Name: _____

Date:_____

Pd: _____

Phases, Eclipses & Tides

Notes Summary

INTRODUCTION:

As the moon moves, the positions of the moon, Earth, and the sun change in relation to each other. **The changing relative positions of the moon, Earth, and the sun cause the phases of the moon, eclipses, and tides.**

MOTION OF THE MOON:

The moon revolves around Earth about once every 27.3 days. It also rotates on its own axis about once every 27.3 days. The same side of the moon always faces Earth. The different shapes of the moon you see from Earth are called **phases. The phase of the moon you see depends on how much of the sunlit side of the moon faces Earth.**

ECLIPSES

When the moon's shadow hits Earth or Earth's shadow hits the moon, an eclipse occurs. An **eclipse** occurs when an object in space comes between the sun and a third object, and casts a shadow on that object. There are two types of eclipses: solar and lunar.

A solar eclipse occurs when the moon passes between Earth and the sun, blocking the sunlight from reaching Earth. The moon's shadow then hits Earth. So a **solar eclipse** occurs when a new moon blocks your view of the sun. The darkest part of the moon's shadow is called the **umbra**. From any part of the umbra, the moon completely blocks light from the sun. Only people in the umbra see a total solar eclipse. Another part of the shadow is less dark and larger than the umbra. It's called the **penumbra**. From within the penumbra, people see a partial eclipse because part of the sun is still visible.

A **lunar eclipse** occurs at a full moon when Earth is directly between the moon and the sun. **During a lunar eclipse, Earth's shadow falls on the moon.** Earth's shadow also has an umbra and a penumbra. When the moon is completely within Earth's umbra, you see a total lunar eclipse. A partial lunar eclipse happens when the moon moves partly into Earth's umbra, and the rest of the moon is in the penumbra.

TIDES

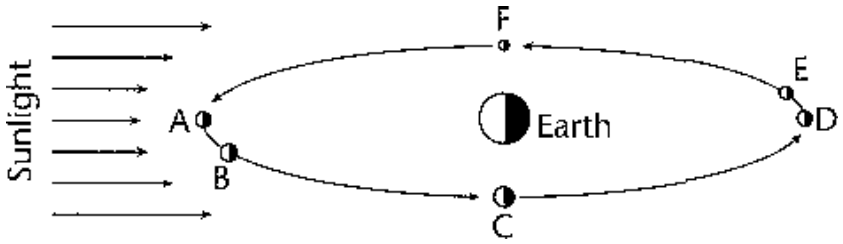
Tides are the rise and fall of the ocean's water every 12.5 hours, or so. The force of gravity pulls the moon and Earth toward each other. **Tides are caused mainly by differences in how much the moon pulls on different parts of Earth.** As Earth rotates, the moon's gravity pulls water toward the point on Earth's surface closest to the moon. The moon pulls least on the side of Earth farthest away. Two tides occur each day because of this difference in the pull of the moon's gravity.

Twice a month, the moon, Earth, and the sun are in a straight line. The combined forces of the gravity of the sun and moon produce an especially high tide on two sides of the planet - **called a spring tide**, and an especially low tide on the other two sides. Also twice a month, the pull of gravity of the sun and moon are at right angles to each other. At those times, the high tide is lower than usual, and the low tides are higher than usual. This "even" tidal situation is called a **neap tide**.

Phases, Eclipses, and Tides Worksheet

UNDERSTANDING MAIN IDEAS

Use the following figure to answer questions 1 and 2. Write your answers on a separate sheet of paper.



1. What phases of the moon would someone on Earth see when the moon is at positions A through F?

   Phase at A _____
   Phase at B _____
   Phase at C _____
   Phase at D _____ Phase at E _____ Phase at F _____

2. What kind of tide (spring or neap) will occur when the moon is at positions A, C, D, and F?

   A _____ C _____ D _____ F _____

BUILDING VOCABULARY

From the list below, choose the term that best completes each sentence, and write it in the blank.

phase gravity penumbra umbra solar
tides lunar eclipse spring neap

3. A(n) _____ tide occurs when the sun is at right angles to the line between Earth and the moon.

4. A(n) _____ occurs when the moon's shadow hits Earth or Earth's shadow hits the moon.

5. A person standing in the moon's _____ would see a partial solar eclipse.

6. Differences in the moon's pull on different parts of Earth cause _____.

7. A person standing in the moon's _____ would see a total solar eclipse.

8. The _____ of the moon you see depends on how much of the sunlit side of the moon faces Earth.

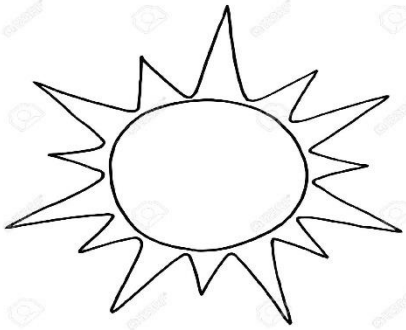
9. A(n) _____ tide occurs when the sun, moon, and Earth line up.

