

**WRITING EQUATIONS** Write the standard form of the equation of the circle that passes through the given point and whose center is the origin.

31.  $(-6, 0)$                       32.  $(0, 5)$                       33.  $(-4, 3)$                       34.  $(2, -4)$   
 35.  $(-6, 8)$                       36.  $(-9, 2)$                       37.  $(4, -10)$                       38.  $(-8, -5)$   
 39.  $(-8, 14)$                       40.  $(5, -12)$                       41.  $(-11, -11)$                       42.  $(9, 40)$

43. **TX TAKS REASONING** What is the equation in standard form of the circle that passes through the point  $(4, -6)$  and whose center is the origin?

- (A)  $x^2 + y^2 = 5$                       (B)  $x^2 + y^2 = 10$                       (C)  $x^2 + y^2 = 52$                       (D)  $x^2 + y^2 = 2\sqrt{13}$

**GRAPHING** In Exercises 44–52, equations of both circles and parabolas are given. Graph the equation.

44.  $y^2 + x^2 = 49$                       45.  $4x^2 + y = 0$                       46.  $7x^2 + 7y^2 = 63$   
 47.  $y^2 - 121 = -x^2$                       48.  $x^2 + 16y = 0$                       49.  $3x = -y^2$   
 50.  $12x^2 + 12y^2 = 192$                       51.  $2x^2 + 2y^2 = 16$                       52.  $6x + 6y^2 = 0$

**EXAMPLE 3**

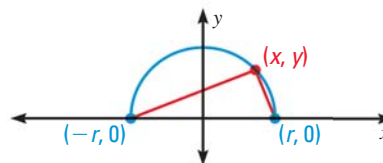
on p. 627  
for Exs. 53–58

**TANGENT LINES** Write an equation of the line tangent to the given circle at the given point.

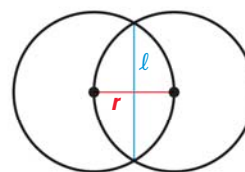
53.  $x^2 + y^2 = 17$ ;  $(1, 4)$                       54.  $x^2 + y^2 = 13$ ;  $(2, -3)$                       55.  $x^2 + y^2 = 34$ ;  $(-5, 3)$   
 56.  $x^2 + y^2 = 40$ ;  $(-6, -2)$                       57.  $x^2 + y^2 = 106$ ;  $(-5, 9)$                       58.  $x^2 + y^2 = 250$ ;  $(15, 5)$

59. **TX TAKS REASONING** Write equations in standard form for three circles centered at the origin so that each circle passes between  $(-3, 5)$  and  $(-6, 2)$ .

60. **REASONING** Use the diagram to show that an angle inscribed in a semicircle is a right angle. (*Hint: Show that the segments meeting at  $(x, y)$  have slopes that are negative reciprocals.*)



61. **CHALLENGE** Suppose two congruent circles intersect so that each passes through the other's center, as shown. Write an equation that gives the length  $\ell$  of the chord formed by joining the intersection points in terms of the radius  $r$  of each circle.



**PROBLEM SOLVING**

**EXAMPLE 4**

on p. 628  
for Exs. 62–64

62. **CELL PHONES** A cellular phone tower services a 15 mile radius. On a hiking trip, you are 9 miles east and 11 miles north of the cell tower. Are you in the region served by the tower?

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63. **BATS** During the warmer months, more than 1 million Mexican free-tailed bats live under the Congress Avenue Bridge in Austin, Texas. The bats have an estimated feeding range of 50 miles. Is a location 40 miles north and 25 miles west of the bridge located within this range?

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