

Name _____ Date _____

Earth and Sun

Use your textbook to help you fill in the blanks.

What is gravity?

1. The force of attraction between any two objects is _____.
2. The strength of gravity increases as the _____ of objects increases and decreases as the distance between objects increases.
3. The Sun's gravitational pull on Earth is _____ than its pull on a planet much farther away, such as Neptune.
4. A path that one object takes as it moves around another object is its _____.
5. Earth and the other planets move in orbits around the _____.
6. Moving objects have the tendency to keep moving in a straight line; this is called _____.
7. Because of the effects of gravity and inertia, Earth moves in a nearly circular orbit shaped like a(n) _____.

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What causes the seasons?

8. Every year, Earth makes one complete trip, or _____, around the Sun.
9. As Earth revolves around the Sun, sunlight strikes different parts of Earth at different _____.

10. Sunlight strikes Earth differently at different times of year because Earth's axis is _____.
11. The changes in the angle of sunlight on Earth's surface cause the _____.
12. When the Northern Hemisphere is tilted away from the Sun, the season there is _____.
13. When it is winter in the Northern Hemisphere, it is _____ in the Southern Hemisphere.
14. The heat energy of sunlight is more concentrated in the summer because the hemisphere having summer is tilted _____ the Sun.

What causes day and night?

15. As Earth revolves around the Sun, it also _____ on its axis.
16. At any time, half of Earth faces the Sun and has _____, while the other half faces away and has _____.

Critical Thinking

17. If Earth's axis were not tilted, could any area have both a hot summer and a cold winter?
- _____
- _____
- _____

Earth and Sun

Who am I? What am I?

Choose a word from the word box below that answers each question.

- | | |
|------------|---------------|
| a. ellipse | d. orbit |
| b. gravity | e. revolution |
| c. inertia | f. rotation |

1. _____ I am the tendency of a moving object to keep moving in a straight line. What am I?
2. _____ I am the spinning of Earth around its axis. I cause day and night. Who am I?
3. _____ I am the path that one object, such as a planet, takes as it moves around another object. What am I?
4. _____ I am one complete trip around the Sun. For Earth, one of me is a year. Who am I?
5. _____ I am the force of attraction, or pull, between two objects. I increase as the mass of the objects increases. What am I?
6. _____ I am the shape of a planet's orbit. Who am I?

Earth and Sun

Fill in the blanks.

axis	night	summer
concentrated	revolution	winter
day	seasons	

Earth moves in two main ways. Each year, it makes one _____ around the Sun. At the same time, Earth also spins on its _____. As it spins, half of Earth faces the Sun and has _____, while the other half faces away from the Sun and has _____. Earth's tilt on its axis causes _____.

The hemisphere of Earth tilted toward the Sun has _____ temperatures are warmer at this time of year because the Sun's heat strikes at a direct angle and is _____. The hemisphere tilted away from the Sun has _____. The seasons in the Northern Hemisphere and Southern Hemisphere are always opposite.

Earth and Moon

Use your textbook to help you fill in the blanks.

How does the Moon appear?

1. Although the Moon has no water, vast plains called _____, a Latin word meaning “seas,” cover large parts of its surface.
2. Rocks striking the Moon over billions of years have formed many _____.
3. The Moon shines with light that comes from the _____ and reflects off the Moon’s surface.
4. The appearance and shape of the Moon as you see it from Earth is called a(n) _____.

What causes eclipses?

5. A darkening or hiding of the Sun, a planet, or a moon by another object in space is a(n) _____.
6. A solar eclipse happens when the _____ casts a shadow on part of Earth, and people there see the Moon move across the face of the Sun.
7. A solar eclipse occurs only during the _____ phase.
8. A lunar eclipse happens when the Moon moves into and is hidden by the shadow of _____.

9. During an eclipse, the area where the Sun is completely blocked is the _____, and the area where light is not completely blocked is the _____.

What causes the tides?

