

On Level



SCIENCE • GRADE 3

California Content Standards

Earth Sciences: 4.A

Earth Sciences: 4.B

Earth Sciences: 4.C

Earth Sciences: 4.D

Earth Sciences: 4.E

Student Book

The Earth in Space

Print pages 5 – 18 of this PDF for the student book.

How to Make the Student Book

- The student book is contained on pages 5–18 of this PDF. It begins on the next page.
- To make one student book, or a two-sided master copy that can be photocopied, you will print on both sides of seven sheets of 8.5" x 11" paper.
- Do a test printout of one book first to familiarize yourself with the procedure.
- Follow these instructions carefully.

First—Select the Paper

Since you will be printing on both sides of the sheets of paper, select a good quality white paper. We recommend using at least a 22lb sheet.

Second—Check Printer Settings

Be sure you have the correct page setup settings for your computer and printer. You will print these pages in landscape format.

Third—Print EVEN Pages

Open the PDF of the book you want to print. Select print from your file menu. In your printer's dialogue box enter pages 5–18 to print. Then select EVEN pages only. It is important to print only the EVEN pages first. Click "Print" to print the even pages. (**Important note:** The first page that prints will be blank. DO NOT discard this page. It will be needed to print the cover in the next step.)

Forth—Print ODD Pages

When the even pages have printed, flip the stack of pages over to print the odd pages. Place the stack back in your printer. Select print from the file menu again. In your printer's dialogue box, select ODD pages. Click "Print" to print the odd the pages.

Fifth—Fold the Book

You now have a complete book. Check to be sure the pages are in the correct order with the book's cover as the top page. Then fold the stack of paper in half.

Sixth—Staple the Book

Use an extended-length stapler to staple the pages together. Place three staples in the spine of the book.

Please note that printers vary in how they output pages. Do a test printing with one book and adjust the procedure as necessary.

If you want to make a one-sided master copy, print ALL pages 5–18 at once. Then select "one-sided to two-sided" on the copy machine.

The Earth in Space
**California's Science
Content Standards Met**

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GRADE 3 SCIENCE

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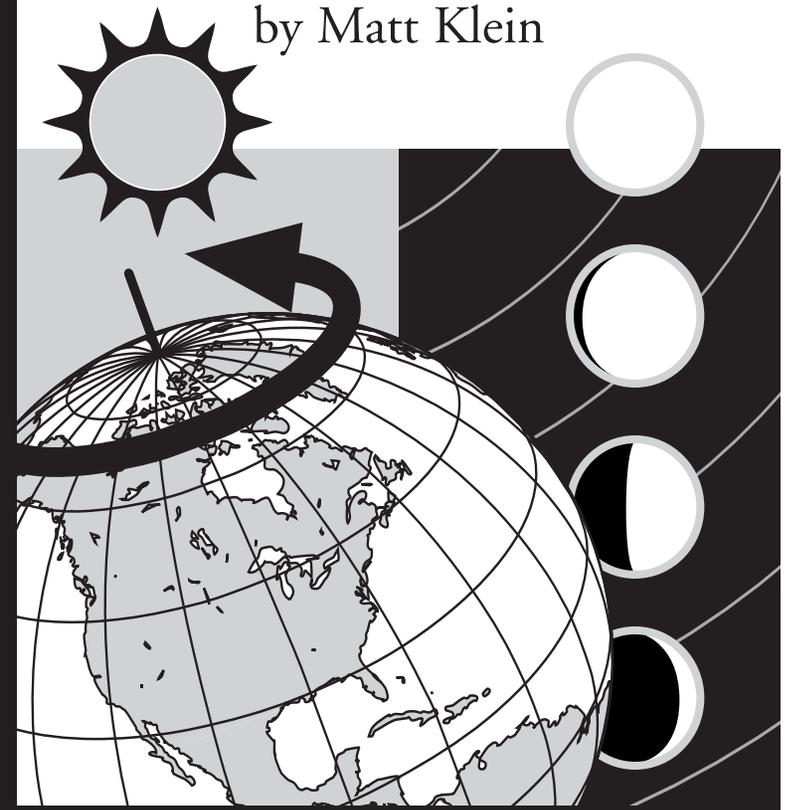
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California Content Standards

