Focus on the NYS Learning Standards

Lesson 23 The Moon

PS 1.1e Most objects in the solar system have a regular and predictable motion. These motions explain such phenomena as a day, a year, phases of the Moon, eclipses, tides, meteor showers, and comets.

PS 1.1g Moons are seen by reflected light. Our Moon orbits Earth, while Earth orbits the Sun. The Moon's phases as observed from Earth are the result of seeing different portions of the lighted area of the Moon's surface. The phases repeat in a cyclic pattern in about one month.

Learn about the Moon and how its appearance in the sky changes.

A **moon** is a natural object that orbits a planet.

A **lunar cycle** is the period of time that it takes the Moon to revolve around Earth.

An **eclipse** happens when one body in space passes into the shadow of another body.

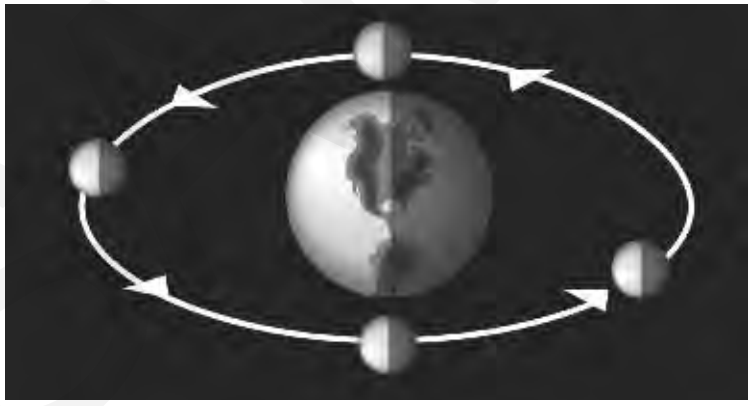
A **tide** is the rising or falling in sea level.

Guided Instruction

DIRECTIONS Read the following information.

Most planets in our solar system have moons. A **moon** is a natural object that orbits a planet. Some planets, such as Saturn, have several moons. Our planet has only one moon. Our moon revolves around Earth and also rotates on its axis.

The Moon is about 384,000 kilometers from Earth. Even though it is very far away, the Moon can appear as a brightly-lit object in the dark sky. Light from the Sun allows us to see the Moon from Earth. Sunlight reflects off the Moon's surface, making it the second-brightest object in our sky. Only the Sun is brighter.



Just as Earth rotates on its axis and revolves around the Sun, the Moon rotates on its axis and revolves around Earth. It takes about twenty-eight days, or about one month, for the Moon to revolve around Earth. It takes the same amount of time for the Moon to rotate on its axis. The same side of the Moon always faces Earth because the Moon's revolution and rotation take the same amount of time.

Guided Questions

How many **moons** revolve around Earth?

Why is the **Moon** so bright?

Why does the same side of the **Moon** always face Earth?

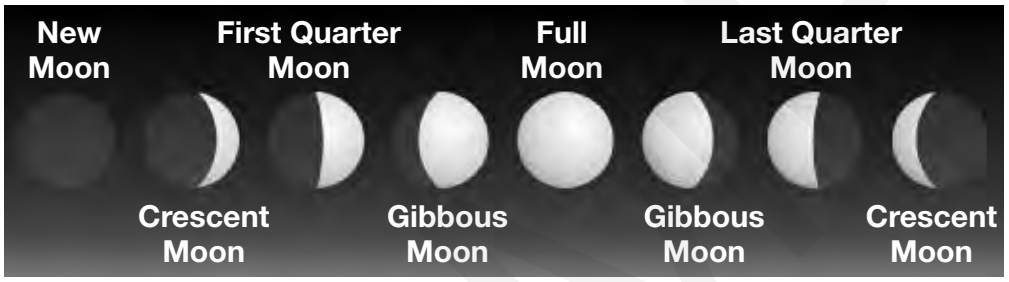
Guided Questions

Half of the Moon's surface is always lit. As the Moon revolves around Earth, we see different amounts of the Moon's lighted part. Sometimes, the Moon looks like a circle. At other times, it looks like a semicircle, a thin sliver, or something in between. The different shapes of the Moon are called *phases*. The phases repeat about every 28 days, or after one complete revolution of the Moon around Earth. This period of time is called a **lunar cycle**.

What kinds of shapes make up the phases of the **Moon**?

The lunar cycle includes five main types of phases of the Moon. They are new moon, crescent moon, quarter moon, gibbous moon, and full moon. The lunar cycle begins with a new moon, which is not visible from Earth. This is because the Sun is not lighting the side of the Moon facing Earth. Notice in the diagram below that gibbous moons are larger than quarter moons. Notice also that crescent moons are smaller than quarter moons.

What is a **lunar cycle**?



In which phase does the **Moon** look like a complete circle?

An **eclipse** occurs when one body in space passes into the shadow of another body. The revolution of the Moon causes eclipses. A *solar eclipse* occurs when the Moon moves directly between the Sun and Earth. The Moon blocks light from the Sun and casts a shadow on part of Earth.

What causes an **eclipse**?

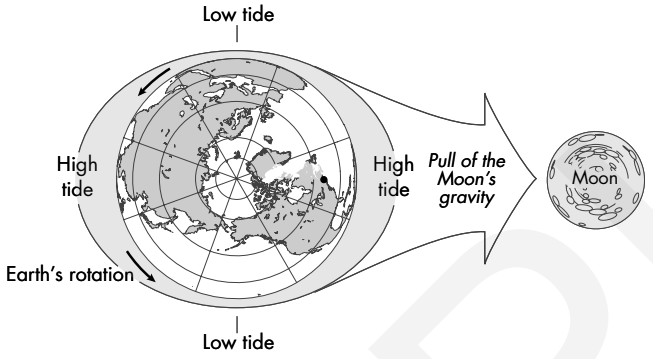
If Earth is directly between the Moon and the Sun during a full moon, Earth's shadow can fall on the Moon and cause a *lunar eclipse*. Earth blocks light coming from the Sun, so the Moon looks like it disappears from the sky. Eclipses happen only a few times each year when the Moon, Earth, and the Sun are lined up perfectly.

