PRACTICE & PROBLEM SOLVING

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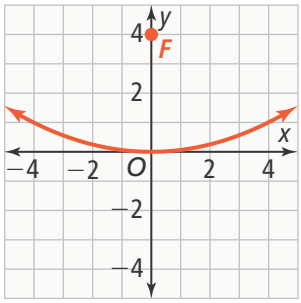
Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

10. Use Structure Write an equation of the parabola shown in the graph.



11. Generalize What determines the type, size, and shape of a conic section?

12. Error Analysis Describe and correct the error a student made in identifying the vertex and directrix of the parabola with equation $0 = 2x + y^2 - 8y + 16$.

$0 = 2x + y^2 - 8y + 16$

$-2x = (y - 4)^2$

$x = -\frac{1}{2}(y - 4)^2$

Vertex: (4, 0); directrix: $x = -2$

✗

13. Look for Relationships What is the shape of a parabola whose focus is very near the directrix?

14. Reason The equation of a parabola is $(x + 2)^2 = 12y$. What are the y-intercept(s), if any, of the parabola?

15. Higher Order Thinking The parabola with equation $y = (x + 3)^2 - 5$ has its vertex at $(-3, -5)$ and passes through $(1, 11)$.

a. Identify the focus and directrix of the parabola.

b. Name the line of symmetry.

c. Find another point through which the parabola passes that is the same distance from the line of symmetry as $(1, 11)$.

PRACTICE

Write an equation for all points equidistant from the given point and line. SEE EXAMPLE 1

16. point $(0, -2)$ and line $y = 2$

17. focus $\left(\frac{1}{4}, 0\right)$ and directrix $x = -\frac{1}{4}$

18. A parabola has a focus of $(-5, 0)$ and a directrix at $x = 5$. SEE EXAMPLE 2

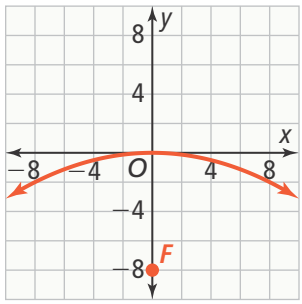
a. What is the vertex of the parabola?

b. Is the equation in the form $y = ax^2$ or $x = ay^2$?

c. What is the focal length?

d. What is the equation of the parabola?

19. What is the equation of the parabola shown in the graph? SEE EXAMPLE 3



20. The cross section of a newer solar cooker is a parabola modeled by the equation $y = \frac{1}{160}x^2$, with distances measured in centimeters. The bracket that holds the pan for the cooker needs to be placed at the focus. Assuming that the vertex of the parabolic dish is at the point $(0, 0)$, at what coordinates should the bracket be placed? SEE EXAMPLE 4

21. Complete the square to find the vertex form, and identify the vertex, focus, and directrix of the parabola with the given equation. SEE EXAMPLE 5

a. $0 = -x + 2y^2 - 12y + 19$

b. $x^2 + 24y - 8x = -16$

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Mixed Review Available Online

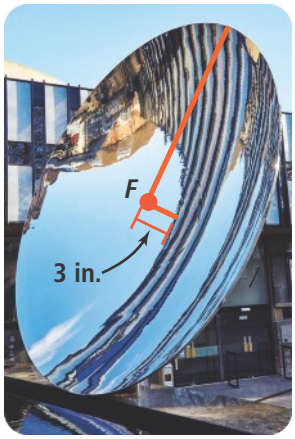
APPLY

22. Make Sense and Persevere The graphs of the equations $0 = y^2 - 8y - 8x$ and $0 = y^2 - 8y + 12x + 28$ have the same directrix.

a. What is the equation of the directrix?

b. What is the distance between the foci?

23. Model With Mathematics A parabolic mirror has a focus that is located above the vertex of the mirror at the distance shown below. Assume the vertex is at the origin. Write an equation of the parabola that models the cross section of the mirror.



24. Reason The EuroDish was developed to provide electricity in remote areas, collecting sunlight with a parabolic reflector, which, in turn, powers the engine located at the focus. Assume that a cross section of the parabolic reflector has its vertex at (0, 0). The engine is 12 ft from the vertex.

a. Write an equation for the parabola.

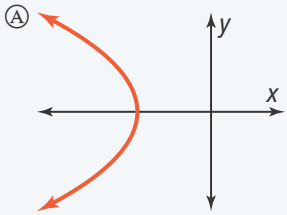
b. Suppose the diameter of the dish is 24 ft. How deep is the dish?

ASSESSMENT PRACTICE

25. Which of the following are true about the graph of the parabolic equation $x + y^2 = 2y - 1$? Select all that apply.

Ⓐ opens downward
Ⓑ vertex (1, 0)
Ⓒ directrix $x = \frac{1}{4}$
Ⓓ focus $\left(-\frac{1}{4}, 0\right)$

26. SAT/ACT Which graph could have a focus at $(h, 0)$ and directrix $x = -h$, for $h < 0$?

Ⓐ


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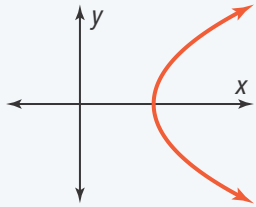

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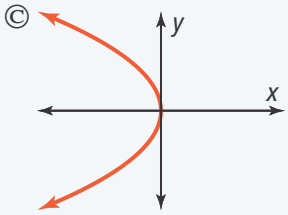

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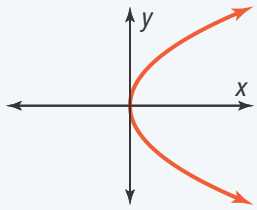
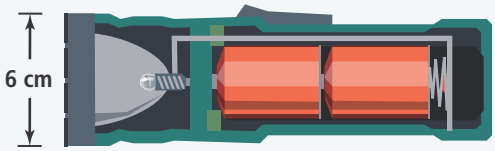


27. Performance Task The cross section of a flashlight reflector is parabolic. It has an axis of symmetry that is horizontal, and the measure of the widest part of the parabola has the measure shown. The light bulb is at the focus of the parabolic cross section, and the distance from the vertex to the light bulb measures 1 cm.



Part A What is the equation of the parabolic cross section of the reflector?

Part B How many centimeters deep is the reflector?