Earth Sciences: 4.A, 4.B, 4.C, 4.D, 4.E

The Earth in Space

by Matt Klein





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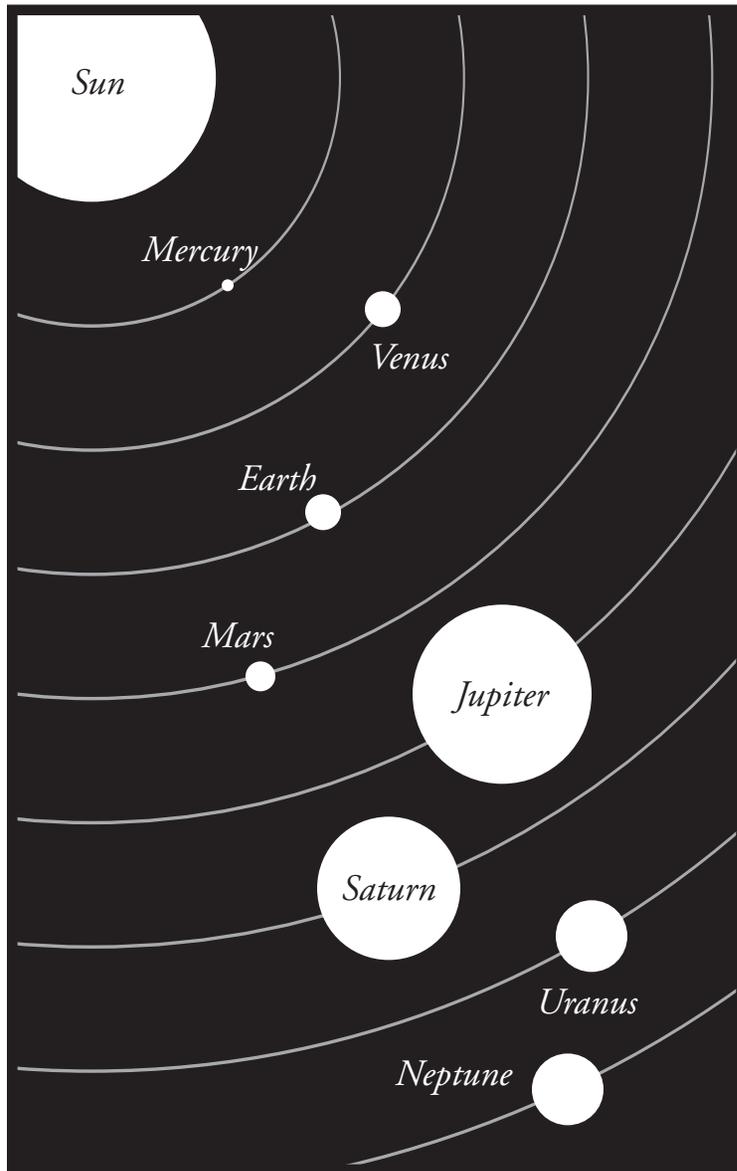
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*What do you think you will
learn from this book?*

The Solar System



INTRODUCTION

The Solar System

The solar system consists of the sun, eight planets, moons, comets, asteroids, and other objects found in space. The sun is at the center of the solar system and is the largest object in it. Everything else in the solar system **orbits** around the sun. Most of the solar system is empty space. The space between the planets' orbits is very large.

The orbits of the planets around the sun are not quite circular. They are **elliptical**. An elliptical orbit looks like a circle that has been stretched out at the ends, like the outline of an egg.

Astronomers think the solar system formed over four billion years ago when gases and other material came together to form the sun and planets.

orbits: circling a planet or sun
elliptical: having the form of a regular oval shape

The Sun

The sun is at the center of the solar system. It is about 93 million miles away from Earth. The sun is a hot ball of gas. Even though the sun is so far away, it provides Earth with light and heat.

The sun can be thought of as having many different layers. The heat and energy from the sun begins in the center, or core. The energy created in the core then moves outward to the other layers.

It takes millions of years for this energy to move from the core to the layer just under the surface. Once energy reaches this layer the process speeds up, allowing light and heat to reach Earth.

The Stars

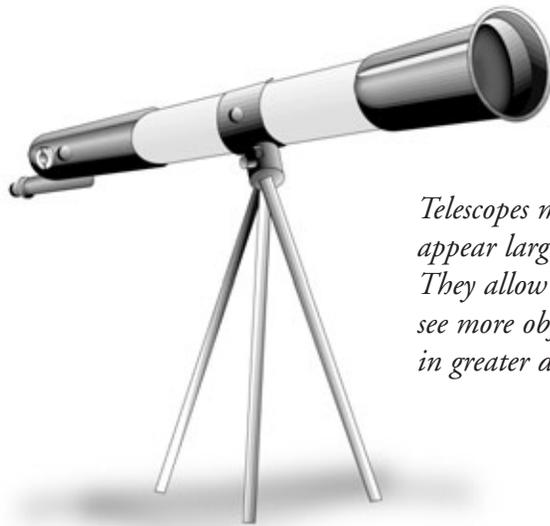
A star is a mass of hot, glowing material giving off heat and light. The sun is a star. It is the closest star to Earth. The sun is a medium-sized star. Some stars are bigger than the sun, and some are smaller.

