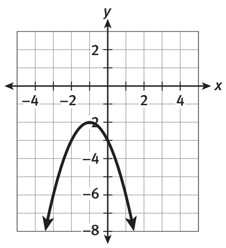
ACTIVITY 10 PRACTICE

Write your answers on notebook paper. Show your work.

Lesson 10-1

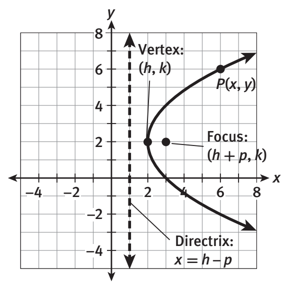
Use the parabola shown in the graph for Items 1 and 2.



1. What is the equation of the parabola?
   A. $y = -(x - 1)^2 - 2$ B. $y = -(x + 1)^2 - 2$
   C. $y = (x - 1)^2 - 2$ D. $y = (x + 1)^2 + 2$
2. The focus of the parabola is $\left(-1, -\frac{9}{4}\right)$, and the directrix is the line $y = -\frac{7}{4}$. Show that the point $(-2, -3)$ on the parabola is the same distance from the focus as from the directrix.
3. Graph the parabola given by the equation $x = \frac{1}{2}(y - 3)^2 + 3$.
4. Identify the following features of the parabola given by the equation $y = \frac{1}{8}(x - 4)^2 + 3$.
   a. vertex b. focus
   c. directrix d. axis of symmetry
   e. direction of opening
5. Describe the relationships among the vertex, focus, directrix, and axis of symmetry of a parabola.
6. The focus of a parabola is $(3, -2)$, and its directrix is the line $x = -5$. What are the vertex and the axis of symmetry of the parabola?

For Items 7–11, use the given information to write the equation of each parabola.

7. vertex: $(0, 0)$; focus: $(0, 5)$
8. vertex: $(0, 0)$; directrix: $x = -3$
9. vertex: $(2, 2)$; axis of symmetry: $y = 2$; focus: $(1, 2)$
10. opens downward; vertex: $(-1, -2)$; directrix: $y = -1$
11. focus: $(-1, 3)$; directrix: $x = -5$
12. Use the diagram below to help you derive the general equation of a parabola with its vertex at (h, k), a horizontal axis of symmetry, a focus of $(h + p, k)$, and a directrix of $x = h - p$. Solve the equation for x.



Lesson 10-2

Write the equation of the quadratic function whose graph passes through each set of points.

13. $(-3, 0)$, $(-2, -3)$, $(2, 5)$
14. $(-2, -6)$, $(1, 0)$, $(2, 10)$
15. $(-5, -3)$, $(-4, 0)$, $(0, -8)$
16. $(-3, 10)$, $(-2, 0)$, $(0, -2)$
17. $(1, 0)$, $(4, 6)$, $(7, -6)$
18. $(-2, -9)$, $(-1, 0)$, $(1, -12)$

ACTIVITY 10 Continued

ACTIVITY PRACTICE

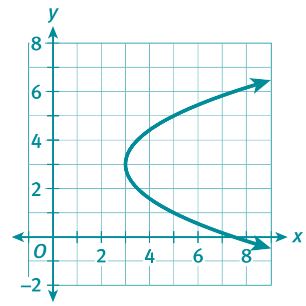
1. B
2. distance to focus:

$$\sqrt{(-1-(-2))^2 + \left(-\frac{9}{4}-(-3)\right)^2} = \frac{5}{4}$$

distance to directrix:

$$\sqrt{(-2-(-2))^2 + \left(-\frac{7}{4}-(-3)\right)^2} = \frac{5}{4}$$

3.



4. a. $(4, 3)$
   b. $(4, 5)$
   c. $y = 1$
   d. $x = 4$
   e. upward
5. Sample answer: The axis of symmetry is perpendicular to the directrix. The focus and the vertex lie on the axis of symmetry. The vertex is the midpoint of the segment that lies on the axis of symmetry and has its endpoints at the focus and on the directrix.
6. Vertex: $(-1, -2)$; axis of symmetry: $y = -2$
7. $y = \frac{1}{20}x^2$
8. $x = \frac{1}{12}y^2$
9. $x = -\frac{1}{4}(y - 2)^2 + 2$
10. $y = -\frac{1}{4}(x + 1)^2 - 2$
11. $x = \frac{1}{8}(y - 3)^2 - 3$
13. $y = x^2 + 2x - 3$
14. $y = 2x^2 + 4x - 6$
15. $y = -x^2 - 6x - 8$
16. $y = 3x^2 + 5x - 2$
17. $y = -x^2 + 7x - 6$
18. $y = -5x^2 - 6x - 1$

12. Sample derivation:

distance from P to focus = distance from P to directrix

$$\sqrt{(x-(h+p))^2 + (y-k)^2} = \sqrt{(x-(h-p))^2 + (y-y)^2}$$

$$(x - (h + p))^2 + (y - k)^2 = (x - (h - p))^2 + (y - y)^2$$

$$x^2 - 2(h + p)x + (h + p)^2 + (y - k)^2 = x^2 - 2(h - p)x + (h - p)^2$$

$$x^2 - 2hx - 2px + h^2 + 2hp + p^2 + (y - k)^2 = x^2 - 2hx + 2px + h^2 - 2hp + p^2$$

$$-2px + 2hp + (y - k)^2 = 2px - 2hp$$

$$(y - k)^2 + 4hp = 4px$$

$$\frac{1}{4p}(y - k)^2 + h = x$$

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