ANSWER PAGE FOR EXERCISE 17.1

1. First make the necessary measurements to determine the horizontal and vertical chart scales in ("/cm). Measure the largest distances possible, between fiducial points, along the sides of the chart to get the best results. Record your measurements and do the calculations here:

   Distance along y-axis in cm: _____ Chart scale for y-axis _____ ("/cm)

   Distance along x-axis in cm: _____ Chart scale for x-axis _____ ("/cm)

2. Draw a smooth, symmetrical curve among the data points that is the best fit. Make several measurements of the amplitude of the wave (from peak to trough) in cm at several different places along the wave, take an average, and record your answer below. Multiply this by the vertical chart scale to convert cm to arcseconds and record on the next line. Half of this (the semi-ampltude) is the parallax of the star. Record this on the next line.

   Ave. amplitude in cm. _____. Ave. amplitude in arcsecs. _____.

   Parallax in arcseconds: _____.

3. Calculate the distance of the star as explained in Ex. 17.0 and record here: HD = _____ (pc).

4. Measure the wavelength of the wave in cm at several places along the wave (peak to peak), take an average and record your answer below. Multiply this by the horizontal chart scale and record your results. This is the proper motion of the star in arcseconds per year:

   Proper Motion wavelength in cm: _____ . Proper motion, **μ**, in arcseconds/year: _____ .

5. The actual distance that the star has moved through space, perpendicular to the line of sight, in one year is T_D and may be calculated from:

   $$T_D = HD \tan \mu$$

   But to find tan μ with your calculator, the proper motion must be converted to degrees by dividing μ by 3600 arcseconds per degree. Record this value here with 3 significant figures: …… _____(deg./yr).

6. Then use your calculator to find tan μ. Record this value here (express in powers of ten): _____.

7. Multiply this by HD to get T_D and record here: ……..____ (pc/yr.). This is actually the tangential velocity of the star in parsecs per year.

8. Now calculate the number of seconds in a year and record here:…….. _____ (sec/yr). Divide the answer in 7 by the number of seconds in a year and this is the tangential velocity of the star in parsecs per second.

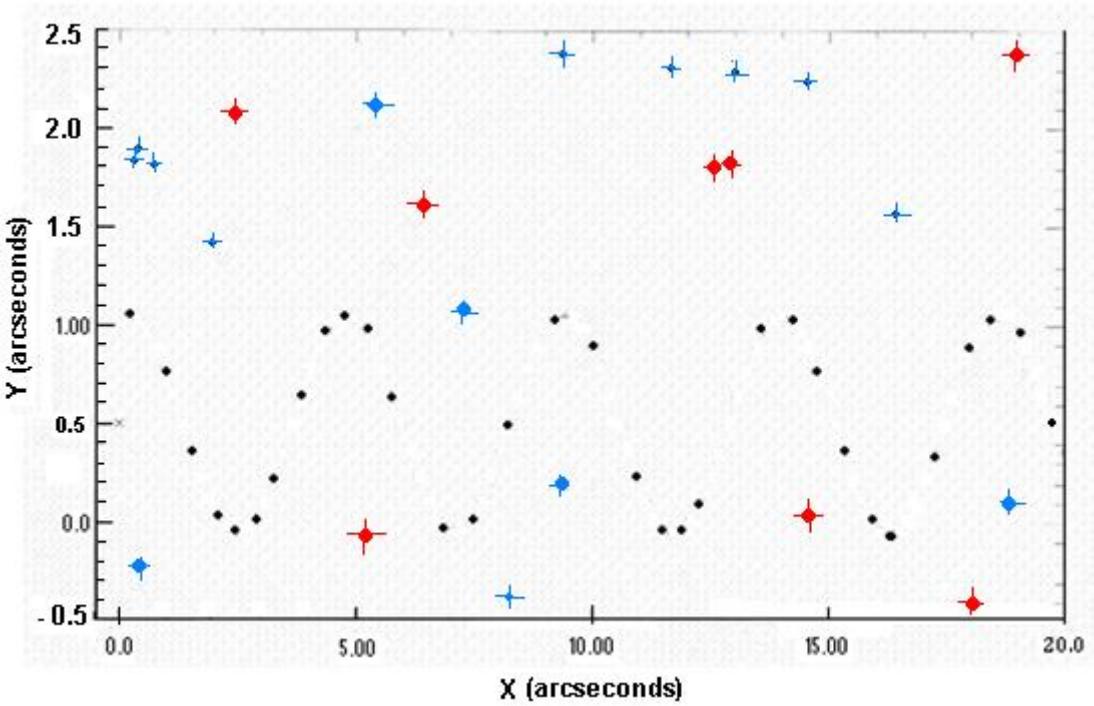
   T_D in pc/sec: _____.

If we multiply the last answer in 8, T_D, by the number of kilometers in a parsec (you should be able to calculate what this is), we obtain the tangential velocity of the star in km/sec. First use the data given in Exercise 17.0 to help you calculate the number of kilometers in a parsec and record this as item 9:

9. No. of kilometers in a parsec: ……____ (km/pc).

Now multiply the value of TD in 8 by the value in 9:

10. Tangential velocity of star in km/sec.: ……_____(km/sec).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15.00
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