

Math Review: Measuring Angles in Astronomy

You are probably familiar with angles measured in degrees, where we divide a circle into 360 equal parts. You may not be familiar with the traditional system for expressing fractions of degrees. Each degree is divided into 60 equal pieces, each of these pieces is called an arcminute, and denoted with a single tick mark, that is:

$$1^\circ = 60'.$$

Furthermore, if we need a fraction even smaller than $1/60$ of a degree, we divide each arcminute into 60 pieces, and call that an arcsecond, that we denote with a double tick mark:

$$1' = 60''.$$

Notice that this means that one degree can be divided into 3600 arcseconds.

As an example, let's look at specifying an angle of $1/8$ of a degree in arcminutes and arcseconds. First let's figure out the number of arcminutes this angle corresponds to. Because there are 60 arcminutes in 1 degree, this angle is

$$1/8^\circ(60'/1^\circ) = 7.5'.$$

This means that there are 7 whole arcminutes in $1/8$ of a degree, but we need to turn the 0.5' into arcseconds:

$$(0.5')(60''/1') = 30''.$$

Therefore $1/8$ of a degree is also equal to $7' 30''$.

Your Turn

1. What is $1/16$ of a degree in arcminutes and arcseconds?

Answer: $3' 45''$.

2. What is an angle of 42.32 degrees in degrees, arcminutes, and arcseconds?

Answer: $42^\circ 19' 12''$.