In the sky at night, you will see thousands of stars. If you were able to get far enough away, the sun would look like one of those twinkling dots of light.

Every individual star is unique, however they also share many of the same characteristics. All stars are born from gases in space, they produce energy in the form of light and heat, and they all eventually die.

What are three characteristics that all stars share?

Astronomers study stars with telescopes. Telescopes are instruments that make objects seem larger and closer. They also allow scientists (and you, too) to see many more stars in space.



Telescopes make objects appear larger and closer. They allow scientists to see more objects in space in greater detail.

If you look in the night sky over time, it appears that the stars move. However, the patterns of stars you see actually stay the same. It is not the stars that are moving. It is Earth that is moving. Read on to learn how Earth's rotation and orbit affect what we see in the sky.

CHAPTER 1

Earth

Earth is one of the eight planets that orbit the sun. It is the third planet from the sun. The two planets closer to the sun are Mercury and Venus. Mars is just beyond Earth.

The four planets that are closest to the sun are called **terrestrial** planets because they have some solid surfaces. Earth is the largest terrestrial planet, and the only planet in the solar system capable of supporting life.

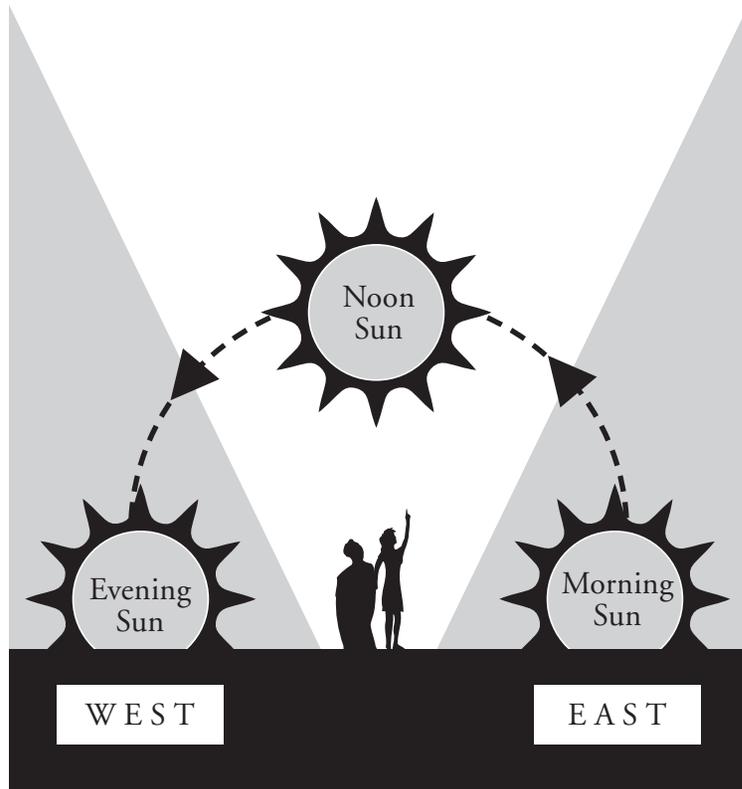
Three-fourths of the surface of Earth is covered by water, either in liquid form or ice. A thin blanket of gas surrounds the entire planet. We call this layer of gas the **atmosphere**. The atmosphere has several layers and extends upwards about 250 miles.

Describe the Earth's position in the solar system.

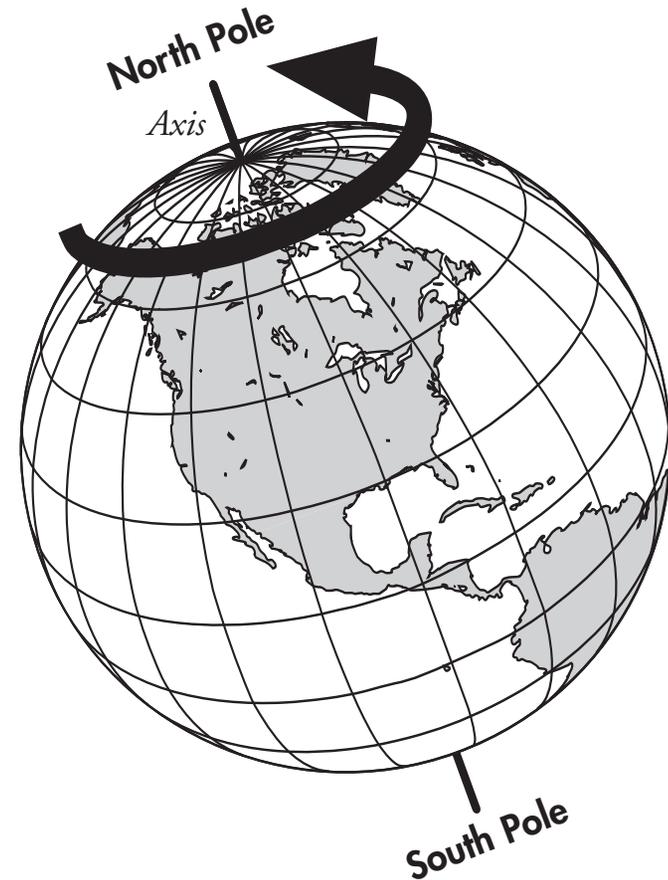
terrestrial: made up of rocks and land
atmosphere: the gases that surround Earth