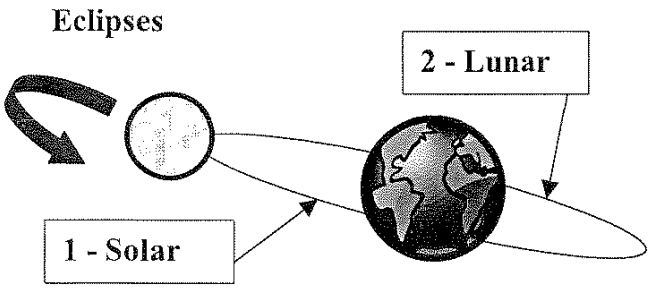
10. A(n) _____ eclipse occurs at a full moon when Earth is directly between the moon and the sun.

11. A(n) _____ eclipse occurs when the moon passes between Earth and the sun.

12. The force of _____ pulls the moon and Earth toward each other.

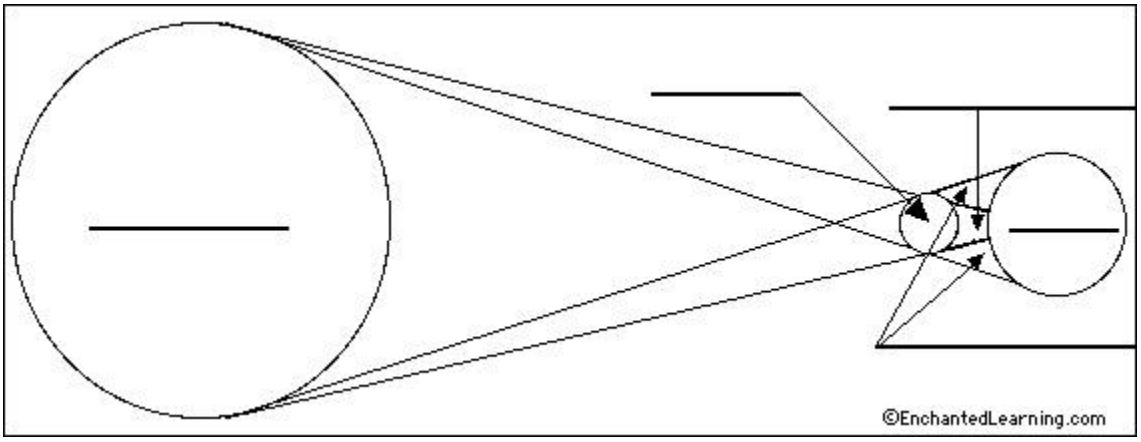
Solar and Lunar Eclipses



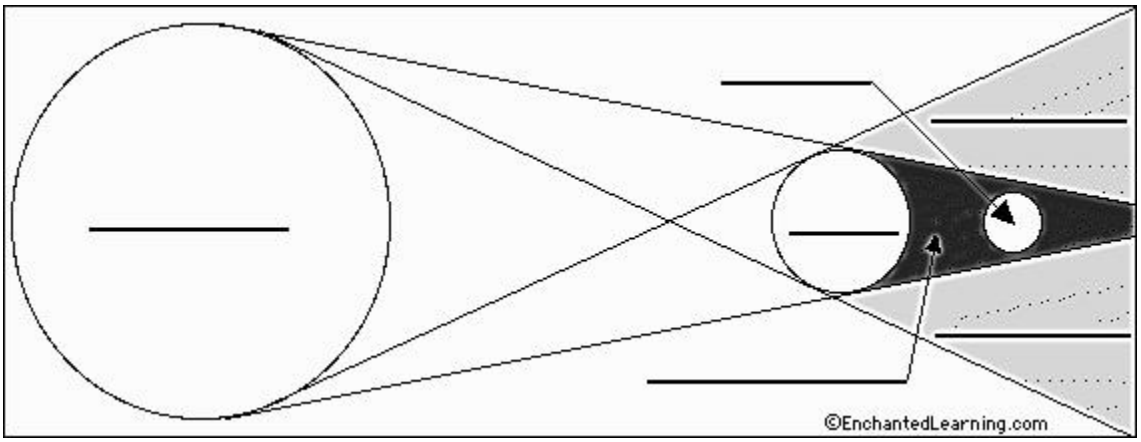


The moon's orbit is tilted 5 degrees from the Earth's orbit. There are two points in this orbit that can cause an eclipse to occur

1



2



Fill in the blanks using this word bank & then color in the diagram:

Earth – (BLUE) the planet on which we live

Moon – (WHITE) the natural satellite of the Earth

Penumbra – (GRAY) the area in which the shadow of an object (the moon on the Earth) is partial, and the area in which the partial solar eclipse is experienced.

Sun – (YELLOW) the star in our Solar System.

Umbra – (BLACK) the area in which the shadow of an object (the moon on the Earth) is total, and the area in which a total solar eclipse is experienced.