

# 5 Exercises

2.0, 16.0, 24.0

## GUIDED PRACTICE

1. **Vocabulary** Describe the relationship between a parabola and its *directrix*.

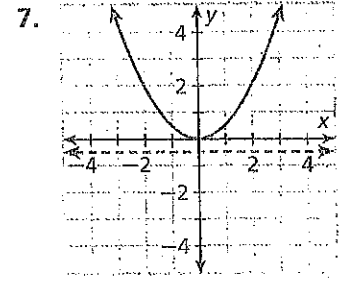
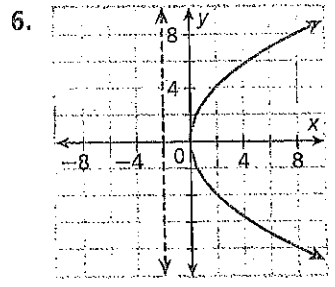
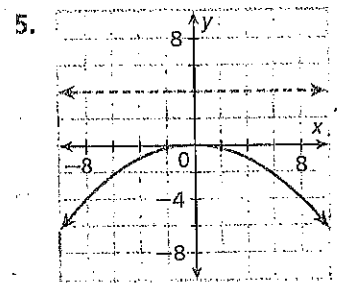
**EXAMPLE 1**  
p. 751

Use the distance formula to find the equation of a parabola with the given focus and directrix.

2.  $F(0, -5), y = 5$       3.  $F(7, 0), x = -7$       4.  $F(-3, 0), x = 6$

**EXAMPLE 2**  
p. 752

Write the equation in standard form for each parabola.



8. vertex  $(0, 0)$ , focus  $(0, 1)$       9. vertex  $(0, 0)$ , focus  $(-8, 0)$

**EXAMPLE 3**  
p. 753

Find the vertex, value of  $p$ , axis of symmetry, focus, and directrix of each parabola, and then graph.

10.  $y = \frac{1}{32}(x + 2)^2$       11.  $x = \frac{1}{24}(y - 4)^2$       12.  $y + 1 = \frac{1}{16}(x - 2)^2$

**EXAMPLE 4**  
p. 754

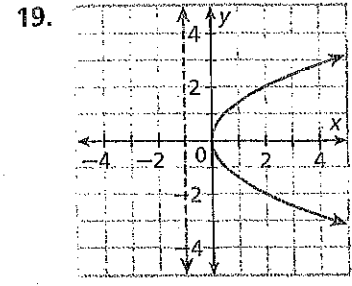
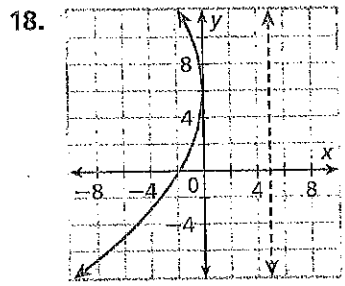
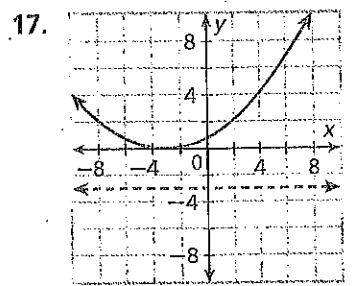
13. **Communications** The equation for the cross section of a parabolic satellite TV dish is  $y = \frac{1}{38}x^2$ , measured in inches. How far is the focus from the vertex of the cross section?

## PRACTICE AND PROBLEM SOLVING

Use the distance formula to find the equation of a parabola with the given focus and directrix.

14.  $F(0, 3), y = -5$       15.  $F(-2, 0), x = 8$       16.  $F(7, 0), x = -1$

Write the equation in standard form for each parabola.



20. vertex  $(0, 0)$ , focus  $(\frac{1}{2}, 0)$       21. vertex  $(0, 0)$ , focus  $(0, -6)$

Find the vertex, value of  $p$ , axis of symmetry, focus, and directrix of each parabola, and then graph.

22.  $y = \frac{1}{8}(x - 1)^2$       23.  $x = 2y^2 + 1$       24.  $x - 2 = \frac{1}{2}(y + 1)^2$

**Independent Practice**

For Exercises	See Example
14-16	1
17-21	2
22-24	3
25	4

**Extra Practice**  
Skills Practice p. 523  
Application Practice p. 541

eg 755

GUIDED PRACTICE

Identify the conic section that each equation represents.