Earth's Rotation

Everyday, if you look up in the sky, the sun appears to rise in the east in the morning. It is above you at midday, and it sets in the west in the evening.



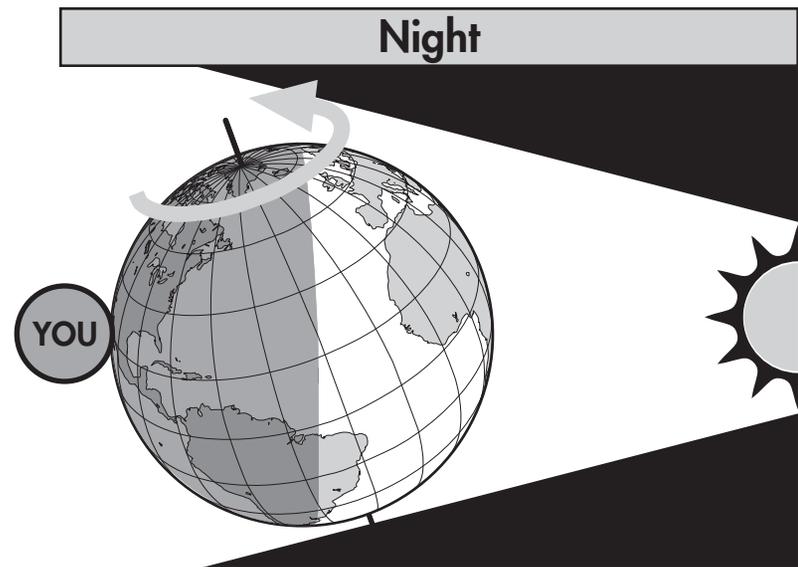
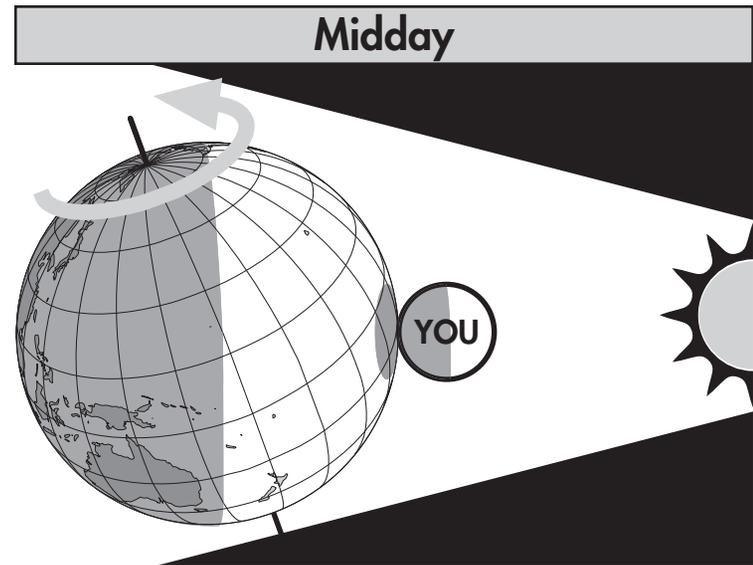
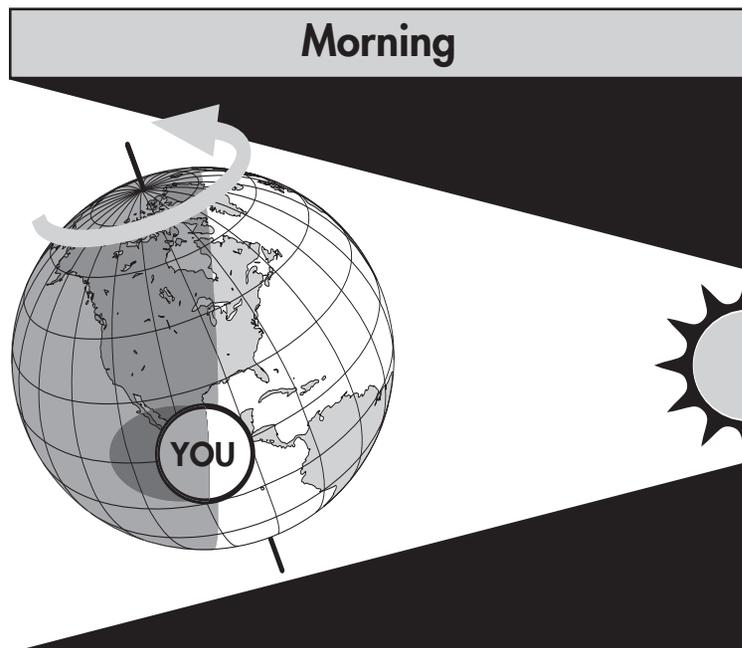
However, the sun is not moving at all. The spinning of Earth makes the sun appear to move. Earth spins counterclockwise around its **axis**. Earth's axis is an imaginary line that runs through its center.



