

Scale Model of the Solar System Including Halley's Comet

This lab will guide you in drawing a scale model of the solar system including the orbit of Halley's comet.

To draw the orbit of Halley's comet, you must know the length of its major axis (36 AU) and the distance between its foci (35 AU). If you use a scale of 1 AU = 1 cm, the orbit will fit on a 19" × 24" sheet of paper.

- 1) Make a loop of string 36 cm long. The easiest way to do this is to put two tacks 36 cm apart on your piece of cardboard; then tie the loop **tightly** around these tacks. This will be used to make an ellipse with a major axis corresponding to that of Halley's Comet.
- 2) Pin or tape the paper down on a thick piece of cardboard. Get two tacks and place them in line on the paper, separated by 35 AU on your scale. Loop the string around both tacks. Place a pencil within the loop of the string and, keeping that string taut, trace out the ellipse. ***You may have a little trouble keeping the string tight through the perihelion and aphelion points, but be careful to do so.***
- 3) When the ellipse is drawn, take away the string and tacks and draw in the major axis and minor axis. Label the sun (which is at one focus), the perihelion point (where Halley's Comet was nearest the Sun) and the aphelion point (where it was furthest from the Sun). Measure the length of the major axis and minor axis then calculate the semimajor and semiminor axis (half the major or minor axis) and label them on your drawing.
- 4) Draw in the orbits of Mercury (0.4 AU), Venus (0.7 AU), Earth (1 AU), Mars (1.5 AU), Jupiter (5 AU), Saturn (10 AU), Uranus (19 AU) and Neptune (30 AU) as circles centered on the sun. Also, include the asteroid belt that is between the orbits of Mars and Jupiter. ***Note: Do not force the compass to open further than it easily opens.*** You will need to figure out a way to draw the orbits of the outer planets **without** using a compass.
- 5) Label the dates when Halley's Comet was at the following locations: Aphelion: 1948, Orbit of Uranus: 1983, Orbit of Saturn: 1985; Perihelion: 2/9/86; Orbit of Earth: 4/11/86.
- 6) Show the comets tail at different points in the orbit. ***The tail only appears when the sun's heat evaporates ice from the comet. This began to occur in December 1985.*** There are two parts to the tail: the blue gas tail that is always blown directly away from the sun by the solar wind and the yellowish dust tail that curves away from it. See Figure 12.10 on page 354 of your text.