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

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

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

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

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

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$(0, 0)$.

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

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

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

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

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

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