axis: a real or imaginary line about which something turns

Day and Night

The spinning of Earth around its axis is what causes day and night. As the spinning Earth turns us towards the sun, it becomes morning. At noon, we face the sun. It appears directly over our heads. When the spinning Earth turns us away from the sun, it becomes night.



Explain how the position of the Sun in the sky changes during the course of the day.

Earth's Seasons

Earth spins around its axis once a day. As it spins, it also orbits the sun. It takes Earth one year to orbit the sun.

You cannot feel the Earth moving as it orbits the sun. However, you know it is happening because you can watch the seasons change. Each year, Earth experiences spring, summer, fall, and winter.

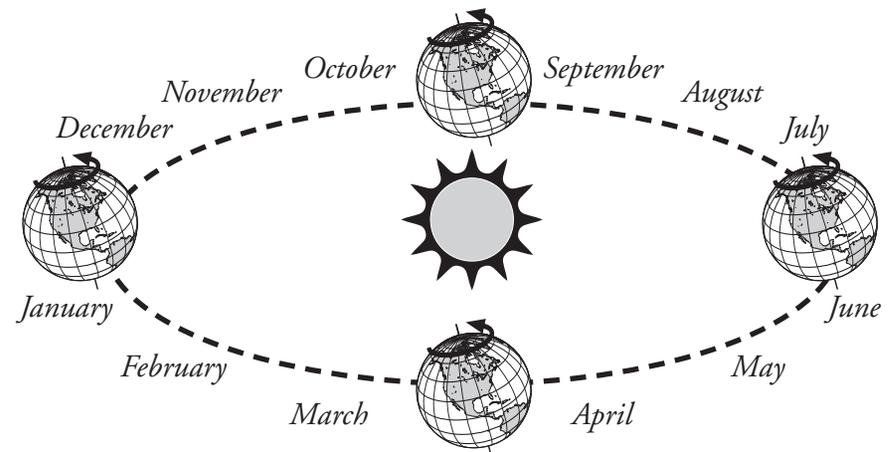
Seasons occur because the Earth's axis is tilted. Earth's axis runs from the North Pole to the South Pole. But Earth's axis is not **perpendicular** to its orbit. It is tilted a little—about 23 degrees. This tilt causes the four seasons.

When you are at a place on Earth that tilts toward the sun, the days get longer and it gets warmer. When you are at a place that tilts away from the sun, the days get shorter and it gets colder.

perpendicular: straight up and down; at right angles to a given line

Spring

When Earth moves in its orbit to a position where the North Pole begins to tilt towards the sun, spring begins in the Northern Hemisphere. This happens on March 21. At the same time, the South Pole begins to tilt away from the sun. Fall begins in the Southern Hemisphere. Fall is also known as autumn.



Explain why Earth experiences equal amounts of day and night on March 21st.

Summer

When the Earth moves along its orbit and the North Pole points toward the sun, summer begins in the Northern Hemisphere. This happens on June 21st. The sun shines directly on the Northern Hemisphere. Now, the South Pole points away from the sun. Winter begins in the Southern Hemisphere.

Fall

Autumn begins in the Northern Hemisphere on September 21. On this day, Earth moves in its orbit to a position where the North Pole begins to tilt away from the sun. Days become shorter and temperatures begin to drop. Spring begins in the Southern Hemisphere.

Winter

On December 21, Earth moves in its orbit to a position where the North Pole tilts away from the sun. Temperatures in the Northern Hemisphere are the coldest of the year. Now, it's summer in the Southern Hemisphere.

Explain how the position of the Sun in the sky changes from season to season.

CHAPTER 2

The Moon

The moon is another object in the solar system. While Earth is orbiting the sun, the moon is orbiting Earth. The moon is about one-fourth the size of Earth. It can be seen at night because it reflects the light from the sun.

When we see the sun is shining on the entire moon, it can look to us like a big plate. At other times, we can see the sun shining on only a thin section of the moon. Then it can look like a sliver. The changing views of the moon are known as **phases**.

phases: stages in a series of changes

Phases of the Moon

The moon goes through phases every 29 days, or about 4 weeks. That is the amount of time it takes the moon to circle Earth.

