6 - Field Work: Estimating the Diameter of the Sun

Purpose: To use a pinhole tube to measure the Sun.

Materials:
    pinhole tube

Procedure: Building a Pinhole Tube
Work in a team of two or individually. Record your answers on this worksheet.

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 graph 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." (Divide the answer from questions Q1 by the answer from question Q2.)

Q4: How many solar diameters is the Sun from Earth? Refer to Figure 2 in the lab manual: the image inside the tube creates the triangle *ABP* and the triangle outside the tube, the triangle *XYP*. *ABP* and *XYP* 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: $\dfrac{L}{AB} = \dfrac{D}{XY}$

Using the above relationship, determine the ratio *D/XY*.

Q5: Given that the Sun is 150,000,000 km from Earth, calculate the diameter of the Sun. Using the same relationship in Q4, calculate now the real size of the Sun *D*.