10. The rise and fall of the ocean's surface because of the gravity of the Moon and Sun is the _____.

11. A bulge of water occurs on the side of Earth facing the _____ and on the opposite side of the planet.

12. There are high tides at the bulges of water and _____ halfway between the bulges.

13. When the Sun and Moon align at full moon and pull on Earth together, the higher high tides and lower low tides are called _____.

14. When the Sun and Moon pull at a right angle and their pulls partly cancel each other, more moderate tides called _____ occur.

Critical Thinking

15. What would be different on Earth if the Moon did not exist?

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LESSON
Vocabulary

Earth and Moon

Use the words below to help you complete the sentences.

lunar eclipse	phase	solar eclipse
maria	rill	tide

1. A groove in the Moon's surface is often called a _____.
2. The periodic rise and fall of the ocean's surface is the _____.
3. The appearance and shape of the Moon as you see it from Earth is called a _____.
4. When the Moon moves into Earth's shadow, a _____ occurs.
5. A vast plain on the Moon's surface is a _____.
6. When the Moon passes directly between the Sun and Earth, a _____ happens.

Earth and Moon

Fill in the blanks.

low	month	rotates	tides
lunar eclipse	phase	solar eclipse	

The Sun lights half of the Moon at all times, but people on Earth see different amounts of the Moon's lit half at different times of the _____. The shape of the Moon as you see it from Earth at a particular time is called its _____. The Moon sometimes passes directly between the Sun and Earth, causing a _____. When Earth's shadow falls on the Moon, a _____ occurs.

The gravity of the Moon and the Sun pull on the surface of Earth's oceans, forming bulges that we know as _____. As Earth _____, the tides move around the planet. Most places have two high tides and two _____ tides during a single day.

The Moon is a rocky body with no atmosphere.

Name _____ Date _____

What Would Happen if Gravity Went Away?

Read the Writing in Science feature in your textbook.



Write About It

Explanatory Writing You know that gravity keeps everything on Earth from floating off into space. Look at the picture on page 438 of your textbook. Explain what would change if gravity suddenly stopped working.

Planning and Organizing

Explanatory writing requires you to organize your ideas in chronological or time order. When Luis planned to make a mobile to represent the solar system, he needed to list the steps in sequence. Here are some steps that he wrote, number them from 1 to 5 with 1 being the first step.

1. _____ Next, cut out the circles. Punch a hole at the top.
2. _____ Then, thread the string through the hole in each circle. Attach it to a coat hanger. Finally, paste a cutout of the Sun onto the coat hanger.
3. _____ First, look at the sizes of the planets in comparison to each other.
4. _____ After that, use string to represent how far each planet is from the Sun.
5. _____ Then, use a compass to draw circles on cardboard to represent each planet. Make sure each circle represents the relative size of each planet. Color each planet and write its name.

Now write the first draft of your composition. Begin with a paragraph that establishes your topic and briefly describes the important ideas. Then describe the events that occur in chronological order. End with a short summary of the events and how they relate to your topic.

Now revise and proofread your instructions. Ask yourself:

- ▶ Have I explained the topic and described the important ideas?
- ▶ Have I described the events in time order?
- ▶ Have I provided clear descriptions of the events?
- ▶ Have I corrected all grammar errors?
- ▶ Have I corrected all errors in spelling, punctuation, and capitalization?

The Solar System

Use your textbook to help you fill in the blanks.

How do we observe objects in space?

1. An optical telescope uses _____ or mirrors to make distant objects seem larger and nearer.
2. The orbiting Hubble Space Telescope “sees” objects more clearly than Earth-based telescopes because Earth’s _____ does not change Hubble’s view.
3. Radio telescopes are giant dishes on Earth’s surface that gather _____ waves from objects in space.

What are planets?

4. The solar system includes eight _____ that orbit the Sun.
5. The planet closest to the Sun is _____, and the planet farthest away from the Sun is _____.
6. Mercury, Venus, Earth, and Mars are terrestrial planets with surfaces made of _____.
7. Jupiter, Saturn, Uranus, and Neptune have surfaces made of _____.

