

## SCIENCE BACKGROUND — EARTH, MOON AND SUN 4.7

### VOCABULARY TO KNOW BEFORE WE START...

**Rotate, rotation:** to spin on an axis

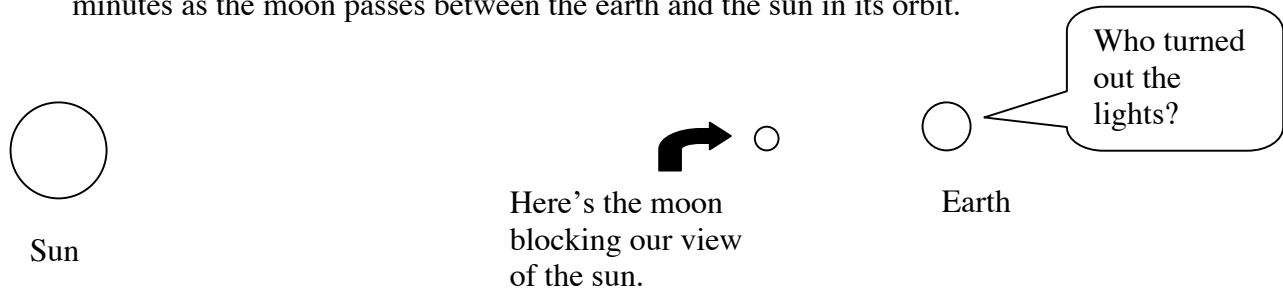
**Revolve, revolution:** to move on a path around something.

**Solar:** Having to do with the sun.     **Lunar:** Having to do with the moon.

**JUST THE BASICS...** The earth orbits the sun, rotating as it travels. The earth rotates one time every 24 hours (our day) and it takes about 365 days for it to revolve around the sun (our year). Meanwhile, the moon orbits or revolves around the earth, and the same side of the moon faces the earth at all times. We never see the “back side” of the moon. It takes the moon about 28 days to revolve around the earth. The moon travels with us as we orbit the sun.

### ECLIPSES

**Solar eclipse:** The word **eclipse** means to cover, hide or overshadow. Sometimes the sun is partly or fully blocked from our sight by the moon. This happens for just a few minutes as the moon passes between the earth and the sun in its orbit.



**Lunar eclipse:** In a lunar eclipse nothing is blocked from view. A lunar eclipse happens when the earth casts a shadow on the moon. Sometimes the sun, the earth and the moon line up so that the earth is right between the sun and the moon. Since the earth is 4 times bigger than the moon, it blocks the sun's rays from getting to the moon, making a big round shadow on the moon's surface.

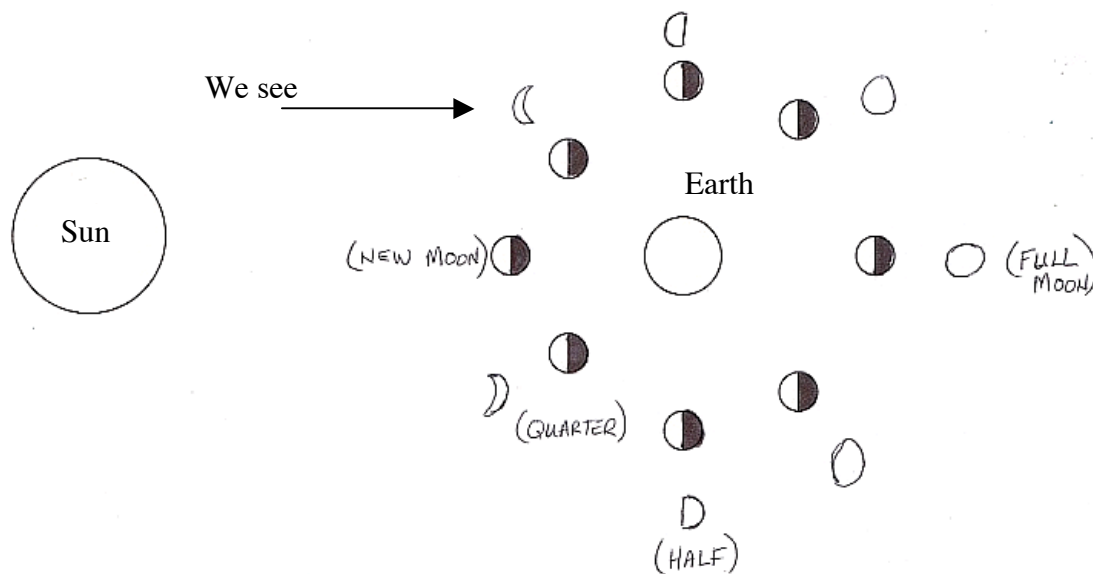


## REVIEWING FACTS ABOUT THE MOON...

- The moon is like a very large rock in space. It has no water and no atmosphere. There is gravity on the moon, but since the moon is about a quarter of the size of the earth, its gravity is much weaker than earth's.
- The moon revolves around the earth.
- It takes about 28 days for it to make one full revolution.
- The same side of the moon always faces us.
- Because the earth is spinning, the moon seems to rise in the east, move across the sky and set in the west, just like the sun.