SEE EXAMPLE 1  
p. 760

1.  $\frac{(x+4)^2}{2^2} + \frac{(y-3)^2}{3^2} = 1$

2.  $\frac{(x-8)^2}{5^2} - \frac{y^2}{5^2} = 1$

3.  $y^2 + 9 = 4(x-1)^2$

4.  $(x-2)^2 + (y-6)^2 = 13^2$

SEE EXAMPLE 2  
p. 761

5.  $12x^2 + 18y^2 - 8x + 9y - 10 = 0$

6.  $-4y^2 + 15x + 12y - 8 = 0$

7.  $10x^2 + 15xy + 10y^2 + 15x + 25y + 9 = 0$

8.  $6x^2 = 14x + 12y^2 - 16y + 20$

SEE EXAMPLE 3  
p. 762

Find the standard form of each equation by completing the square. Then identify and graph each conic.

9.  $x^2 + y^2 - 16x + 10y + 53 = 0$

10.  $x^2 + 14x - 12y + 97 = 0$

11.  $25x^2 + 9y^2 + 72y - 81 = 0$

12.  $16x^2 + 36y^2 + 160x - 432y + 1120 = 0$

SEE EXAMPLE 4  
p. 763

13. **Multi-Step** A moth is circling an outdoor light in a path that can be modeled by equation  $4x^2 + 9y^2 - 108y = -288$ , measured in inches. How close does the moth pass to a lizard located at the origin?

PRACTICE AND PROBLEM SOLVING

Identify the conic section that each equation represents.

Independent Practice For Exercises	See Example
14-17	1
18-21	2
22-31	3
32	4

14.  $\frac{(y-11)^2}{2^2} - \frac{(x+15)^2}{9^2} = 1$

15.  $x - 4 = \frac{1}{16}(y - 3)^2$

16.  $(x+2)^2 + (y-4)^2 = 3^2$

17.  $\frac{(x+2)^2}{6^2} + \frac{(y-7)^2}{8^2} = 1$

18.  $12x^2 - 18y^2 - 18x - 12y + 12 = 0$

19.  $7x^2 + 28x - 29y - 16 = 0$

20.  $-12x^2 - 3y^2 + 7x + 9y - 5 = 0$

21.  $12x^2 + 9y^2 - 2xy + 9 = 8y - 3y^2$

**Extra Practice**  
Skills Practice p. S23  
Application Practice p. S41

Find the standard form of each equation by completing the square. Then identify and graph each conic.

22.  $x^2 + 20x - 4y + 100 = 0$

23.  $x^2 + y^2 - 8y - 33 = 0$

24.  $9x^2 + 36y^2 - 72x - 180 = 0$

25.  $25x^2 - 4y^2 - 72y - 424 = 0$

26.  $x^2 - 2x - 20y - 79 = 0$

27.  $x^2 + y^2 + 10x + 4y + 9 = 0$

28.  $64x^2 + 49y^2 + 256x - 196y - 2684 = 0$

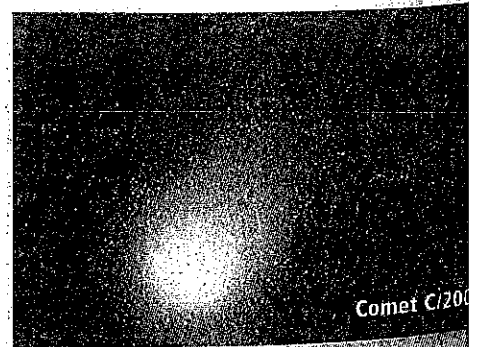
29.  $9x^2 - 4y^2 + 18x + 56y - 223 = 0$

30.  $y^2 + 6x + 12y - 6 = 0$

31.  $x^2 + y^2 - 5x + 9y + 10.5 = 0$

32. **Astronomy** Scientists find that the path of a comet as it travels around the Sun can be modeled by the function  $225x^2 + 64y^2 + 7650x + 50,625 = 0$ , with the Sun as one focus.

- Write the equation in standard form.
- If measurements are in millions of miles, about how close will the comet come to the sun?



Py 764