

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Outdoor Laboratory: Measuring Angular Distance

### Introduction

The distance between objects in the night sky is referred to as angular distance or angular separation. It is the distance, measured in degrees, minutes of arc (arc-minutes) or seconds of arc (arc-seconds), between any two objects from the observer's perspective. The Peterson Guide often notes the separation between stars in a multiple star system in arc-seconds. Without a telescope, distance is measured in degrees. For instance, how far above the horizon is Polaris (the north star) located? We all know from learning the star charts that this is the same as our latitude on Earth. Based on this, you can be put anywhere on the Earth above the equator and determine your latitude if you can accurately measure the distance from the horizon to Polaris. If you are below the equator, you would use any star near the celestial south pole.

### Procedure:

Tonight, you will determine the angular separation between 5 pairs of objects. The objects can be stars, planets, constellation centers, the Moon and some other object, etc. The adult human hand is an excellent reference. Below are some ways to estimate distance in degrees **at arm's length**.

$1^\circ \approx$  The width of your pinky finger.

$5^\circ \approx$  The index, middle and ring finger side-by-side.

$10^\circ \approx$  A closed fist.

$15^\circ \approx$  The index and pinky fingers spread apart.

$25^\circ \approx$  The thumb and pinky fingers spread apart.

|    | <u>Object 1</u> | <u>Object 2</u> | <u>Angular Separation</u> |
|----|-----------------|-----------------|---------------------------|
| 1. | _____           | _____           | _____ °                   |
| 2. | _____           | _____           | _____ °                   |
| 3. | _____           | _____           | _____ °                   |
| 4. | _____           | _____           | _____ °                   |
| 5. | _____           | _____           | _____ °                   |