Angular Diameter: Worksheet

Getting started:

Go to: https://ccnmtl.github.io/astro-simulations/small-angle-demo/

Warming up:

Before beginning the questions below, take a minute to familiarize yourself with the simulator by experimenting with the different controls and options. You can drag the sliders or make smaller changes by clicking on the bars. You can also input a custom position or diameter directly into the relevant field, or simply drag the ball to any desired position.

Note that the demo calculates the angular diameter (labeled with the Greek letter alpha) in arcseconds, which are equivalent to 1/3600 degrees.

Once you have spent some time experimenting with the simulation, click the 'reset' button at the top right of the screen and proceed to the questions below.

Questions:

1. For a beach ball of diameter 1.0 unit, how far away must the ball be to subtend an angle of 1°? We call this angle the *angular diameter* of the ball.

   See below for all work. 57.3 units

2. What happens to the angular diameter if you double the actual diameter of the beach ball?

   Angular diameter doubles.

3. Set the distance to 60. If you halve the distance, what happens to the angular diameter?

   Angular diameter doubles.

4. If the linear diameter and the distance were equal, what would be the angular diameter ***in degrees***? Does this number look familiar?

   57.3 degress.

5. Multiply this number by 2π. Does this number look familiar?

   360 degrees.

6. The angular diameter of the Moon is 0.518 degrees (1865 arcseconds). Using the demo, what can you say, qualitatively, about the distance to the Moon as measured in Moon diameters?

   110 moon diameters.

7. The Moon's radius is 1737.5 km. What is its distance?

   382250 km

8. During a solar eclipse, it is evident that the Moon is just about the right size in the sky to entirely block out the Sun. What can you infer from this about their angular diameters?"

   See below

9. If the Sun's diameter is 1.39 million km, how far away is it?

152 million km