**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_**

**UNIT 1: Worksheet 3a - Small Angle Approximations**

The following geometry gives the small angle approximation where is the angle in radians:







Which gives the following equation:

This formula calculates the angular sizes of objects **in radians**. Recall that radians can be converted to other units (degrees, arcminutes, arcseconds) using a calculator with the appropriate function key or multiplying the angle in radians by 57.3 degrees/radian and then arcminutes or arcseconds as needed.

Calculate the angular sizes of each of the following in radians.

1. The Moon with a diameter of 3480 km at a distance of 384,000 km.
2. The Sun with a diameter of 1,400,000 km at a distance of 1 Astronomical Unit (AU) (150,000,000 km)
3. What do you notice about the angular sizes of the Moon and the Sun? What astronomical event can you associate with this fact?
4. A basketball (22 cm diameter) held by a player 20 meters away.
5. A round window (50 cm diameter) on the side of a house that is 1 km away.
6. Jupiter with a diameter of 142,000 km at a distance of 4.2 AU (see #2)
7. The galaxy Andromeda with a diameter of 200,000 Light Years (LY) at a distance of 2,500,000 LY. A light year (LY) is the distance light travels during one year. This distance is equivalent to 9.4×1012 km.