## THE PHASES OF THE MOON

Unless the earth is making a shadow on the moon (a lunar eclipse), the sun's rays light up the side of the moon that's facing it. We see different views of the lit side depending on the position of the moon in its orbit. Take a look at this diagram.

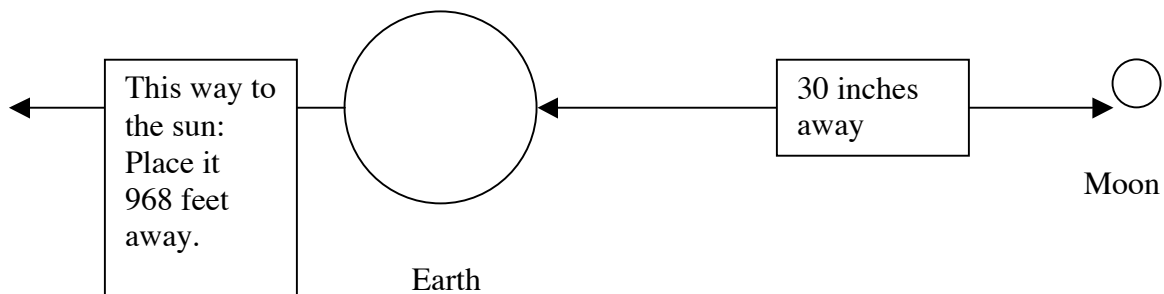


## SOME FACTS ABOUT THE SUN:

- It's a star and it's incredibly hot. Things that get close to the sun burn up. As the most massive body of our solar system, the sun has the strongest gravitational pull. This pull keeps all of the planets in their orbits. Without the pull of the sun, they would all start moving into outer space. (You can imagine what would happen to a yoyo if you spun it around your head and then let go.)
- It's made almost entirely of hydrogen
- Like all stars, the sun has a life cycle. Millions of years from now, the sun will flare up and finally die out.

## WHAT WOULD A REAL SCALE MODEL LOOK LIKE?

You've seen little models that show the sun and the planets. These models are fine for showing the order of our solar system, but they are completely wrong as far as comparative size and distances go. If you wanted to make a scale model with an earth and moon large enough to see, you'd have to head out to the blacktop or a big parking lot to have the right amount of space. Here's an idea of a scale you could use. In this model the earth is one inch in diameter and the moon is 1/4 of an inch in diameter. The sun will have to be 9 feet in diameter. Not exactly like the solar system models you may have seen, right. Plus, even with everything this size, the sun will have to be a few block away – 968 feet to be close to the correct scale.



## **NASA**

NASA stands for the National Aeronautics and Space Administration. NASA is a government agency that leads research in flight and space. In the 1960's NASA's Mercury and Apollo space missions enabled scientists to gain new information about conditions in space and on the moon. NASA astronauts have orbited the earth and the moon, lived in space labs orbiting the earth and they have landed, walked and driven on the moon. Today, NASA's most visible projects are the space shuttle flights, the Hubble space telescope and the Mars Exploration Project.

## **GREAT SCIENTISTS' IDEAS ABOUT THE SOLAR SYSTEM**

### **Aristotle – 370 BC**

- Earth is the center of the universe.
- The earth is inside of a giant ball that turns and the things in the sky are attached to the ball.
- The earth doesn't move.

### **Ptolemy – 100 AD**

- The earth is spherical (round) and the objects in space orbit the earth.
- The earth doesn't move.

### **Copernicus – 1480**

- The earth is spherical
- The earth spins on its axis.
- The earth and the other planets revolve around the sun.

### **Galileo – 1575**

- He proves that Copernicus' theory is correct.
- Builds a telescope to study the moon.
- Discovers that the moon is not flat – it has mountains and craters.

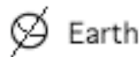
## ALL ABOUT THE SEASONS...

The earth rotates on its axis as it orbits the sun. This axis is tilted – the earth spins on a tilt. Because of this, there are times of the year when the sun shines more directly on the top half of the earth (the northern hemisphere) and times when it shines more directly on the bottom part of the earth (the southern hemisphere). Direct sunshine equals more hours of daylight and warmer temperatures – summer. Indirect sunshine equals fewer hours of daylight and cooler temperatures. Take a look at these little diagrams that show how our seasons here in Virginia are effected.

### Winter Solstice December 21st



In the winter, the northern hemisphere is tilted away from the sun. This causes our weather to be cooler and our nights to be longer.



**Spring**

**Fall**



In the spring and fall, the earth is rotating with both hemispheres at the same angle to the sun. This is when our days and nights are similar in length and our weather is neither hot nor cold.



### Summer Solstice June 21st

In the summer, the northern hemisphere is tilted toward the sun. Our days are longer than our nights and the weather is at its warmest.