How do the planets compare?

8. The most noticeable feature about _____ is its large set of rings that are made of ice and rock.

9. Venus has an atmosphere made mostly of _____, which holds in heat and gives this planet the hottest surface in the solar system.

10. The solar system's highest mountains and largest canyon system are on the surface of the planet _____.

How do the moons compare?

11. A natural object that orbits a planet is a _____.

12. The solar system's moons are natural _____, but artificial satellites orbit Earth to gather weather data and help people communicate.

13. Objects from space can strike moons or planets to create bowl-shaped holes called _____.

What are asteroids, comets, and meteors?

14. Most of the solar system's _____ orbit the Sun in a belt between Mars and Jupiter.

15. A comet is a mixture of _____, dust, and rock that moves around the Sun.

How do we explore the solar system?

16. The only place in the solar system that humans have visited is Earth's _____.

Critical Thinking

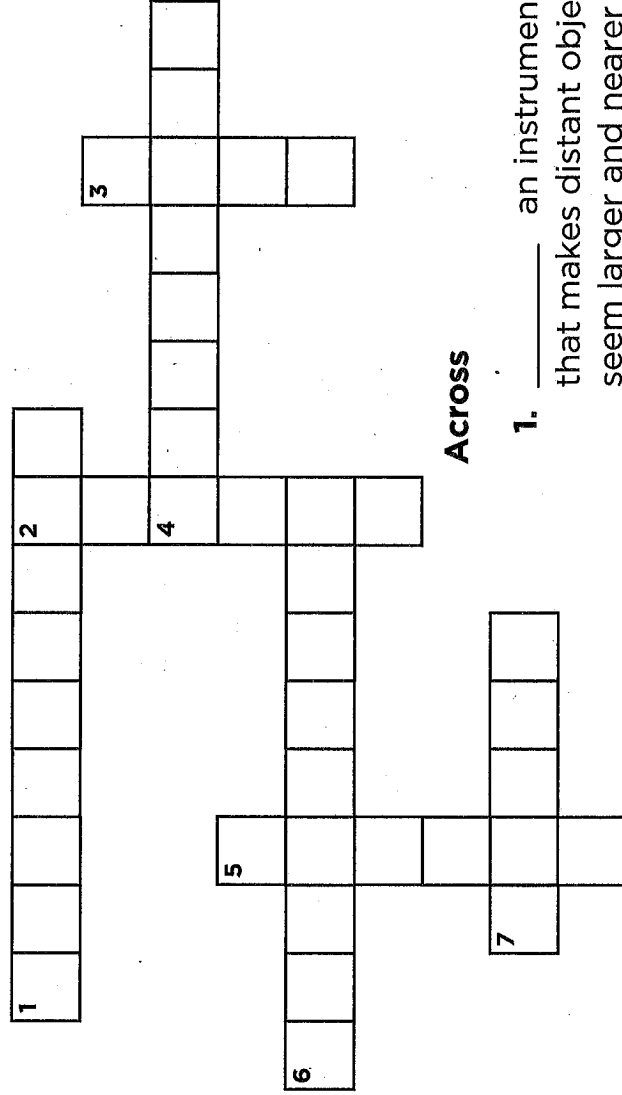
17. Why is it not possible to land a spacecraft on Jupiter or Saturn?

The Solar System

Match the correct letter with the description and fill in the crossword puzzle.

- a. asteroid
- b. comet
- c. meteor
- d. moon
- e. planet
- f. satellite

- g. telescope



Across

1. _____ an instrument that makes distant objects seem larger and nearer

4. _____ a rock that revolves around the Sun in a belt between Mars and Jupiter

6. _____ an object in space that orbits another object

7. _____ an object made of ice, dust, and rock that orbits the Sun

Down

2. _____ a large object that orbits a star but does not give off its own light

3. _____ a natural object that orbits a planet

5. _____ a meteoroid that enters Earth's atmosphere

The Solar System

Fill in the blanks.

asteroids	gases	none	telescopes
comets	Jupiter	tail	terrestrial

The major objects of the solar system are eight planets that orbit the Sun and their moons. Earth is one of the _____ planets, which have rocky surfaces. Jupiter, Saturn, Uranus, and Neptune have surfaces made of _____. Earth has one moon, some planets (such as Mercury and Venus) have _____, and other planets (such as Jupiter and Saturn) have many.