New Moon—The moon is between Earth and the sun, so no sunlight can be seen reflecting off the moon during this phase.

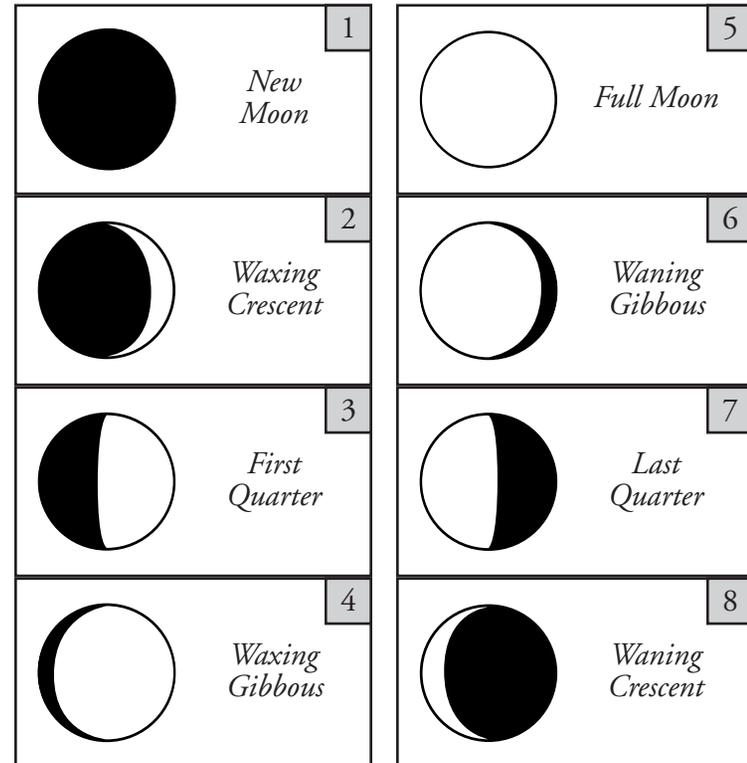
Crescent Moon—*Crescent* means “curved shape,” and that is what the moon looks like during this phase.

Quarter Moon—The moon looks like half of a circle during this phase.

Gibbous Moon—A gibbous moon is almost, but not quite, a full circle.

Full Moon—When the moon is full it looks like a complete circle.

Phases of the Moon

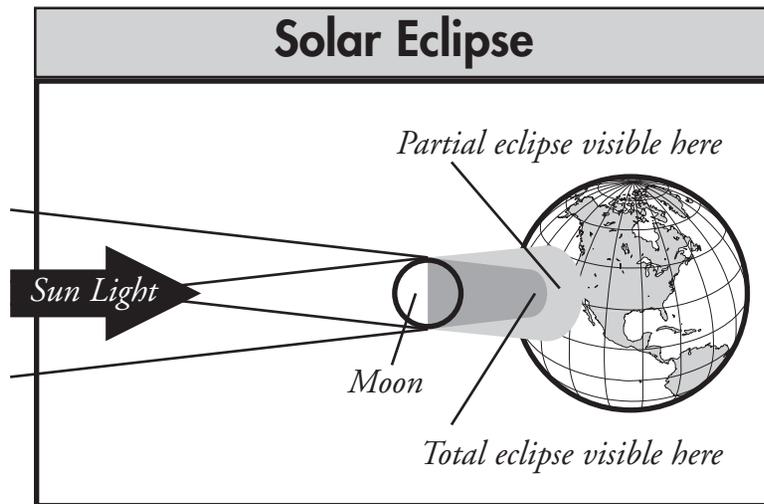


After the moon reaches the full phase, the phases continue in reverse order. The moon enters its gibbous phase, then the quarter moon phase, next comes the crescent phase, and finally the new moon phase where the cycle begins again.

Explain the way in which the moon's appearance changes during the four-week cycle.

