

**DIRECTIONS:** If the graph of the given equation is a circle, find its center and radius. If the equation has no graph, say so.

1.  $x^2 + y^2 = -8y$

$$x^2 + (y + 4)^2 = 16$$

Center: (0, -4)  
Radius: 4

2.  $x^2 + y^2 - 4x + 2y - 4 = 0$

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

Center: (2, -1)  
Radius: 3

**DIRECTIONS:** Find the center and radius of each circle (Hint: First divide both sides by the coefficient of the second-degree terms).

3.  $9x^2 + 9y^2 + 6x + 18y + 9 = 0$

$$\left(x + \frac{1}{3}\right)^2 + (y + 1)^2 = \frac{1}{9}$$

Center:  $\left(-\frac{1}{3}, -1\right)$   
Radius:  $\frac{1}{3}$

4.  $3x^2 + 3y^2 - 6x + 24y + 24 = 0$

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

Center: (1, -4)  
Radius: 3

**DIRECTIONS:** Find an equation of the circle (in standard form) that is described (Hint: It may be helpful to sketch a graph of the circle).

5. Center(0, 5); the circle passes through the point(0, 0).

$$x^2 + (y - 5)^2 = 25$$

6. Center(-2, 0); the circle passes through the point(2, 0).

$$(x + 2)^2 + y^2 = 16$$

7. A diameter of the circle has endpoints (2, 5) and (0, 3).

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

8. The center is in Quadrant II; the radius is 3; the circle is tangent to the y-axis at (0, 4).

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

9. The center is on the line  $y - 4 = 0$ ; the circle is tangent to the x-axis at (-2, 0).

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

10. The center is on the line  $x + y = 4$ ; the circle is tangent to both coordinate axes.

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

11. The circle is tangent to both coordinate axes and the line  $x = -8$  (there are two answers).

$$(x + 4)^2 + (y - 4)^2 = 16 \quad \text{or} \quad (x + 4)^2 + (y + 4)^2 = 16$$