

# Eclipsing Binary Stars

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**Background:** Binary stars are two stars caught in each other's gravity. They orbit in ellipses around their common center of mass. The center of mass is located at the \_\_\_\_\_ of the ellipse.

1. Draw the circular orbits of a pair of stars with equal masses:

Draw the circular orbits of a pair with masses in the ratio of 1 to 2:

2. Draw the elliptical orbits of a pair with equal masses:

Draw the elliptical orbits of a pair with masses in the ratio of 1 to 2:

Sometimes it is easier to just measure the separation of the fainter star (secondary) from the brighter star (primary). Sketch the previous case:

3. For some binary pairs our line of sight toward them lies in the plane of their orbits. This means that they have eclipses. During that time we see the light of only one star not both. Sketch the brightness vs. time for a full orbit for a pair of equal mass stars. This is called their light curve.
4. We can find when a known pair of eclipsing binaries is expected to have an eclipse (minimum light) at [www.as.ap.krakow.pl/o-c/cont.html](http://www.as.ap.krakow.pl/o-c/cont.html). Their name is two letters then the constellation abbreviation, for example, FZ Ori (for Orion).

For your constellation find some eclipsing binaries and record their V (visual) magnitude, and the Depth of the eclipse. Pri means primary eclipse, the brighter star is covered.

Choose several binaries with a magnitude brighter than 13 (numbers from 1 to 13) and a Depth more than .3 magnitudes.

Click on the link for current minima, in local time, EDT. Look for minima about 8 or 9 PM (20:00 or 21:00 EDT) on any night listed.

Also note if the Observed minus Calculated (O-C) curve is interesting, that is, an organized curve instead of a scatter diagram or a horizontal line at zero.

List your best candidates and we will discuss the possibilities and try to observe one of them from the class list..