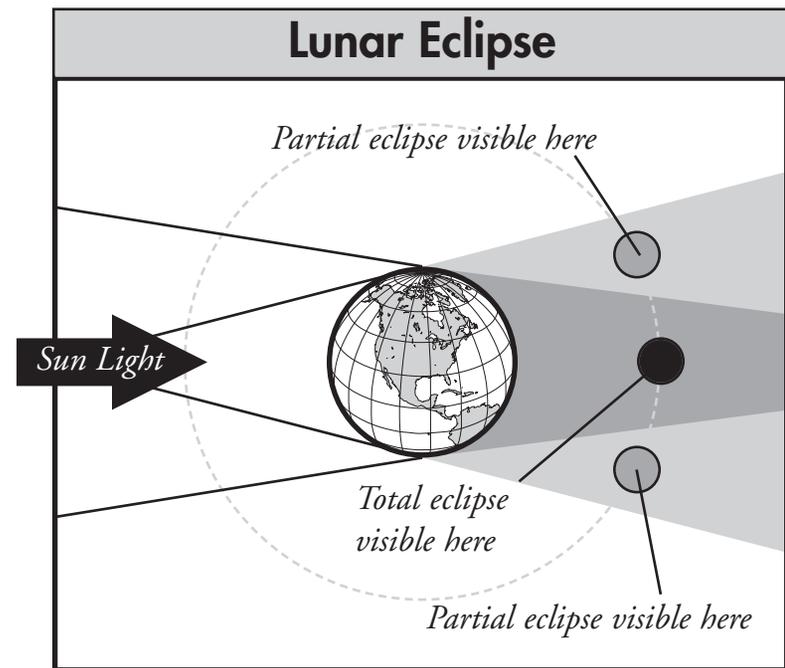
Eclipses

An eclipse occurs when the sun's light is **obscured**. There are two different types of eclipses, solar eclipses and lunar eclipses. During a solar eclipse the moon obscures the sun's light.



obscured: kept from being seen

During a lunar eclipse, Earth blocks the sun's light from reflecting off the moon. When the moon enters Earth's shadow it appears to be going through its phases until it is a new moon, where it can't be seen at all. As the moon continues in its orbit around Earth, it becomes visible again.



Glossary

atmosphere—the gases that surround Earth

axis—a real or imaginary line about which something turns

elliptical—having the form of a regular oval shape

obscured—kept from being seen

orbits—circling a planet or sun

perpendicular—straight up and down; at right angles to a given line

phases—stages in a series of changes

terrestrial—made up of rocks and land

To Find Out More . . .

Want to learn more about Earth and space?

Try these books

Earth: Our Planet in Space by Seymour Simon. Simon & Schuster, 2003.

Space Exploration (DK Eyewitness Books). Dorling Kindersly, 2004.

Space (Insiders) by Alan Dyer. Simon & Schuster, 2007.

Earth (Watts Library: Space) by Donna Walsh Shepherd. Franklin Watts, 2003.

Earth's Outer Atmosphere: Bordering Space (Earth's Spheres) by Gregory Vogt. Twenty-First Century Books, 2006.

Access these Web sites

NASA Kid's Club

<http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html>

NASA, For Kid's Only, Earth Science Enterprise

<http://kids.earth.nasa.gov/>

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ENGLISH-LANGUAGE ARTS • GRADE 3

California Content Standards
Vocabulary and Concept Development: 1.4
Vocabulary and Concept Development: 1.6
Comprehension and Analysis of Grade-Level-Appropriate Text: 2.3
Comprehension and Analysis of Grade-Level-Appropriate Text: 2.6

English-language Arts Activities

The Earth in Space

Print pages 20–24 of this PDF for the reading activities.

Antonyms

TRY THE SKILL

An antonym is a word that has the opposite meaning of another word. Some examples of antonyms are:

left and *right*

inside and *outside*

large and *small*

Read these sentences. Look for antonyms.

Earth's axis is an imaginary line that runs through its center. While the axis runs from the North Pole to the South Pole it is not straight up and down, it is tilted a little over 23 degrees.

***Up* and *down* are antonyms. Here is another sample. Look for the antonyms.**

Three-fourths of the surface of Earth is covered by water, either in liquid form or solid form as ice.

***Liquid* and *solid* are antonyms.**

1. Read the passage from *The Earth in Space* and circle the antonyms.

As the spinning Earth turns us towards the sun, it becomes morning. At noon, we face the sun. It appears directly over our heads. When the spinning Earth turns us away from the sun, it becomes night.

2. Read the passage from *The Earth in Space* and circle the antonyms.

Everyday, if you look up in the sky, the sun appears to rise in the east in the morning. It is above you at midday, and it sets in the west in the evening.

3. Read the passage from *The Earth in Space* and circle the antonyms.

The sun is a star. It is the closest star to Earth. The sun is a medium-sized star. Some stars are bigger than the sun, and some are smaller.

In the sky at night, you will see thousands of stars. If you were able to get far enough away, the sun would look like one of those twinkling dots of light.

Context Clues

TRY THE SKILL

The definition of a word can often be determined from the words that surround it in either the same sentence or surrounding sentences. These words are called context clues. Context clues can help you learn new words.

Read these sentences from *The Earth in Space* and look for context clues that explain the word *elliptical*.

An elliptical orbit looks like a circle that has been stretched out at the ends, like the outline of an egg.

Is this a good definition?

Elliptical means the same as circular.

No! This statement defines *elliptical* as a circular shape. Is this a good definition?

Elliptical means the same as oval.

