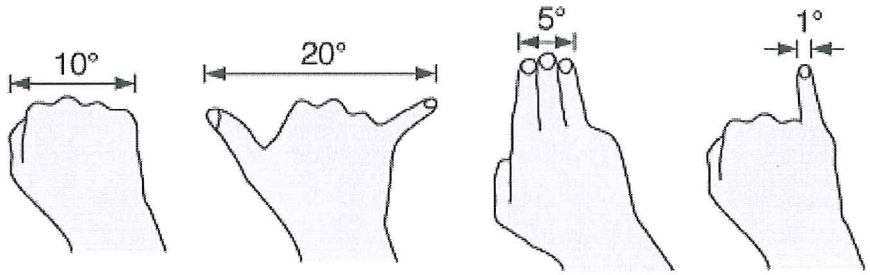
INST 2403

Angular Sizes and Distances



When observing the sky, we see how big objects **appear**, but not how big they **are**. Therefore, we will use angles to measure the "size" of objects and the "distance" between objects. For example, if the full moon and the sun appear in the East and the West, respectively, we say they are 180 degrees apart, but have no idea how many miles or kilometers there are between them.

In this activity, we will explore how angular sizes and distances are measured and what we can or cannot do with this information.

1. Use your hand on an outstretched arm to measure the angular distance between two nearby objects or the angular size of a nearby object, e.g. two close trees, or a window on a nearby building. For instance, 2 trees 10° apart.

2. What, if anything, does this tell you about the actual distance or size (in meters or feet).

   Nothing. Need to know/measure distance to object to determine its actual size.

3. Describe how the angular distance or size changes as you move closer to the object(s).

   The closer you get, the bigger (larger angle) the object appears.

4. Repeat 1-3 for far away object(s).

   ✓

5. Imagine the objects are very far away, like the moon or the stars
   a. Are the angles involved typically big or small? Very small.
   b. Does it make a difference if you are moving a substantial distance on Earth, e.g. does the moon look bigger on the equator or from Mt Everest? Why or why not?

      No. Stars look the same from Mt Everest. 9km (height of Everest) is insignificant compared to millions of km to sun, etc.

6. Try to think of a method of measuring the size of faraway objects like the moon, or list methods that will work for close but not for faraway objects.

   Need to use indirect methods (no yard sticks!) like triangulation, see surveyor methods.