Study Guide



- Complete student edition
- Section and chapter self-assessments
- Assessment reports for teachers

Help Students Read Building Vocabulary

Word-Part Analysis Remind students that they can use what they know about word parts to figure out the meanings of words. Use the words *rotation* and *revolution* as examples. Tell students that *-ion* means "the act of" or "the result of an act." Explain that rota comes from a Latin word meaning "wheel" and that *revolvere* comes from another Latin word meaning "to turn over" or "to roll back."

Vocabulary Knowledge Rating Chart

Have students make a four-column chart with the headings Term, Can Define/Use It, Heard/Seen It, and Don't Know. Have them put vocabulary terms in the first column and then rate their knowledge of each term by putting a checkmark in one of the other columns. Have students create another chart after they have completed the chapter review.

Connecting Concepts

Concept Maps Help students develop one way to show how the information in this chapter is related. The movements and relative positions of Earth, the moon, and the sun cause Earth to experience day and night, years, seasons, moon phases, eclipses, and tides. Have students brainstorm to identify the key concepts, key terms, details, and examples, and then write each one on a sticky note and attach it at random on chart paper or on the board.

Tell students that this concept map will be organized in hierarchical order and to begin at the top with the key concepts. Ask students these questions to guide them to categorize the information on the sticky notes: How does Earth move? What phenomena are caused by the movement of Earth, the moon, and the sun? What are features on the moon?

Chapter **Study Guide**

1 Earth in Space

Key Concepts

- Earth moves through space in two major ways: rotation and revolution.
- Earth has seasons because its axis is tilted as it revolves around the sun.

Key Terms

orbit

solstice

rotation

astronomy

axis revolution calendar equinox



2 Gravity and Motion **Key Concepts**

- The strength of the force of gravity between two objects depends on two factors: the masses of the objects and the distance between them.
- Newton concluded that two factors—inertia and gravity-combine to keep Earth in orbit around the sun and the moon in orbit around Earth.

Key Terms

force gravitv law of universal gravitation mass weight inertia Newton's first law of motion **3** Phases, Eclipses, and Tides

Key Concepts

- The changing relative positions of the moon, Earth, and sun cause the phases of the moon, eclipses, and tides.
- The phase of the moon you see depends on how much of the sunlit side of the moon faces Earth.
- When the moon's shadow hits Earth or Earth's shadow hits the moon, an eclipse occurs.
- A solar eclipse occurs when the moon passes directly between Earth and the sun, blocking sunlight from Earth.
- During a lunar eclipse, Earth blocks sunlight from reaching the moon.
- Tides are caused mainly by differences in how much the moon's gravity pulls on different parts of Earth.

Key Terms

phases solar eclipse penumbra tide neap tide

eclipse umbra lunar eclipse spring tide

4 Earth's Moon

Key Concepts

- Features on the moon's surface include maria, craters, and highlands.
- The moon is dry and airless. Compared to Earth, the moon is small and has large variations in its surface temperature.
- Scientists theorize that a planet-sized object collided with Earth to form the moon.

Key Terms

telescope maria craters meteoroids



Prompt students by using connecting words or phrases, such as "are caused by" and "formed when," to indicate the basis for the organization of the map. The phrases should form a sentence between or among a set of concepts.

Answer Accept logical presentations by students.

All in One Teaching Resources

- Key Terms Review: Earth, Moon, and Sun
- •Connecting Concepts: Earth, Moon, and Sun

Review and Assessment







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For: Self-Assessment Visit: PHSchool.com

Reviewing Key Terms

Choose the letter of the best answer.

- **1.** The movement of Earth around the sun once a year is called Earth's
 - **a.** inertia. **b.** rotation.
 - **c.** revolution. **d.** axis.
- A day when the sun reaches its greatest distance north or south of the equator is called a(an)
 a. umbra.

 - **b.** penumbra.
 - **c.** equinox. **d.** solstice.
- 3. The tendency of an object to resist a change in motion is calleda. gravity.
 - **b.** inertia.
 - **c.** force.
 - d the law of universal
 - **d**. the law of universal gravitation.
- **4.** When Earth's shadow falls on the moon, the shadow causes a
 - **a.** new moon.
 - **b.** solar eclipse.
 - **c.** full moon.
 - **d.** lunar eclipse.
- 5. The craters on the moon were caused by
- a. tides.
- **c.** meteoroids. **d.** maria.

If the statement is true, write *true*. If it is false, change the underlined word or words to make the statement true.

