If you poke a small hole in a piece of cardboard and hold it in bright sunlight, you'll cast a "pinhole-image" of the Sun on the ground below. Carefully measure the distance between the cardboard and the solar image and you'll find it's about 108 times greater than the diameter of the solar image. What does this tell you about the diameter of the Sun, compared with its average 150,000,000-km distance from Earth?

Aha ... when the cardboard is held 108 cm above the ground, the solar image has a diameter of 1 cm!

Next-Time Question

If you poke a small hole in a piece of cardboard and hold it in bright sunlight, you'll cast a "pinhole-image" of the Sun on the ground below. Carefully measure the distance between the cardboard and the solar image and you'll find it's about 108 times greater than the diameter of the solar image. What does this tell you about the diameter of the Sun, compared with its average 150,000,000-km distance from Earth?

150,000,000 km = 108 D

How nice I can measure the Sun's diameter with a household ruler! Who woulda thunk it?

If the Sun is low in the sky and its image is an ellipse, should you measure the short or the long diameter for your calculation?

108 d

d

Answer:
With a bit of simple geometry and knowing that light travels in straight lines, we see that the

$$\frac{\text{Sun's diameter}}{\text{Sun's distance}} = \frac{\text{image diameter}}{\text{image distance}}.$$

So the Sun's diameter is 1/108 the 150,000,000-km distance from Earth — 1,390,000 km.
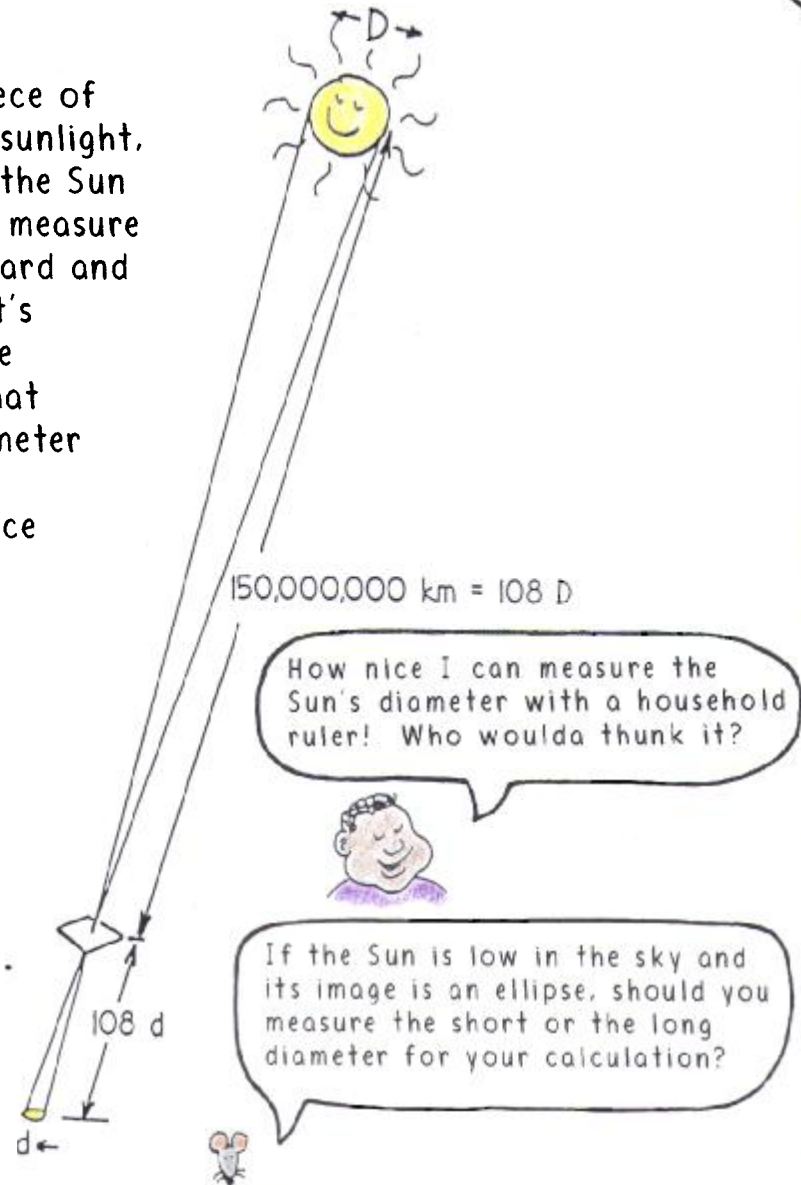
$$D = 1/108 \ (150,000,000 \text{ km})$$

Hewitt Drewit!