

1. A radio tower services a 10 mile radius. You stop your car 5 miles east and 8 miles north of the tower. Will you be able to receive radio waves from the tower? Explain.
2. A satellite in stationary orbit rotates about the Earth once each day. Assume the satellite is 22,300 miles above the Earth's surface and that the Earth's radius is 3960 miles. Write an equation that represents the orbit of the satellite on the coordinate plane with the origin representing the center of the earth.
3. A pizza delivery area can be represented by a circle, and extends to the points (0, 18) and (-6, 8) (these points are on the diameter of this circle). Write an equation for the circle that models this delivery area. Determine the delivery area of the pizza shop.
4. A 2 lane highway goes through a semicircular tunnel that is 14 feet high at the top. If each lane is 12 feet wide, how high is the tunnel at the edge of each lane?
5. A wishing pool in the park is in the shape of an ellipse that is 5 meters across and 8 meters long with decorative fountains located at the foci. How far from the center should the fountains be located? (Rounded to the nearest hundredth). How far apart are the fountains?
6. An arch in the shape of the upper half of an ellipse is used to support a bridge that is to span a river 20 meters wide. The center of the arch is 6 meters above the center of the river. Write an equation for the ellipse if the x-axis coincides with the water level and the y-axis passes through the center of the arch.
7. A narrow arch supporting a stone bridge is in the shape of half an ellipse and is 24 meters long and 8 meters high. A person standing at one focus of the ellipse throws a rubber ball against the arch. No matter what direction the ball is thrown, it always bounces off the arch once and strikes the same point on the ground (the other focus). How far apart are the person throwing the ball and the point on the ground at which the ball strikes?
8. An elliptically shaped garden is surrounded by a wood walkway. The garden is 15 meters long and 8 meters wide. The walkway is 2 meters wide. Find the equation describing the ellipse that includes both the garden and the walkway.
9. An arch of a bridge over a highway is semi-elliptical in shape and 42 ft. across. The highest point of the arch is 14 feet above the highway. What is the maximum height, to the nearest inch, of a truck 8 ft. wide that can fit under the arch? (assume the highway is one lane)
10. The ceiling of the "whispering gallery" of the Statuary Hall in the United States Capitol is semi-elliptical. Because of the properties of reflection, if a person is standing at one focus, her whisper can be heard by a person standing at the other focus.
  - a. Suppose the ceiling measures 46 feet high and 96 feet long. How far apart are the two people?
  - b. **(Optional)** Suppose the distance between the foci is 38.5 feet and the maximum height above ear level is 37 feet. Find the equation of the elliptical cross section of the gallery assuming the center is at the origin.
11. **(Optional)** An ice rink is in the shape of an ellipse, and is 150 feet long and 75 feet wide. What is the width of the rink at a position 15 feet from a vertex?