The force of gravity between the Moon and Earth can affect the oceans. The Moon's gravitational pull causes oceans on Earth to rise and fall during the day. This rising or falling in sea level is called a **tide**.

Guided Questions

The Moon's gravitational pull is stronger on the parts of Earth closer to the Moon. A bulge of water forms on the side of Earth facing the Moon. Earth is also pulled toward the Moon a bit, so another bulge of water forms on the opposite side of Earth. The areas under the bulges experience high tides. The other areas of Earth experience low tides. As Earth rotates, various locations on its surface pass through high and low tide.

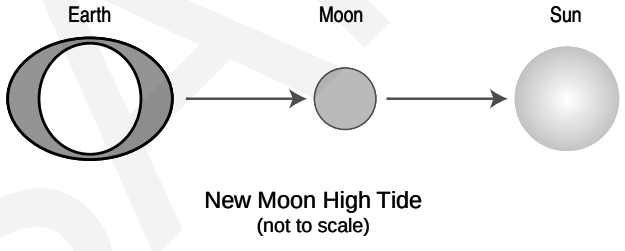
What causes **tides** to form?



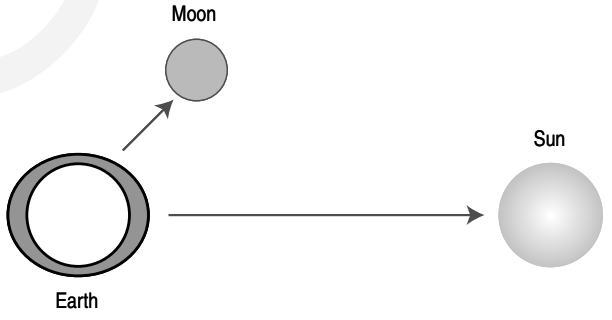
What kind of **tide** forms in areas of the ocean that are not under bulges?

The Sun can also affect tides. The Sun can add to or work against the gravitational pull of the Moon. When the Moon, Earth, and the Sun are lined up, the pull of the Sun and Moon together causes very high tides. When the Sun, Earth, and the Moon form a right angle, the pull of the Sun and the Moon are against each other. This causes high tides to be lower than normal and low tides to be higher than normal.

Which two bodies affect **tides**?



New Moon High Tide
(not to scale)



First and Third Quarter Tides
(not to scale)

DIRECTIONS For each question, write your answer in the space provided.

1. Why is the Moon visible to observers on Earth?

2. How long does it take the Moon to revolve around Earth?

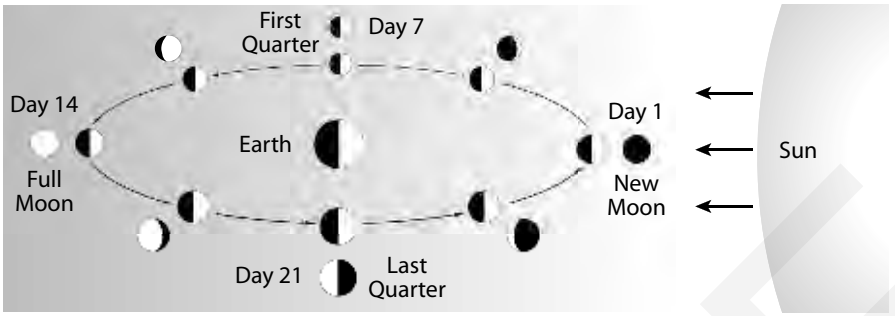
3. During which phase is the Moon not visible from Earth? Why is it not visible?

4. What happens during a lunar eclipse?

5. What causes high tides? What makes high tides stronger or weaker?

Apply the NYS Learning Standards

DIRECTIONS Study the drawing, read the paragraph, and answer the questions.



The diagram above shows changes in the Moon's phases as it revolves around Earth. The circle shows the orbit of the Moon around Earth. The outer pictures show you what the Moon looks like from Earth.

1. During which phase is Earth between the Sun and the Moon?

_____

2. How many weeks are between the new moon phase and the full moon phase?

_____

3. Draw what a first quarter moon looks like from Earth.

4. Draw what a last quarter moon looks like from Earth.

NYS Test Practice

DIRECTIONS Choose the best answer for each question. Then circle the number of the answer you have chosen.

1 Which of the following is the source of the Moon's light?

(1) Earth

(2) Jupiter

(3) the Sun

(4) the Moon

2 About how long does it take the Moon to rotate on its axis?

(1) one day

(2) one week

(3) one month

(4) one year

3 A student is looking up at the sky on a clear, starry night. The student is not able to see the Moon. This is most likely because the Moon is in which phase?

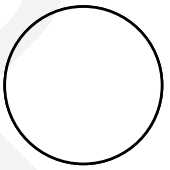
(1) new moon

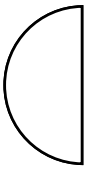
(2) full moon

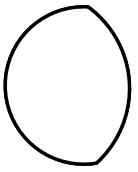
(3) gibbous moon

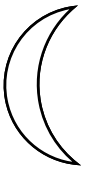
(4) quarter moon

4 If the Moon is in the first quarter phase tonight, what will it look like in 7 days?

(1) 

(3) 

(2) 

(4) 

DIRECTIONS Record your answer on the lines provided below the question.

5 Describe the tides when Earth, the Moon, and the Sun are all lined up.