Conics Hmwk Day 3: Ellipse Applications

Precalc: p. 438 #32 and p. 439 #45, 48a, b, 52 and p. 440 66 and
Our book: p. 761 #31

32. HISTORY The United States Capitol has a room with an elliptical ceiling. This type of room is called a *whispering gallery* because sound that is projected from one focus of an ellipse reflects off the ceiling and back to the other focus. The room in the Capitol is 96 feet in length, 45 feet wide, and has a ceiling that is 23 feet high.

a. Write an equation modeling the shape of the room. Assume that it is centered at the origin and that the major axis is horizontal.

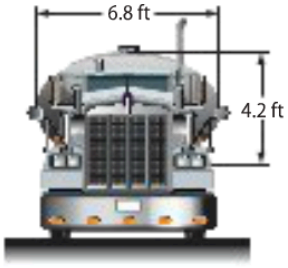
b. Find the location of the two foci.

c. How far from one focus would one have to stand to be able to hear the sound reflecting from the other focus?

Find the center, foci, and vertices of each ellipse.

45. $\frac{x^2}{100} + \frac{(y+6)^2}{25} = 1$

48. TRUCKS Elliptical tanker trucks like the one shown are often used to transport liquids because they are more stable than circular tanks and the movement of the fluid is minimized.



a. Draw and label the elliptical cross-section of the tank on a coordinate plane.

b. Write an equation to represent the elliptical shape of the tank.

52. ROLLER COASTERS The shape of a roller coaster loop in an amusement park can be modeled by

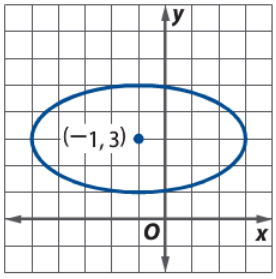
$$\frac{y^2}{3306.25} + \frac{x^2}{2025} = 1.$$

a. What is the width of the loop along the horizontal axis?

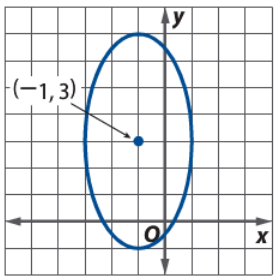
b. Determine the height of the roller coaster from the ground when it reaches the top of the loop, if the lower rail is 20 feet from ground level.

66. ERROR ANALYSIS Yori and Chandra are graphing an ellipse that has a center at $(-1, 3)$, a major axis of length 8, and a minor axis of length 4. Is either of them correct? Explain your reasoning.

Yori



Chandra



Find the point(s) of intersection, if any, between each circle and line with the equations given.

31. $x^2 + (y + 2)^2 = 8$

$y = x - 2$