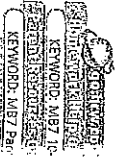


# 10-1 Exercises

8.0 12.0 17.0



## GUIDED PRACTICE

1. Vocabulary What are the four different types of conic sections?

SEE EXAMPLE 1 Graph each equation on a graphing calculator. Identify each conic section. Then describe the center and intercepts.

2.  $x^2 + 3y^2 = 48$       3.  $9x^2 + 16y^2 = 144$       4.  $x^2 + y^2 = 36$

SEE EXAMPLE 2 Graph each equation on a graphing calculator. Identify each conic section. Then describe the vertices and the direction that the graph opens.

5.  $5y^2 = x$       6.  $x^2 = y^2 + 9$       7.  $y^2 - x^2 = 25$   
 8.  $12y = 6x^2$       9.  $2x^2 - y^2 = 4$       10.  $-y^2 = 4 + x$

SEE EXAMPLE 3 Find the center and radius of a circle that has a diameter with the given endpoints.

11. (3, 6) and (13, 30)      12. (-4, 1) and (-16, -8)      13. (6, -9) and (-8, 39)

## PRACTICE AND PROBLEM SOLVING

Graph each equation on a graphing calculator. Identify each conic section. Then describe the center and intercepts.

14.  $40x^2 + 36y^2 = 1764$       15.  $\frac{x^2}{9} + \frac{y^2}{9} = 1$       16.  $243 - 3x^2 - 3y^2 = 0$   
 17.  $\frac{x^2}{4} = 1 - \frac{y^2}{25}$       18.  $4x^2 + 81y^2 = 324$       19.  $\frac{4x^2}{25} + \frac{4y^2}{25} = 1$   
 20.  $\frac{3x^2}{4} + \frac{3y^2}{4} = 75$       21.  $4x^2 + 4y^2 = 81$       22.  $x^2 + y^2 = \frac{4}{9}$

Graph each equation on a graphing calculator. Identify each conic section. Then describe the vertices and the direction that the graph opens.

23.  $y = 2x^2$       24.  $x^2 = y^2 + 64$       25.  $x + 2y^2 = 0$   
 26.  $x = \frac{2}{3}y^2$       27.  $0 = 1 + \frac{x^2}{64} - \frac{y^2}{36}$       28.  $5y^2 - 5x^2 = 180$   
 29.  $x = 4y^2 - 3$       30.  $y = 4 - \frac{x^2}{5}$       31.  $9x^2 - 16y^2 = 144$

Find the center and radius of a circle that has a diameter with the given endpoints.

32. (20, 21) and (12, 6)      33.  $(\frac{9}{2}, \frac{5}{2})$  and  $(\frac{5}{2}, \frac{17}{2})$       34. (7, -5) and (-1, 10)

35. Geometry A circle has center (-7, 10) and contains the point (23, -6).

- Find the circumference and area of the circle.
- Find the other endpoint of the diameter with one endpoint (23, -6).

## CONCEPT CONNECTION



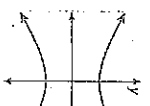
36. This problem will prepare you for the Concept Connection on page 758. The orbit of an asteroid can be modeled by the equation  $16x^2 + 25y^2 = 400$ .

- Graph the equation on a graphing calculator, and identify the conic section.
- Identify the  $x$ - and  $y$ -intercepts of the orbit.
- Suppose that each unit of the coordinate plane represents 50 million miles. What is the maximum width of the asteroid's orbit?

## STANDARDIZED TEST PREP

50. Which of the following could be the equation of the graph shown?

- $9x^2 - 4y^2 = 36$
- $4x^2 + 9y^2 = 36$
- $9x^2 - 4x^2 = 36$
- $9x^2 + 4y^2 = 36$



51. One endpoint of a line segment is (-4, -8), and the midpoint of the line segment is (2, -12). Which of the following is the other endpoint?

- (-1, -10)
- (3, -2)
- (-8, 16)
- (8, -16)

52. Which of the following are the  $x$ -intercepts of the graph of  $4x^2 + 25y^2 = 100$ :

- (2, 0) and (-2, 0)
- (5, 0) and (-5, 0)
- (4, 0) and (-4, 0)
- (10, 0) and (-10, 0)

53. What is the distance between the points (-2, 6) and (5, 30)?

- $3\sqrt{145}$
- 31
- $3\sqrt{65}$
- 25

## CRITICAL THINKING AND EXTENDED

Find  $a$  so that the two points are the given distance apart.

54. (-5, 8) and (3,  $a$ ): 17      55. (4, -10) and (a, 5): 39

56. **Writing** Step A degenerate conic is formed when a plane passes through the  $ve$  of a hollow double cone. A point, a line, and a pair of intersecting lines are all degenerate conics.

