SOLAR ECLIPSE ACTIVITY
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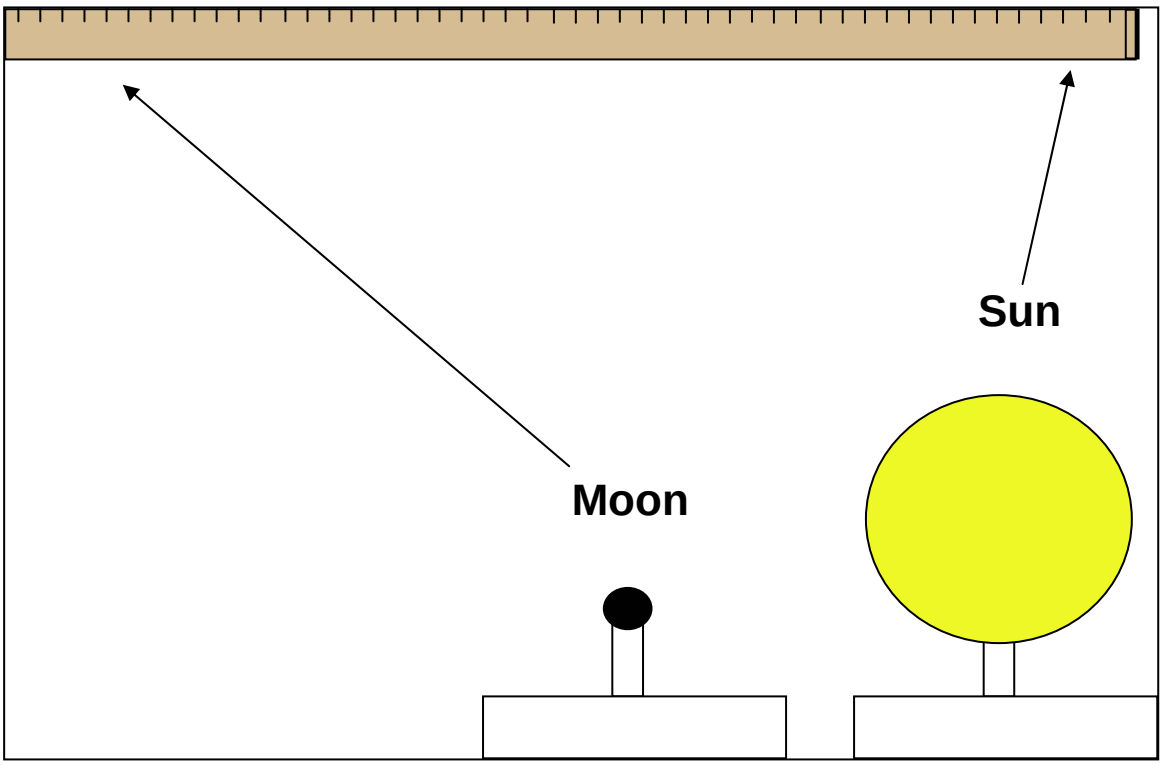
GOALS:
To simulate a solar eclipse
To understand the concept of angular size
To make estimates of absolute and relative size

MATERIALS:
Yard or meter stick (don't confuse your units!)
Construction paper
Tape
Scissors
CD-ROM
Pencil
Black and yellow markers

PROCEDURE:
1. MAKE THE SUN: Lay the CD on the construction paper and trace around its outer edge. Then trace around the center hole.
2. Draw two lines (a tab) down from the CD and fanning out so the CD circle and tab look like the picture on this slide. The tab will be used to mount the CD circle on the yard/meter stick.
3. Cut out the large CD circle and connected tab. This will represent the sun. The small circle in the center will represent the size of the moon (of course, this is not to scale).
4. Color the CD circle yellow (for the sun) and the small center circle black.
5. MAKE THE MOON: Now, on a different piece of construction paper, trace just the center hole in the CD. Make the same kind of tab for this circle as you did for the sun circle. Make the tab a bit longer than the sun's tab. Color the moon black and cut it out.
6. ASSEMBLE: Bend the sun and moon back 90 degrees from their tabs at the BASE of the tab. Wrap the fanned out portion of the tabs around the yard/meter stick and tape the ends together. The sun should be near the end of the stick and the moon should be near the front. The sun and moon should now be able to slide up and down the stick.



Now, holding the yard/meter stick against your cheek, sight down the stick. The smaller moon circle will cover some portion of the sun circle. Slide the moon back and forth to a place where it just covers the sun.

Looking at the yard/meter stick, note the distance (in inches or cm) of the moon. Then note the distance of the sun. Finally, measure the diameter of the moon. You can now create similar triangles that will help you answer the following questions:

1. **On the yard/meter stick, how much further away is the sun than the moon?**

2. **Given the diameter of the moon, can you predict the diameter of the sun?**

3. **In space, our real moon has a diameter of 3,476 km and is on average 384,400 km from Earth. The sun is about 149,600,000 km from the Earth. How many times further is the sun then the moon? What would you estimate to be the diameter of the sun?**

4. **What is the angular size of the sun? moon?**
   (hint: construct right triangles and use trigonometry)

Answers for teachers:
(For a clean copy of this math activity, download the file "slide 41 eclipse math activity")

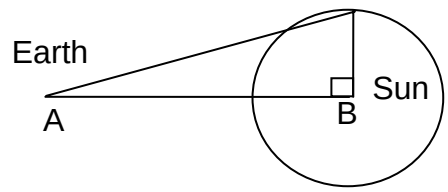
- $$\frac{3{,}476\text{km}}{384{,}400\text{km}} = \frac{X}{149{,}598{,}000\text{km}}$$ (definition of the A.U.)

$$(3{,}476\text{km})\,(149{,}598{,}000\text{km}) = 384{,}400\text{km}\ X$$

$$\frac{(3{,}476\text{km})\,(149{,}598{,}000\text{km})}{384{,}400\text{km}} = X;$$ X = 1,352,764 km ~ Diameter of the sun **

** The reported solar diameter is 1,391,785 km. Your derived value is a bit small because we are using the AVERAGE distance to the moon. In order for the moon to completely cover the sun, it would be a bit closer to the Earth than its average distance.

4. Compute angular diameter of the sun:



Given a right triangle ABC,