

Activity 3: Simple Parallax.

How far is a star? That is a hard question, and to answer it requires a very good telescope. However, we can use the same method astronomers use on stars to figure out how far away the Moon is. To begin with, printout the file [MoonWiggles.pdf](#).

First, to get the idea behind parallax, try this: Look at something that is about 5 to 10 feet away, with something behind it that is much farther away. (A good example is looking at a tree or lamp post through a window.) Close one eye; then open it and close the other. Notice how the closer item appears to shift? If you have trouble doing this by alternating eyes, close one and shift your head gently back and forth a few inches for the same effect. If it is still hard to see, hold a finger up a foot or two from your nose and watch it shift back and forth. Try this with a variety of distances from you to the nearby thing and with a variety of far away backgrounds. Do you notice any pattern in the amount of shifting vs. how far away the nearest object is? Print out the .pdf file (LunarParallax.pdf) and then use it to estimate the parallax of the Moon as follows:

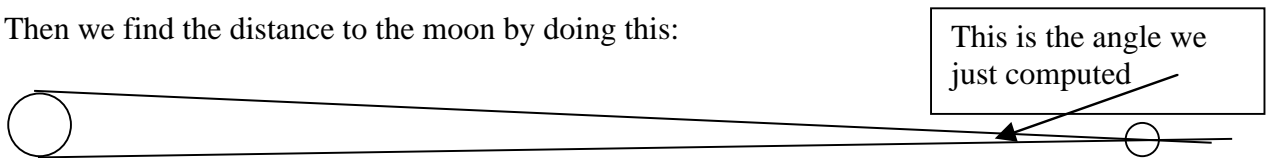
The diameter of the Moon, expressed as an angle on the sky, is 30 arc minutes. How much does it shift back and forth each day? Measure it like this:



Measure the diameter of the Moon on your printout and also measure the length of the little stubby lines perpendicular to the long line. (Note: The moon is a bit fuzzy so you'll have to make a good guess about how big it is.) Divide the length of the line by the diameter of the Moon to get the total daily parallax in unit of the diameter of the Moon. Since we know the diameter of the Moon in arcmin, we can write:

$$(\text{Stubby line length}/\text{circle diameter}) \times 30 = \text{daily parallax in arcmin.}$$

Then we find the distance to the moon by doing this:



Fill in these blanks to analyze your results:

Best estimate for the size of the moon's image, cm or inches: _____

Total daily parallax (stubby line), cm or inches _____

Daily parallax / Moon's image = _____

x 30 arcsec = daily parallax in arcmin

Then the distance to the Moon in units of the diameter of the Earth is just:

1719 divided by the (daily parallax in arcmin) = _____.

(That number comes from the number of arcminutes in a circle with a factor of pi in there because a circle has a circumference of πD and is 360×60 arcmin).