Other objects in the solar system include the _____ that orbit the Sun between Mars and _____. Balls of ice, dust, and rock in elongated elliptical orbits around the Sun are _____. When far away from the Sun, comets remain frozen, but they form a glowing _____ of gas and dust as they get close to the Sun. Astronomers study the solar system with many types of _____.

Voyager Discoveries

Read the following passage.

In 1977, NASA launched the Voyager Interstellar Mission to explore Jupiter, Saturn, Uranus, Neptune, and their moons. The trip had to be very precisely planned. Speeds and distances had to be accurately calculated. The two *Voyager* spacecraft had to be close enough to each planet to collect data and to get a pull from that planet's gravity in order to be propelled toward their next destination. At the same time, the spacecraft had to be far enough away from the planets that they would not go into orbit around them. All of NASA's careful planning worked. The *Voyager* Mission has provided scientists with new and closer looks at our farthest neighbors.

Voyager Spacecraft Travel

Jupiter-1979:

Images show Jupiter's rings. Volcanic activity is observed on Io, one of Jupiter's moons.

Saturn-1980-91:

Scientists get a close look at Saturn's rings. They contain structures that look like spokes, or braids. Scientists observed that Titan, one of Saturn's moons, has a thin atmosphere and active, geyser-like landforms.

Uranus-1986:

Scientists discover the dark rings around Uranus. They also see ten new moons, bringing Uranus's total to 15 moons. *Voyager* sends back detailed images and data on the planet, its moons, and dark rings.

Neptune-1989:

Large storms are seen on the planet. One of these storms is Neptune's Great Dark Spot. Neptune was originally thought to be too cold to support this kind of weather.

After observing these planets, the *Voyager* spacecraft keep traveling. They are the first human-made objects to go beyond the heliosphere. The heliosphere is the region of space reached by the energy of our Sun. It extends far beyond the most distant planets in the Solar System.



Write About It
Cause and Effect

- ▶ Look for the reason why something happens to find a cause.
- ▶ An effect is what happens as a result of a cause.

1. What would cause the *Voyager* spacecraft to be propelled toward their next destination?

2. What was an effect of the *Voyager* mission?

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Date _____

LESSON
Outline

Stars and the Universe

Use your textbook to help you fill in the blanks.

How do stars form?

1. Stars form from a huge cloud of gases and dust called a(n) _____.
2. When the cloud contracts and powerful reactions start to turn hydrogen atoms into helium atoms to produce energy, a(n) _____ forms.
3. A _____ is a small very dense star that shines with cool white light.

What happens to larger stars?

4. A star that begins life with much more hydrogen than a medium-size star such as our Sun ends its life as an exploding star called a(n) _____.
5. Very massive stars end their lives as _____, which are objects with gravity so powerful that even light cannot escape from them.
6. Stars are classified by their size, _____, and temperature.
7. The Sun is a medium-size _____ star with a surface temperature of about 6,000°C.
8. By studying the motion of distant stars, scientists have discovered about 160 _____ outside our solar system.

What are constellations?

- 9. Patterns of stars in the sky are _____.
- 10. Most stars are so far from Earth that astronomers use _____ huge measuring units, such as the _____, to describe the distance.

What are star systems?

- 11. Huge, far-off families of stars that look like hazy patches of faint light in the night sky are _____.
- 12. There are spiral galaxies, _____ galaxies, and irregular galaxies.
- 13. When two stars are near each other and rotate around each other, they form a(n) _____ star.

How did the universe form?

- 14. The theory that the universe started from a single point and then exploded outward is the _____ theory.
- 15. According to this theory, the universe continues to _____.

