Student Activity B3m Exploring Orbits of Comets (Drawing Ellipses)

Teacher Notes:
The orbit of a comet is described as an ellipse. Using boards, string loops, and thumbtacks, students will draw a variety of ellipses and compare their characteristics, then make applications to the orbits of comets.

Materials:
- 1" thick pine boards (10"x12")
- Loop of white package string
- 2 thumbtacks per board
- Pencils
- White copy paper
- Investigation page, Drawing Ellipses

Preparation:
1. Cut 12" wide pine boards into 10" lengths. (Avoid having knots in the center of the boards.)
2. Tie loops of string using the 12" lengths.
3. Make copies of the investigation page, Drawing Ellipses.

Student Activity:
1. Explain to the students that they are going to explore the shape of a comet's orbit by drawing several with a string loop and tacks.
2. Pass out copies of the investigation page, Drawing Ellipses and demonstrate how to draw an ellipse using the string loop, tack, and a board. (Don't draw the whole ellipse; just show how to set up the equipment and then demonstrate by drawing part of an arc.)
3. Pass out the materials and encourage the students to draw several ellipses, changing the shape by moving the tacks closer or farther from each other with each drawing. (Caution the students not to push the tacks all the way into the board because the loop of string will bend up or not move smoothly. Later the tacks will be difficult to remove from the board.)

Drawing Ellipses

What you need to begin:
- Scratch paper
- Two thumbtacks
- A loop of string
- A board
- Pencil

1. Place a paper on the board and push the thumbtacks through the paper a few inches apart. Put the string loop over the tacks. Use the pencil point to pull the loop tight. Swing the pencil around the tacks, keeping the string tight. The line drawn will form an ellipse.

Activity B3m Exploring Orbits of Comets (Drawing Ellipses) Page 2

Activity (continued):
period of exploration
students compare ellipses. Ask the students to draw what they think the shape of the orbit would look like. Then ask what they think the period of revolution would be for the ellipse. The more tacks, the

- Ask the students to write the names of objects in the solar system on strips of paper and post them under the ellipse that most resembles their orbit.
- If the two tacks are so close together that they are touching?

(What shape would you get if you used only one tack?)

3. Try moving the tacks as far apart as possible and drawing an ellipse.