Conic Sections Applications and Properties

1. Kepler's first law of planetary motion is:
The path of each planet is an ellipse with the sun at one foci.
a. In its orbit around the sun, the closest the earth comes to the sun is 91,500,000 miles. Its farthest point is 94,500,000 miles. If the sun is at one focus, find the length of the major and minor axes.

Major axis = _____

Minor axis = _____

b. The American artificial satellite Explorer followed an elliptical orbit around the earth. At its closest point to the Earth (perigee) it was 230 miles away. Its farthest point (apogee) was 1700 miles away. If the radius of the Earth is 4000 miles and the center of Earth is at one focus, find the major and minor axes of this orbit.

Major axis = _____

Minor axis = _____

2. If the ellipse is rotated about the major axis, we get an ellipsoid. A football is an example of an ellipsoid.

3. If you have ever been on a tour of the Capitol in Washington, D.C. , you may have been amazed by a demonstration given by the guide. After placing the group of people on a brass plate in the floor of the old House of Representatives, the guide walks about 100 feet away and whispers. You can hear every syllable clearly! ! The reason for this is that the ceiling is elliptical and the sound waves are reflected so that they focus upon a single point. The very weak sound waves of the guide's voice, going out in all directions, were reflected through the other focus (both marked by brass plates).

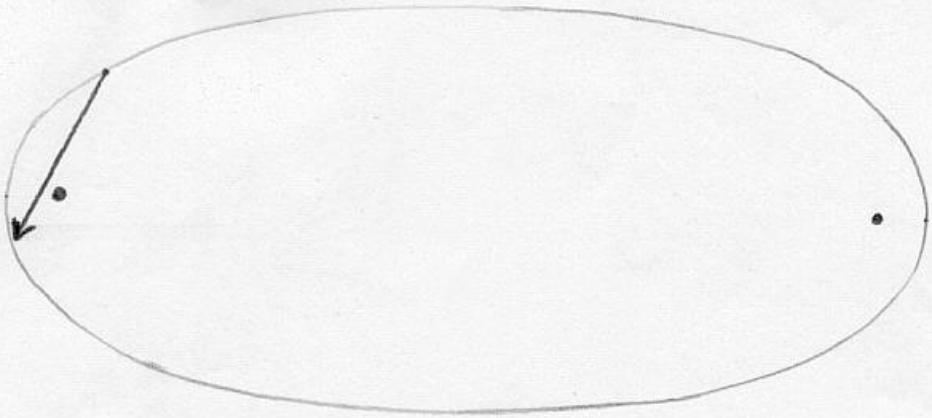
4. Elliptical Billiard Table

A. A ball is hit so as not to pass between the foci. With a ruler and protractor, draw the path of the ball for at least 5 reflections, and then draw a conclusion about its path.

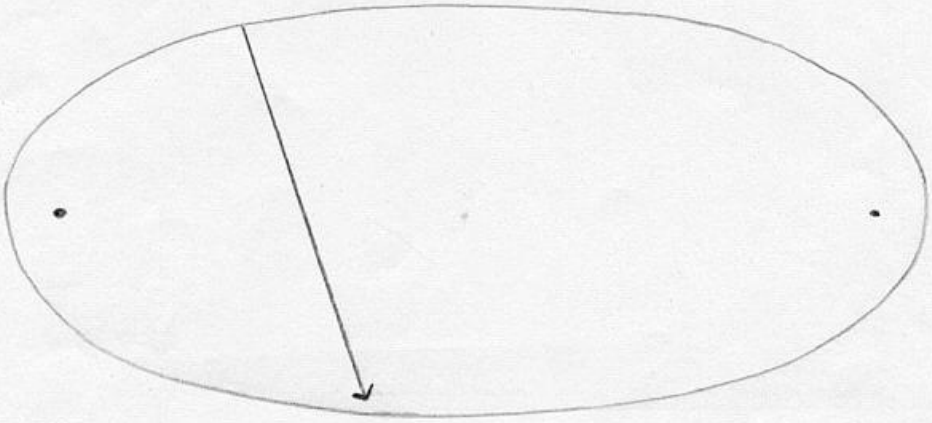
B. The ball is hit between the foci. Follow the path of the ball for at least 5 reflections. Make a conclusion about its path.

C. Now start the ball at a focus, Follow its reflections. What does its course approach after a few rebounds?

A



B



C.