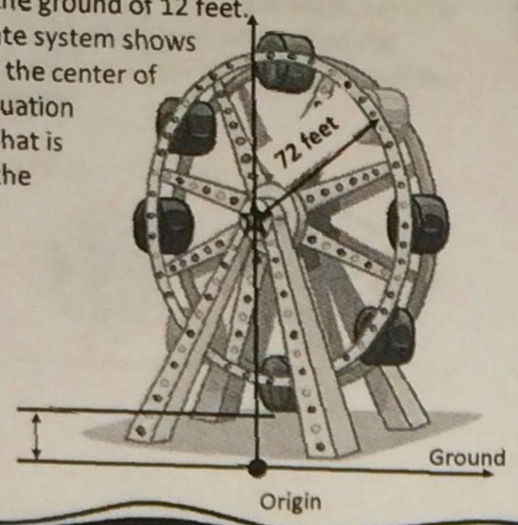
1

The ferris wheel has a radius of 72 feet, with a clearance between the wheel and the ground of 12 feet. The rectangular coordinate system shows The origin directly below the center of The wheel. Write the equation for the circular wheel. What is the maximum height of the ferris wheel?

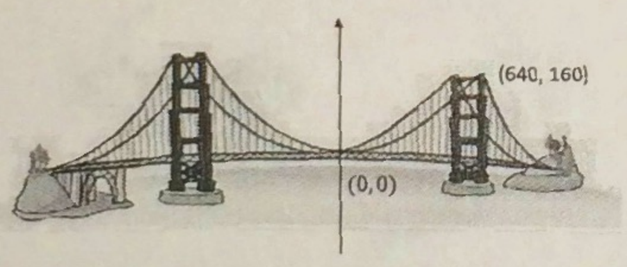


2

The elliptical ceiling in Statuary Hall in the U.S. Capitol Building is 23 feet tall and 96 feet long. John Quincy Adams discovered that he could hear the conversations of the opposing party leaders near the left side of the chamber if he placed his desk at the focus on the right side of the chamber. How far, to the nearest foot, from the center of the ellipse along the major axis did Adams place his desk?

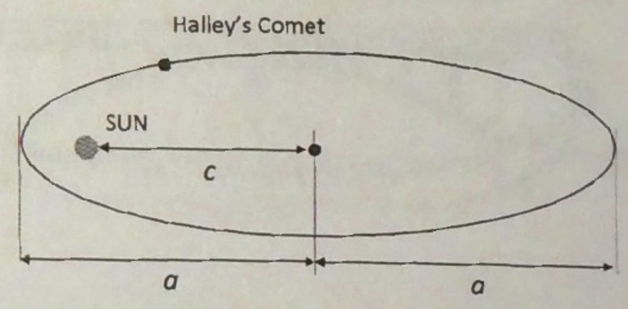
3

The towers of the Golden Gate Bridge across San Franscisco Bay are 1280 meters apart and rise 160 meters above the road. The cable between the towers is shaped like a parabola, and the cable just touches the sides of the road midway between the towers. Find the height of the cable 200 meters from the tower.



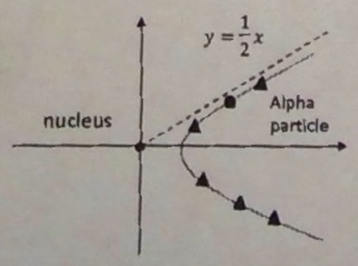
4

Halley's comet has an elliptical orbit with eccentricity $e = 0.967$. By measuring distance in astronomical units, the closest that Halley's comet comes to the sun is 0.587 AA. Approximate the maximum distance of the comet from the sun, to the nearest 0.1 AA. Note: $e = \frac{c}{a}$



5

In 1911, physicist Ernest Rutherford discovered that when alpha particles are shot toward the nucleus of an atom, they are eventually repulsed away from the nucleus along hyperbolic pathways. If a particle gets as close as 3 units to the nucleus along a hyperbolic path with an asymptote given by $y = \frac{1}{2}x$. Find an equation of the path.



6

A satellite dish in the shape of a parabolic surface is 12 feet across and 2 feet deep. Satellite signals strike the surface of the dish and are reflected to the focus, where the receiver is located. How far from the base of the dish should the receiver be placed?