

Agenda 4/10 WED

1. Review HW #14 & 15 & Collect HW #13
2. Problem Solving Review

Pg 641 #1, 2, 3, 6, 8, 9

Pg 667 #1, 2, 4, 6

Ch 9 Test 4/12 Fri

LESSONS 9.1–9.4

1. **MULTI-STEP PROBLEM** Parabolic reflectors with a microphone at the focus allow you to listen to sounds from far away. A parabolic microphone has a reflector that is 22.4 inches in diameter and 8 inches deep.



- a. How far is the focus from the vertex?
- b. Write an equation for the cross section of the reflector such that the vertex is at $(0, 0)$ and the reflector opens to the right
- c. Graph the equation from part (b).

2. **MULTI-STEP PROBLEM** A fishing boat's radar has a range of 16 miles. A second boat is 12 miles west and 12 miles south of the fishing boat.

- a. Write an inequality describing the region covered by the radar if the fishing boat is anchored at the origin.
- b. Is the second boat in range of the radar?
- c. A third boat 6 miles north and 4 miles east of the fishing boat begins moving westward. For what distance will the third boat be in radar range of the fishing boat?

Pg 641

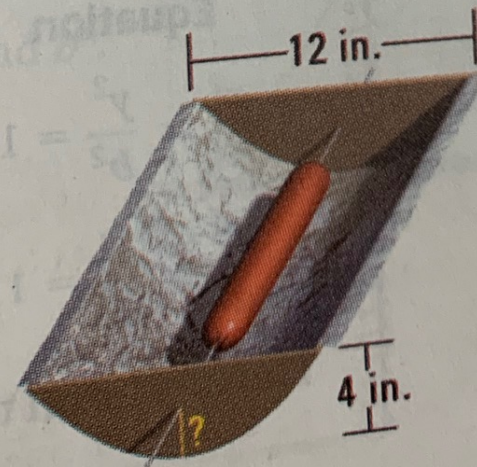
3. **MULTI-STEP PROBLEM** In its elliptical orbit Mercury ranges from 29 million miles to 44 million miles from the sun, which is at focus of the orbit.

- Draw a sketch of the situation.
- Find the values of a and c .
- Write an equation for Mercury's orbit.

6. **SHORT RESPONSE** Two lines are tangent to the circle $x^2 + y^2 = 13$, one at $(-2, -3)$ and one at $(3, -2)$. What is the relationship between the two lines? *Explain.*

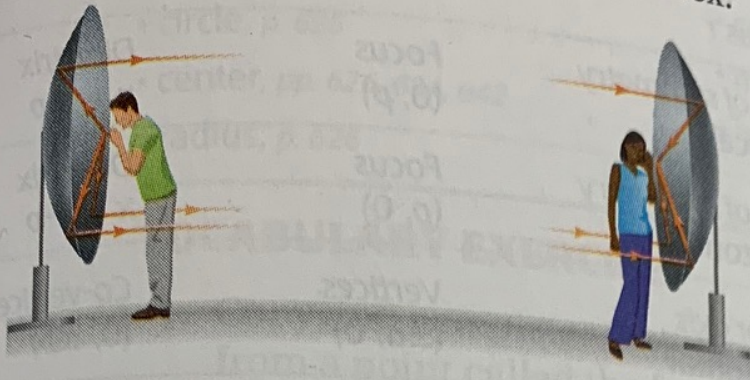
8. **GRIDDED ANSWER** To get from your home to the beach, you drive 8 miles south, then 16 miles east, and then 4 miles south. What is the straight-line distance from your home to the beach?

9. **GRIDDED ANSWER** You can make a solar hot dog cooker by shaping foil-lined cardboard into a parabolic trough and passing a wire through the focus of each end piece. For the trough shown, how far from the bottom, to the nearest tenth of an inch, should the wire be placed?



