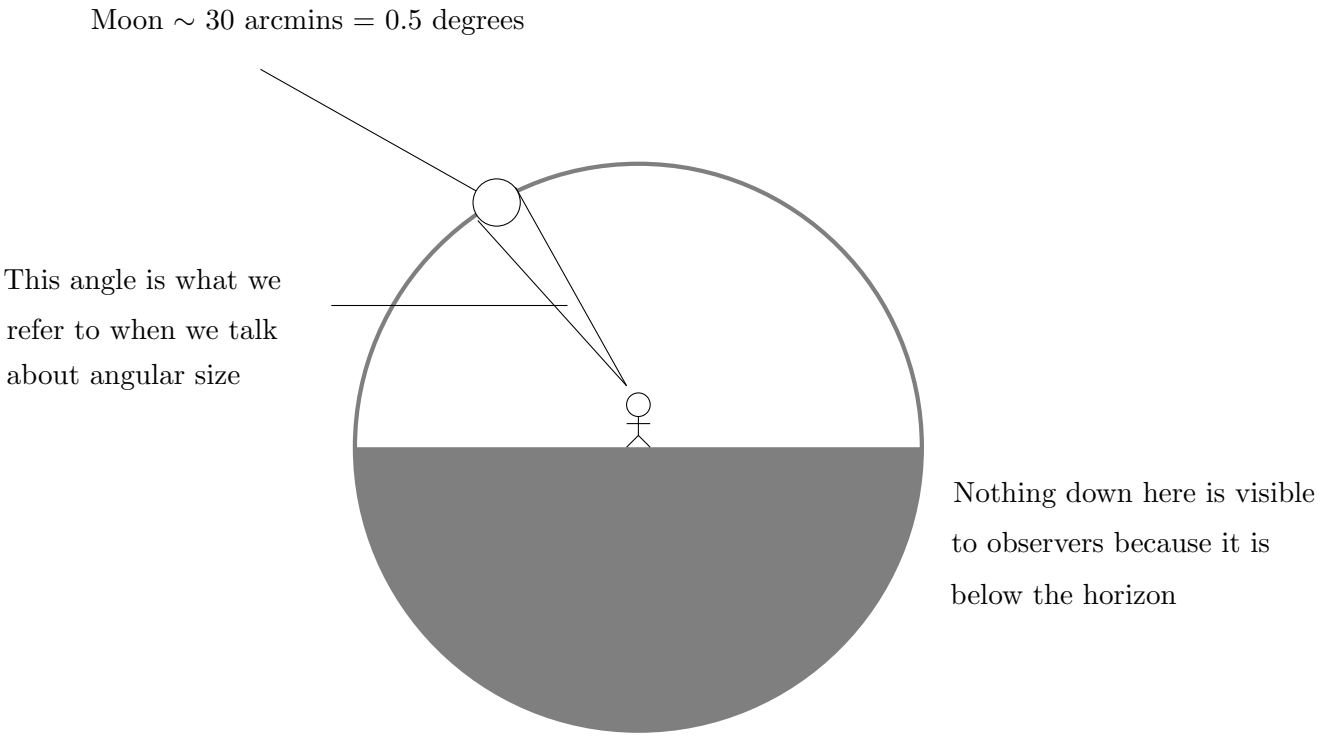
Understanding the arcsecond

The arcsecond is the smallest basic unit of angular measure on the sky. It is also a useful reference as one arcsecond is the approximate limit of resolution for a simple ground-based telescope due to atmospheric conditions. If the telescope is space-based, then physics and optics come into play, and the resolution of the telescope is limited merely by the size of the aperture and the quality of its components.

Let's get some intuition on just how small one arcsecond is.

We see the sky as one half of a circle, stretching from horizon to horizon. In a complete circle there are 360 degrees, so from horizon to horizon we see about half of that. Only around 180 degrees of sky are visible at one time. The moon has an angular diameter of about 0.5 degrees, or 30 arcminutes. Converted to arcsec the moon's diameter is about 1,800 arcseconds!



Here is a quick exercise to help you better understand the size of one arcsecond. Let $\theta = 1$ arcsecond, this is our observed resolution. Let the actual size of the observed object, h, be the diameter of a penny measured in millimeters.

$h =$ _____ mm