- 6. Earth's spinning on its axis is called rotation.
- **7.** The force that attracts all objects toward each other is called <u>inertia</u>.
- **8.** The tilt of Earth's axis as Earth revolves around the sun causes <u>eclipses</u>.
- 9. The amount of matter in an object is its weight.
- **10.** The greatest difference between low and high tides occurs during a <u>neap</u> tide.

Writing in Science

News Report Imagine that you are a reporter asked to write a story about the origin of the moon. Write an article explaining how the moon formed.



Go Inline

For: Self-Assessment Visit: PHSchool.com Web Code: cfa-5010

b. volcanoes.

Students can take an online practice test that is automatically scored.

All in One Teaching Resources

- Transparency J14
- Chapter Test
- Performance Assessment Teacher Notes
- Performance Assessment Teacher Worksheet
- Performance Assessment Scoring Rubric



ExamView[®] Computer Test Bank CD-ROM

Review and Assessment

Organizing Information

- **a.** rotates
- **b.** around the sun
- **c.** night and day

Reviewing Key Terms

- **1.** c **2.** d **3.** b **4.** d **5.** c
- **6.** true
- **7.** gravity
- 8. seasons
- **9.** mass
- 10. spring

Writing in Science

Writing Skill Description

Scoring Rubric

4 Exceeds criteria by including a vivid, detailed description of how the moon formed

- **3** Meets all criteria, but description is uninteresting
- **2** Includes only a brief description
- **1** Is incomplete and inaccurate



Earth, Moon, and Sun

Show the Video Assessment to review chapter content and as a prompt for the writing assignment. Discussion question: **Currently, what is the most probable or likely theory that explains the origin of Earth's moon?** (*Early in its history, Earth was struck by a planet-sized object. This produced a ring of debris around Earth that eventually coalesced to form the moon.*)

Checking Concepts

11. Earth takes 24 hours to rotate once; each 24-hour cycle is called a day. Earth takes about 365 days, or one year, to complete one orbit around the sun.

12. The force of gravity between them would decrease.

13. An object at rest will not move, and an object in motion will keep moving at the same speed and in the same direction, unless acted on by a net force.

14. Phases are caused by changes in the relative positions of the moon, Earth, and the sun.

15. A total lunar eclipse can be seen any place on Earth where the moon is visible. During a total solar eclipse, the moon's umbra reaches only a small part of Earth's surface, and only people within the umbra can see the total eclipse.

16. Closest to the moon, the moon's gravitational pull on water at Earth's surface is stronger than its pull on Earth as a whole, and water flows toward that point. Farthest from the moon, the moon pulls more strongly on Earth as a whole than on water at Earth's surface, creating a high tide at that point as well.

17. Spring tide; the sun, moon, and Earth are aligned in a straight line.

18. By using a telescope, Galileo was able to determine that the moon was not the perfect sphere envisioned by the Greeks. Rather, it had an irregular surface with a variety of features such as craters, maria, and highlands.

19. The moon does not have an atmosphere; atmospheric gases help trap heat from the sun and moderate temperature variations.

20. Scientists theorize that a planet-sized object collided with Earth. Material from the collision was ejected into orbit around Earth, where it formed a ring. Gravity caused this material to eventually combine into the moon.

Review and Assessment

Checking Concepts

- **11.** Explain how the length of the day and year are related to Earth's movement through space.
- **12.** Suppose you moved two objects farther apart. How would this affect the force of gravity between those objects?
- **13.** Explain Newton's first law of motion in your own words.
- 14. Why does the moon have phases?
- **15.** Why do more people see a total lunar eclipse than a total solar eclipse?
- **16.** Why is there a high tide on the side of Earth closest to the moon? On the side of Earth farthest from the moon?
- **17.** Does the diagram below show a spring tide or a neap tide? How do you know?



- **18.** How did the invention of the telescope contribute to our knowledge of the moon's surface?
- **19.** Why do temperatures vary so much on the moon?
- **20.** Explain how scientists think the moon originated.

Thinking Critically

- **21.** Inferring Mars's axis is tilted at about the same angle as Earth's axis. Do you think Mars has seasons? Explain your answer.
- **22.** Comparing and Contrasting How are mass and weight different?
- **23.** Calculating Suppose a person weighs 450 newtons (about 100 pounds) on Earth. How much would she weigh on the moon?

- **24. Applying Concepts** At about what time does the full moon rise? Is it visible in the eastern sky or the western sky?
- **25. Posing Questions** Suppose you were assigned to design a spacesuit for astronauts to wear on the moon. What characteristics of the moon would be important to consider in your design?

Applying Skills

Use the illustration below to answer Questions 26–28.