Critical Thinking

- 16. Will the Sun always shine?

Stars and the Universe

Match the correct letter with the description.

- | | | |
|--------------------|---------------|----------------|
| a. big bang theory | d. galaxies | g. star |
| b. black hole | e. light-year | h. supernova |
| c. constellation | f. nebula | i. white dwarf |

1. An exploding star is a _____.
2. Huge, very far-off families of stars are _____.
3. An object in space that produces its own energy, including heat and light, is a _____.
4. The idea that the universe began with a big bang and has been expanding since that time is the _____.
5. The distance that light travels in one year is a _____.
6. An object that is so dense and has so much gravity that not even light can escape it is a _____.
7. A huge cloud of gases from which stars form is a _____.
8. A group of stars that forms a pattern is a _____.
9. A small, very dense star is a _____.

Stars and the Universe

Fill in the blanks.

elliptical	helium	spiral	white dwarf
galaxies	nebulas	Sun	10 billion

Scientists use the big bang theory to explain how the

universe began and why it is expanding. The universe

contains many families of stars called _____.

Those shaped like pinwheels are _____

galaxies. There are also _____ galaxies and

irregular galaxies. The star closest to Earth, after the

_____ , is Proxima Centauri.

Like living things, stars have life cycles. Stars are born

from clouds of gas called _____. When

gravity causes nebulas to contract enough, temperature

rises and reactions that change hydrogen into _____

start. When the helium is also gone, the star shrinks and

cools to become a _____. The life cycle of a

medium-size star, such as our Sun, is about _____

years. Our Sun is about 5 billion years old.

The Universe

Choose the letter of the best answer.

- Gravity is the
 - measure of mass.
 - force of attraction between objects.
 - size of an object.
 - long distance between stars.
- What is an orbit?
 - the speed of a planet moving around the Sun
 - the order of planets in distance from the Sun
 - the path a planet takes as it moves around the Sun
 - the tilt of Earth on its axis
- Inertia is the tendency of a moving object to
 - keep moving after it hits something.
 - keep moving in a straight line.
 - keep moving faster and faster.
 - rise upward against gravity.
- What is Earth's revolution?
 - its spinning motion on its axis
 - its gravitational pull on the Moon
 - its changing of seasons
 - its movement in orbit around the Sun
- Which of these is a lunar phase?
 - penumbra
 - new moon
 - lunar eclipse
 - neap moon
- What happens during new moon when the Moon passes directly between the Sun and Earth?
 - a solar eclipse
 - a quarter moon
 - a lunar eclipse
 - a new season
- A lunar eclipse happens only during
 - new moon.
 - crescent moon.
 - quarter moon.
 - full moon.

8. What causes tides?
- a. earthquakes beneath the ocean
 - b. the gravity of the Moon and Sun
 - c. Earth's inertia in space
 - d. high winds on the ocean's surface
9. A natural object that orbits a planet is a(n)
- a. asteroid.
 - b. comet.
 - c. moon.
 - d. star.
10. In the solar system, most asteroids are
- a. beyond Neptune.
 - b. orbiting Saturn.
 - c. between Mars and Jupiter.
 - d. next to the Sun.
11. When a meteor lands on the surface of Earth, it is called a(n)
- a. asteroid.
 - b. meteorite.
 - c. comet.
 - d. satellite.
12. What does a telescope do?
- a. makes objects in space appear larger and nearer
 - b. brings objects closer to Earth
 - c. makes Earth seem brighter
 - d. allows us to see black holes
13. Stars form from a cloud of gas called a
- a. galaxy.
 - b. nebula.
 - c. universe.
 - d. neutron star.
14. What object is so dense and has such strong gravity that no light can escape it?
- a. black hole
 - b. neutron star
 - c. white dwarf
 - d. red giant
15. What is the name of the theory that explains the way the universe began?
- a. The Gravitational Microlensing Theory
 - b. The Stellar Life Cycle Theory
 - c. The Big Bang Theory
 - d. The Expanding Universe Theory