Yes! *Elliptical* means the same as oval shaped.

Read the sentences. Answer the question by shading the letter next to the correct answer.

1. During the crescent phase the sun is only shining on a section of the moon, it looks like a thin sliver. What words help define the word *crescent*?
 (A) shining on
 (B) during the
 (C) thin sliver
2. An eclipse occurs when the sun's light is obscured. During a lunar eclipse, Earth blocks the sun's light from reflecting off the moon. What does the word *obscured* mean?
 (A) occurs
 (B) block
 (C) reflecting

Make Inferences

TRY THE SKILL

To make an inference, you think about what you have read and what you already know. Then you reach a decision. To practice, read this passage:

The four planets that are closest to the sun are called terrestrial planets because they have some solid surfaces. Earth is the largest terrestrial planet and the only planet capable of supporting life.

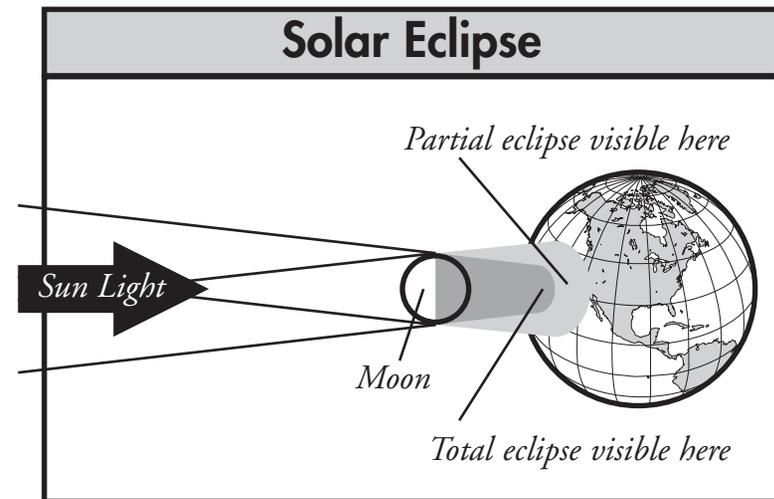
What inferences can you make?

You read in this book that eight planets orbit our sun. If four are called terrestrial because they have some solid surfaces, you can infer that the other four planets have no solid surfaces.

Also, you might know that many people think we have nine planets, including Pluto. This book mentions that the eight planets orbit our sun, so you can infer that there is something unusual about Pluto's orbit. In fact, its orbit is different from that of the other planets in several ways. That's one reason why many scientists no longer consider Pluto to be a planet.

Study this diagram of a solar eclipse. Then use what you already knew, what you read in this book, and the diagram to make an inference and answer this question:

1. What causes the end of a solar eclipse?



Summarize Main Ideas

TRY THE SKILL

Summarizing means retelling what you have read. Summaries are often shorter than the text you read. Summarizing helps you understand what you read.

Read this passage from *The Earth in Space* and try summarizing it.

Everyday, if you look up in the sky, the sun appears to rise in the east in the morning. It is above you at midday, and it sets in the west in the evening.

However, the sun is not moving at all. The spinning of Earth makes the sun appear to move. Earth spins counterclockwise around its axis. Earth's axis is an imaginary line that runs through its center.

Is this a good summary?

The sun rises in the east and sets in the west.

No! This statement is too specific and does not summarize the main idea. How about the one below.

Is it a good summary?

The spinning of the Earth makes the sun appear to move.

Yes! This is a good summary of the paragraph.

Read each paragraph. Circle the letter of the best summary.

1. After the moon reaches its full phase, the phases continue in reverse order. The moon enters its gibbous phase, then the quarter moon phase, next comes the crescent phase, and finally the new moon phase where the cycle begins again.
 - Ⓐ The quarter moon phase comes after the gibbous phase.
 - Ⓑ After the full phase the phases continue in reverse order.
 - Ⓒ The new phase is the final phase.
2. Earth's axis is an imaginary line that runs through its center. While the axis runs from the North Pole to the South Pole it is not straight up and down, it is tilted a little over 23 degrees. This tilt is responsible for the four seasons.
 - Ⓐ Earth's axis is an imaginary line.
 - Ⓑ Earth's axis runs from the North Pole to the South Pole.
 - Ⓒ Earth's axis is tilted a little over 23 degrees and is responsible for the seasons.

Answer Key

Antonyms

1. *towards* and *away*
morning and *night*
2. *rise* and *set*
east and *west*
3. *closest* and *far*
bigger and *smaller*

Context Clues

1. C
2. B

Make Inferences

1. A solar eclipse starts when the moon moves between Earth and the sun, blocking the sun's rays. This eclipse ends as the moon continues in its orbit around Earth and no longer blocks the sun's rays.

Summarize Main Ideas

1. B
2. C