

Observational Activity #1 Measuring Angular Distances in the Sky

At home on a clear dark night when you can see at least twenty or so stars in the sky as well as the moon, complete the following observations and answer the questions below.

Part I. Finding Polaris (The North Star)

1. Locate the asterism "The Big Dipper," Constellation: Ursa Major in the northern sky.
2. The two stars in the outer edge of the "dipper's cup" form a line which points to the first star in the handle of "The Little Dipper" (Ursa Minor). This star is Polaris.
3. Locate a point on the true horizon (90° from zenith) below Polaris
4. Use your hands and fingers to estimate the altitude of Polaris in degrees.

Altitude of Polaris: _____ $^\circ$

5. Now using your hands and fingers estimate the angle from zenith down to Polaris.

Angle from zenith to Polaris _____ $^\circ$

6. Find the compliment of the angle from zenith to Polaris (90° - angle)

Compliment of zenith angle: _____ $^\circ$

Explain in words why this would be a better estimate of the altitude of Polaris than simply measuring from the horizon.

Determine your current latitude and longitude (online)

Orlando Lat. _____ N Orlando Long. _____ W

Explain in a few words or sentences the relationship between the altitude of Polaris and location on Earth.

Part II. Angular Size of the Moon.

1. Locate the moon. Describe its phase, altitude, and the time of the observation.
2. Use your fingers to estimate the largest angular diameter of the Full moon. (i.e. if it's a crescent, measure from horn to horn)

Angular diameter of the Moon _____°

3. Lookup the average Earth-Moon distance. _____ km
4. Using your estimated angular diameter of the Moon, and the Earth-Moon distance, calculate the *physical* diameter of the Moon.

Physical diameter of Moon _____ km

Look up the actual physical diameter of the Moon (twice its radius)

Actual diameter of Moon _____ km

Find the percent error between your calculated value and the actual value. Percent error is $(|Actual - Estimated|/Actual) \times 100\%$.

Percent Error _____%

Explain in a few short sentences whether or not you believe that using your hands and fingers to measure angular distances is an accurate way to measure astronomical objects.

5. Again using your fingers, measure the angular diameter of the moon when its close to the horizon and again when its high in the sky. Does the angular diameter appear to change? Does it actually change? Explain why or why not.