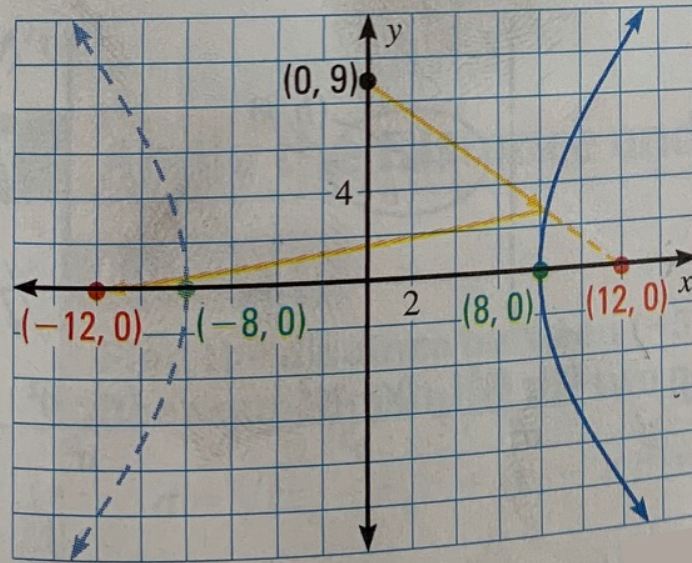
Pg 667

1. **MULTI-STEP PROBLEM** A person at the focus of one of two facing parabolic dishes can hear even a very soft sound made at the focus of the other dish. Two such “whisper dishes” are positioned with their vertices 47 feet apart. Each dish’s focus is 1.5 feet from its vertex.



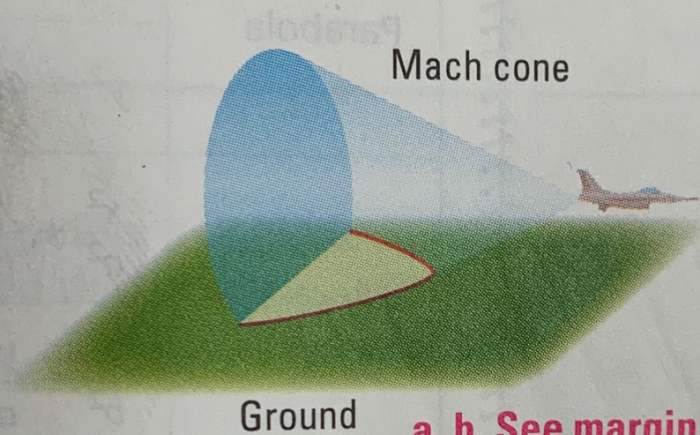
- a. Write an equation in standard form for the cross section of each dish if the vertex of one dish is at the origin and the vertex of the other dish is on the positive x -axis.
- b. The diameter of each dish is 67 inches. How deep is each dish?
- c. How far apart are the focus and vertex for a dish 8 feet in diameter and 1.25 feet deep?

2. **MULTI-STEP PROBLEM** A hyperbolic mirror reflects light directed toward one focus to the other focus. The hyperbolic mirror shown has foci at $(\pm 12, 0)$ and vertices at $(\pm 8, 0)$.



- a. Write an equation for the mirror.
- b. Write an equation for the path of the light beam originating at the point $(0, 9)$ before the beam reflects off the mirror.
- c. At what point does the light beam in part (b) reflect off the mirror?

4. **EXTENDED RESPONSE** When a jet breaks the sound barrier, sound waves form a “Mach cone” behind the jet, and a sonic boom is heard as the cone passes. The Mach cone for a jet in level flight meets the ground in a hyperbola with the jet directly above the center. Suppose a jet makes a sonic boom heard along $\frac{x^2}{36} - \frac{y^2}{100} = 1$ where x and y are in miles.



a, b. See margin.

- What is the shortest possible horizontal distance you could be from the jet when you first hear the sonic boom? *Explain.*
- The jet passes a second time, creating a sonic boom heard along $\frac{x^2}{9} - \frac{y^2}{25} = 1$.

Answer the question from part (a) for this sonic boom.

6. **GRIDDED ANSWER** A logo has intersecting ellipses modeled by $9x^2 + y^2 + 8y = 20$ and $x^2 + 4y^2 = 16$. What is the y -coordinate of the uppermost point of intersection? **2**

- c. Describe the relationship between the two hyperbolas.