

Name:  
Partner(s):

ASTR110L

## 7 - Field Work: Estimating the Diameter of the Sun

Instructions: Complete the following experiment with your Lab 7 partner(s). Record your answers on this worksheet. Show your work.

Due: next week, at start of class.

### Procedure: Building a Pinhole Tube

Purpose: To use a pinhole tube to measure the Sun's diameter (don't look directly at it).

Materials:

pinhole tube  
tracing paper

ruler  
sunny day

1. Make a pinhole tube and take it outside on a sunny day.
2. Aim the pinhole end of the tube towards the Sun. Slowly move the tube around until you see a bright disk on the tracing paper. This disk is the image of the Sun. **LOOK ONLY AT THE TRACING PAPER, NOT AT THE SUN.**

**Q1)** Record the length of the tube from the pinhole to the tracing paper: \_\_\_\_\_ mm.

**Q2)** Record the diameter of the Sun's image: \_\_\_\_\_ mm.

**Q3)** Calculate the number of solar images that if place "end-to-end would fill the length of the tube" (i.e., Q1/Q2).

**Q4)** How many solar diameters is the Sun from Earth? Refer to Figure 2 in the Lab 7 manual: the image inside the tube creates the triangle APB and the triangle XPY inside the tube. APB and XPY are similar triangles, which means that the length of the tube, L, the size of the Sun on the tracing paper AB, the distance from you to the Sun D, and the real size of the Sun XY are related as:

$$\frac{L}{AB} = \frac{D}{XY}$$

**Q5)** Given that the Sun is 150,000,000 km ( $1.5 \times 10^8$  km) from Earth, calculate the diameter of the Sun, XY, using the same relationship in Q4.