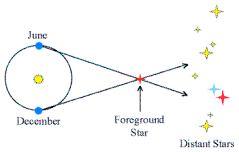
Student Activity:
Distances to Stars



Name _____
Date _____
Period _____ Table _____

How Do Astronomers Measure Distances To Stars?

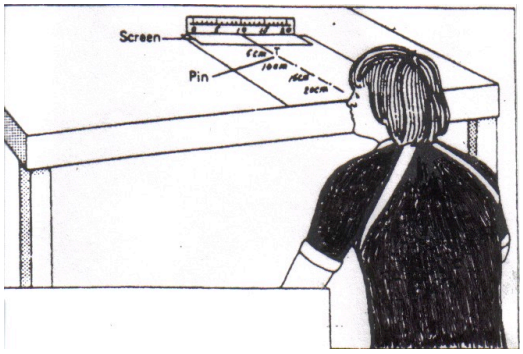
Hold up a pencil about 15 cm in front of your nose. Close one eye and observe a distant object. Now close the other eye and observe the same object. The pencil appears to jump back and forth. This is known as the **parallax effect**. Now you are going to learn how the parallax effect can be used to measure star distances.

Materials:

5 x 7 index card	T-pins	Card-board base mat	Tape
Graph paper	Pencil	Metric ruler	

Procedure:

Part A – Parallax Nearby



1. Fold the index card in half the long way to make a screen that will stand.
2. With a ruler, draw a line in the middle of one folded side of the screen as shown in illustration. Mark the line in 1-cm spaces from 0 cm to 20 cm as shown
3. Place the graph paper and the screen on the table as shown in the illustration. The edge of the paper should be even with the edge of the table. Tape the paper and the screen in place. Now mark a line on the paper from the center of the screen (10-cm mark) to the edge of the graph paper (See the illustration.)
4. Place a T-pin in the graph paper 5 cm from the screen.
5. Stoop down so that your eyes are level with the T-pin. The T-pin should be level with your eyes. Close your right eye and look at the T-pin with your left eye. Note the apparent position of the T-pin on the scale on the screen. Record your position under the heading ***Position A*** in the chart on the following page.
6. Now close your left eye and look at the T-pin. Note its apparent position. Record this in the chart under ***Position B***.
7. Determine how many centimeters the pin appears to shift. To do this, subtract the number in ***Position B*** from the number in ***Position A***. Record this in the last column of the chart.
8. Repeat steps 4-7 with the pin placed at 10 cm, 15 cm, and 20 cm from the screen. Record the data in the chart.

PARALLAX OBSERVATIONS CHART

Distance of T-pin from screen	Position A: Pin Viewed with Left Eye	Position B: Pin Viewed with Right Eye	Distance Pin Appears to Shift
5 cm			
10 cm			
15 cm			
20 cm			

PART B – PARALLAX AT A GREAT DISTANCE

1. Place the T-pin at the 20-cm position. Back off about 3 meters.
2. Look at the T-pin first with one eye, then the other. Observe the apparent shift.

CONCLUSION:

1. In Part A, at which distance did the T-pin appear to shift most? _____ shift least? _____
2. In Part B, you were far away from the pin. Was the parallax shift as great as when you were close? _____
3. When was the parallax shift great—when the T-pin was close to you or far away from you?

   _____
4. Suppose there were two pins in front of the screen. How could you determine which was closer to you? _____
5. Astronomers use the parallax effect to measure distances to nearby stars. The background of far distant stars serve as a screen. Astronomers don't close one eye, then the other. Instead, they look at the stars from two widely separated locations. Suppose they observe stars A and B from two telescopes on opposite sides of Earth. When viewed against the background of distant stars, star A appears to shift very little. Star B shows a large parallax shift.

   Which star is farther away from Earth? _____