- **26.** Interpreting Diagrams On which hemisphere are the sun's rays falling most directly?
- **27. Inferring** In the Northern Hemisphere, is it the summer solstice, winter solstice, or one of the equinoxes? How do you know?
- **28. Predicting** Six months after this illustration, Earth will have revolved halfway around the sun. Draw a diagram that shows which end of Earth's axis will be tilted toward the sun.



Performance Assessment Present your observation log, map, and drawings of the moon. Some ways to graph your data include time of moonrise for each date; how often you saw the moon in each direction; or how often you saw the moon at a specific time. Display your graphs. Discuss any patterns that you discovered.

Chapter Project

Performance Assessment Emphasize these patterns: 1) In the course of a day, the moon's position changes from the eastern sky, through the southern sky, to the western sky; 2) Moonrise gets progressively later throughout the cycle; 3) The moon will be seen mostly in the southern half of the sky; 4) The lit portion of the moon starts on the right side and waxes until full; as it

wanes, the right side progressively becomes dark; the moon's location in the sky at sunset is more toward the east each day.

Encourage students to write about the easiest and hardest parts of the project. What would they do differently if they observed the moon for another month? What surprised them about their observations?

Standardized Test Prep

Test-Taking Tip

Interpreting a Diagram

When answering questions about diagrams, examine the diagram carefully, including labels. For example, the numbers on the diagram shown above Question 5 indicate the locations of the moon in its orbit around Earth. Study the diagram and answer the sample question below.

Sample Question

When the moon is in location 3, a person standing on Earth at night would see

- A a full moon.
- B a crescent moon.
- C a quarter moon.
- D a new moon.

Answer

The correct answer is **A**. The diagram shows that when the moon is at location 3, Earth is between the moon and the sun. Therefore, the sun lights the entire side of the moon facing Earth.

Choose the letter of the best answer.

- 1. You observe a thin crescent moon in the western sky during the early evening. About two weeks later, a full moon is visible in the eastern sky during the early evening. Which conclusion is best supported by these observations?
 - A The moon revolves around Earth.
 - **B** The moon rotates on its axis.
 - **C** Earth revolves around the sun.
 - **D** Earth's axis is tilted relative to the moon.
- **2.** Only one side of the moon is visible from Earth because
 - **F** the moon does not rotate on its axis.
 - **G** the moon does not revolve around Earth.
 - **H** the moon rotates faster than it revolves.
- J the moon revolves once and rotates once in the same period of time.

- **3.** What type of eclipse occurs when Earth's umbra covers the moon?
 - **A** a partial solar eclipse
 - **B** a total solar eclipse
 - **C** a partial lunar eclipse
 - **D** a total lunar eclipse
- 4. The force of gravity depends on
 - F mass and weight.
 - **G** speed and distance.
 - H mass and distance.
 - J weight and speed.

The diagram below shows the relative positions of the sun, moon, and Earth. The numbers indicate specific locations of the moon in its orbit. Use the diagram to answer Questions 5 and 6.



- **5.** Which of the following can occur when the moon is at location 1?
 - A only a lunar eclipse
 - **B** only a solar eclipse
 - **C** both a solar and a lunar eclipse
 - **D** neither a solar nor a lunar eclipse
- **6.** When the moon is at location 2, at most coastal locations there would be
 - **F** only one high tide each day.
 - **G** only one low tide each day.
 - **H** two high tides and two low tides each day, with the most difference between high and low tide.
 - J two high tides and two low tides each day, with the least difference between high and low tide.

Constructed Response

7. The sun rises on the east coast of the United States before it rises on the west coast of the United States. Explain why this happens.

Thinking Critically

21. Yes; Mars has seasons because its north and south pole are pointed toward or away from the sun at different times during its revolution.

22. Mass is the amount of matter in an object. Weight is the force of gravity on an object.

23. The person would weigh one-sixth of her weight on Earth, or about 75 newtons (17 pounds).

24. The full moon rises at sunset because it has to be opposite the sun in the sky for its face to be fully lighted. It therefore rises in the east as the sun sets in the west.

25. Possible answer: You would have to consider the moon's lack of atmosphere, its varying surface temperatures, and its terrain.

Applying Skills

26. They are falling most directly on the Northern Hemisphere.

27. It is the summer solstice because the north end of Earth's axis is pointed toward the sun.

28. Students' sketches should show the south end of Earth's axis tilted toward the sun.

Standardized Test Prep

1. A **2.** D **3.** D **4.** C **5.** B **6.** D

7. Sample answer: Earth rotates from west to east, so the sun appears to rise in the east before it rises in the west. Naturally, the east coast is east of the west coast. As Earth rotates, the sun will rise on the east coast before it rises on the west coast.