- The graph of  $y^2 - x^2 = 0$  is a degenerate hyperbola. Graph  $y^2 - x^2 = 0$ .
- What is the graph of  $x^2 + y^2 = 0$ ?
- Explain how a plane could intersect a hollow double cone to result in the graphs from parts a and b.

57. The midpoint and distance formulas can be extended to three dimensions by including an additional term in each formula for the variable  $z$ .

- Find the midpoint of the segment with endpoints (6, -3, -9) and (12, 7, 2).
- Write a formula to find the midpoint of a segment in three dimensions.
- Find the distance between the points (1, 2, 3) and (5, 8, 10).
- Write a formula to find the distance between two points in three dimensions.

## SPECIAL REVIEW

58. **Construction** A construction crew is repainting the center-line on a 12 mi for the crew has completed 2.5 mi after 45 min, about how much more time should painting take? (Lesson 2-2)

- Find the zeros of each function by factoring. (Lesson 5-3)
59.  $f(x) = x^2 - 2x - 48$       60.  $f(x) = x^2 + 12x + 27$       61.  $f(x) = x^2 - 11x + 18$   
 62.  $f(x) = x^2 + 10x - 24$       63.  $f(x) = 2x^2 - 25x + 33$       64.  $f(x) = 3x^2 + 22x + 7$   
 Graph each exponential function. Find the  $y$ -intercept and the asymptote. Then describe how the graph transformed from the graph of its parent function  $f(x) = 5^x$ . (Lesson 7-7)
65.  $f(x) = -\frac{1}{2}(5^x) + 3$       66.  $f(x) = 4(5^x)$       67.  $f(x) = 6(5^x) - 1$

GUIDED PRACTICE

1. **Vocabulary** How can you recognize a *tangent* of a circle?

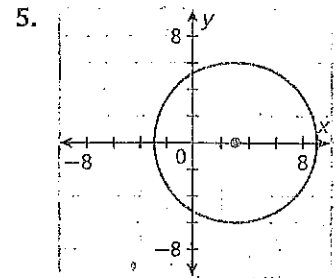
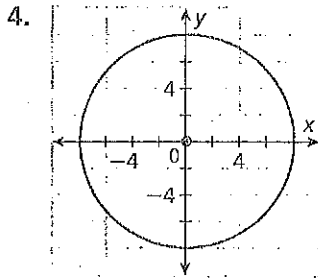
SEE EXAMPLE 1  
p. 729

Write the equation of each circle.

2. center (6, -5) and radius  $r = 4$

3. center (-11, 3) and radius  $r = 9$

SEE EXAMPLE 2  
p. 730



6. center (-1, 9) and containing the point (2, 5)

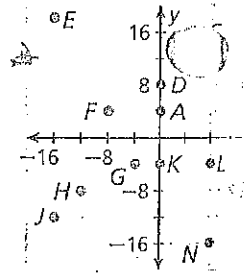
7. center (-2, -5) and containing the point (-10, -20)

SEE EXAMPLE 3  
p. 730

Depending on its strength, an earthquake can be felt in locations miles away from the epicenter.

8. **Multi-Step** Suppose that the epicenter of the earthquake is located at the point (5, -2) and is felt up to 10 mi away. Use the equation of a circle to find the locations that are affected.

9. **Multi-Step** Suppose that the epicenter of the earthquake is located at the point (-5, -7) and is felt up to 8 mi away. Use the equation of a circle to find the locations that are affected.



SEE EXAMPLE 4  
p. 731

**Multi-Step** Write the equation of the line that is tangent to each circle at the given point.

10.  $x^2 + y^2 = 100$ ; (8, 6)

11.  $(x + 6)^2 + (y + 4)^2 = 25$ ; (-9, -8)

PRACTICE AND PROBLEM SOLVING

Independent Practice

For Exercises	See Example
12-13	1
14-17	2
18-19	3
20-21	4

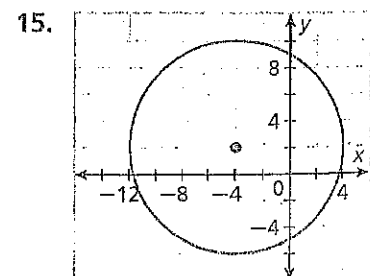
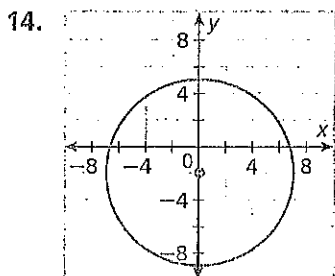
Extra Practice

Skills Practice p. 522  
Application Practice p. 541

Write the equation of each circle.

12. center (3, 2) and radius  $r = 7$

13. center (5, 1) and radius  $r = 10$



16. center (12, -3) and containing the point (-12, 7)

17. center (-6, -4) and containing the point (-2, -1)

Py 732