

Name \_\_\_\_\_

Section \_\_\_\_\_

Partner(s) \_\_\_\_\_

Date \_\_\_\_\_

### DO IT YOURSELF ECLIPSES

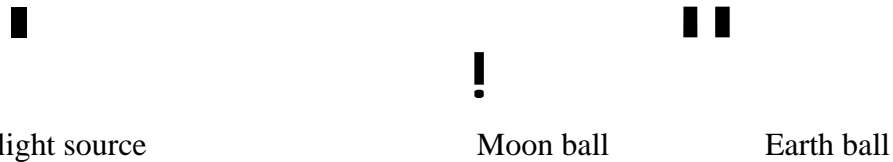
Eclipses do not occur often but when they do they inspire awe and fear.

Have you ever seen an eclipse of the Moon or Sun?

Even if you haven't, do you know how they happen?

### LET'S EXPLORE!

1. Obtain two balls on sticks, one large to represent the Earth and one small to represent the Moon.
2. Position yourself so that the balls are in the path of a bright light (like the overhead projector) to simulate the Sun.



3. Line up the balls as above and see if you can cast a shadow of the Moon ball on the Earth ball.

You have set up eclipse conditions. The body that appears to become dark to an Earth observer is said to be “eclipsed”. Did you generate a solar or lunar eclipse? Explain.

Does the shadow fall on all of the Earth ball or only part?

Would the eclipse be visible to all observers on the Earth or only some? Explain.

How can you make the shadow fall on more or less of the Earth's surface?

What is the phase of the Moon immediately prior to and after this eclipse?

4. Now reverse the positions of the Earth and Moon balls. Try to cast a shadow on the Moon ball from the Earth ball.

Is it easier or harder? Why?

What kind of eclipse did you generate this time?

What is the phase of the Moon now?

5. Move the Moon ball up or down a little so that it is not in line with the Earth ball and light. What happens to the location of the shadow?

## Discussion

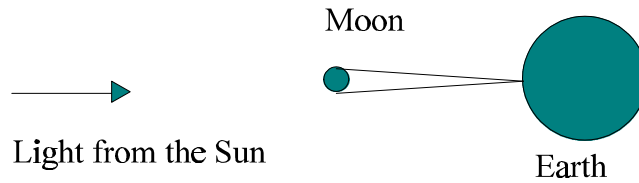
When you cast a shadow of the Moon on the Earth ball you were simulating a **solar eclipse**. If you were standing on the Earth, it would appear as if the Moon had blocked out the Sun. As you were making the shadow, you noticed that the shadow will only fall on part of the Earth. This is why an eclipse can only be seen in select parts of the Earth's surface. If only part of the Moon covers the Sun, a partial shadow will fall on the Earth. This generates a **partial solar eclipse**.

Why are total solar eclipses so rare? Shouldn't we see one with each new Moon?

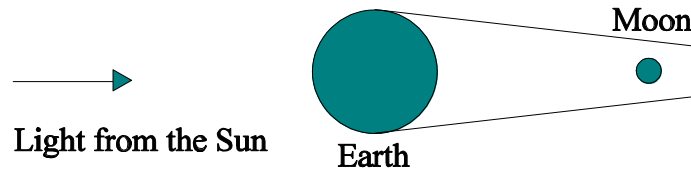
Because the Moon is so much smaller than the Earth, the shadow will only fall on the Earth if the alignment is perfectly correct. The Moon revolves around the Earth in an ellipse. This ellipse falls on a plane that is tilted with respect to the equator of the Earth. It is rare for the Moon to be in the new Moon position and in line for the shadow to fall on Earth.

If the Moon is far away enough from the Earth that it cannot appear to cover the whole surface of the Sun during an eclipse alignment, we may see the Sun with a ring of light around a dark inner circle. This type of eclipse is referred to as an **annular solar eclipse**.

#### ALIGNMENT FOR A SOLAR ECLIPSE



#### ALIGNMENT FOR A LUNAR ECLIPSE



If the Earth casts a shadow on the Moon you will see a **lunar eclipse** from the Earth. Why is a lunar eclipse more likely?

Since the Earth is larger than the Moon, its shadow is more likely to fall on and cover the surface of the Moon. You cannot have a lunar eclipse with every full moon for the reasons discussed above. However, lunar eclipses are definitely more common.

