

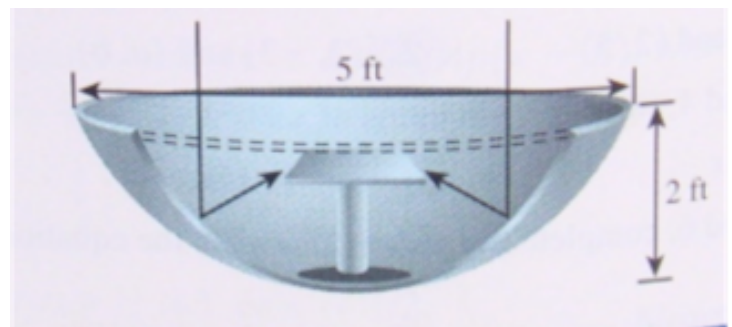
HAT 2/16/18
Conic Applications

- 1) On average, the circular eye of a hurricane is about 15 miles in diameter. Gale winds can affect an area up to 300 miles from the storm's center. A satellite photo of a hurricane's landfall showed the center of its eye on one coordinate system could be approximated by the point $(80, 26)$.
 - a) Write an equation to represent a possible boundary of the hurricane's eye.
 - b) Write an equation to represent a possible boundary of the area affected by gale winds.

- 2) James wants to make an ellipse using a piece of string 26 inches long. He tacks the two ends down 10 inches apart, pulls the string taut, and uses a pen to draw the curve. Write an equation for this curve.

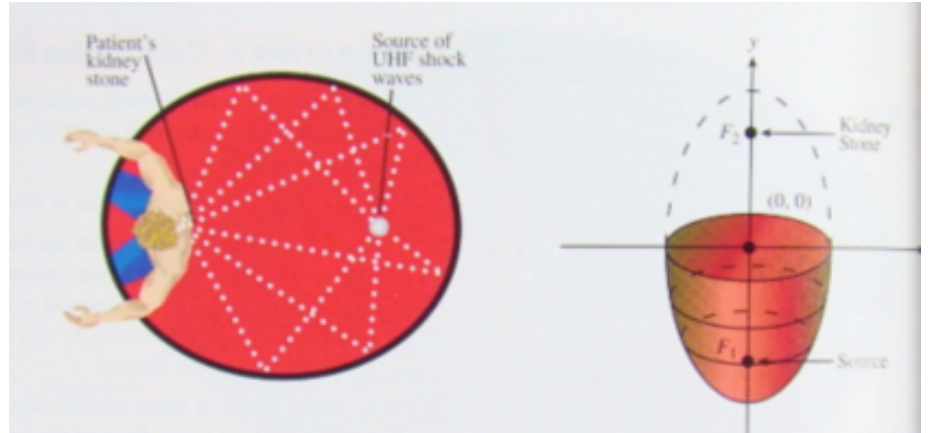
- 3) Brittany and Kirk were talking on the phone when Brittany heard the thunder from a lightning bolt outside. Eight seconds later, she could hear the same thunder over the phone. Brittany and Kirk live 2 miles apart and sounds travels about 1 mile every 5 seconds.
 - a) Assume that Brittany is located at $(-1, 0)$ and Kirk is located at $(1, 0)$. Using the distance formula, write an equation that describes the possible locations of the lightning strike.
 - b) Rewrite the equation in "form" for a hyperbola.
 - c) Which branch of the hyperbola corresponds to the places where the lightning bolt might have struck?

- 4) The reflector of a television satellite dish is a paraboloid of revolution with diameter 5 feet and depth of 2 feet. How far from the vertex should the receiving antenna be placed?

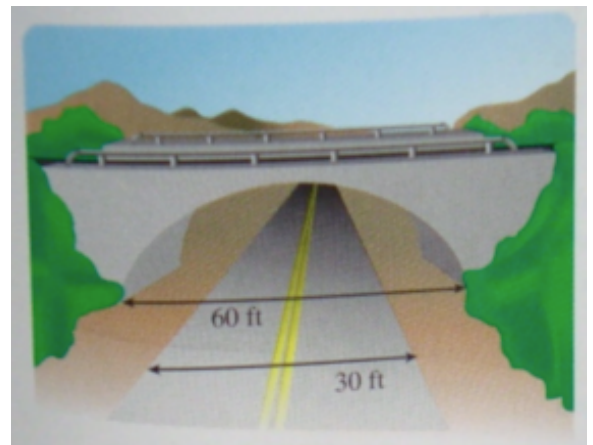


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- 5) A lithotripter's shape is formed by rotating the portion of an ellipse below its minor axis about its major axis. If the length of the major axis is 26 inches, and the length of the minor axis is 10 inches, where should the shock-wave source be placed for maximum effect?

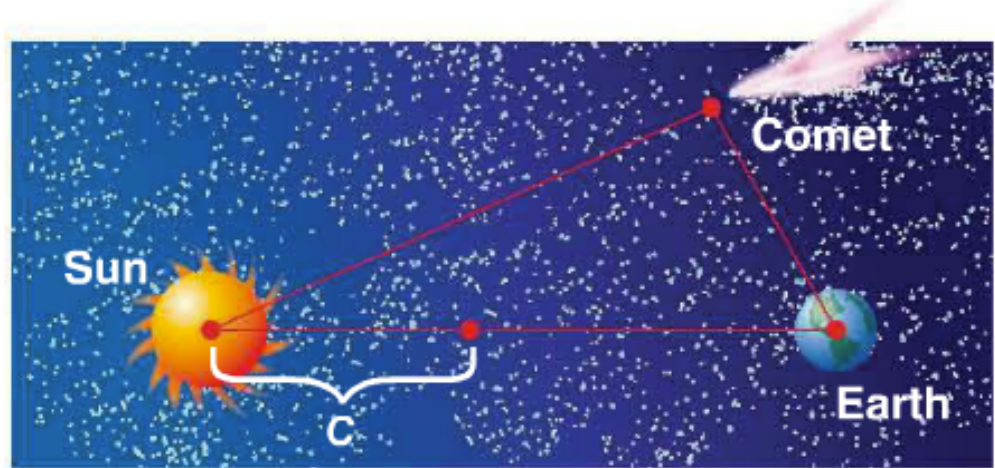


- 6) With the Sun as focus and the center at the origin, a certain comet's path follows a branch of a hyperbola. If two of the coordinates of the path are $(10, 0)$ and $(30, 100)$ where the units are in millions of miles, determine the equation of the path.
- 7) A whispering gallery is an elliptical room in which a faint whisper at one focus cannot be heard by other people in the room, but can easily be heard by someone at the other focus. Suppose an ellipse is 400 feet long and 120 feet wide. What is the distance between the foci?
- 8) Parabolic arches are known to have greater strength than other arches. A bridge with supporting parabolic arch spans 60 feet with a 30 feet wide road centered underneath the bridge. If the parabola is 16 feet tall at the peak, what is the clearance at the outer edge of the road?



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- 9) Earth and the Sun are 146 million kilometers apart. A comet follows a path that is one branch of a hyperbola. Suppose the comet is 30 million miles farther from the Sun than the Earth. Determine the equation of the hyperbola centered at the origin for the path of the comet.



- 10) The range of a radio station is bounded by a circle given by the following equation:

$$x^2 + y^2 - 1620 = 0$$

A straight highway can be modeled by the following equation:

$$y = -\frac{1}{3}x + 30$$

Find the length of the highway that lies within the range of the radio station.

- 11) A seismology records the epicenter of an earthquake 50 miles away. A second seismograph, 50 miles west and 35 miles north of the first, records the epicenter as being 35 miles away. A third seismograph, 80 miles due west of the first, records the epicenter 30 miles away. Where was the earthquake's epicenter in relation to the first seismograph?