Math 3 - Equation of a Circle (HN)   Name _____ #_____

To the right is a circle graphed on a coordinate grid. Through the next series of questions, we will develop the **equation of circle** used to graph a circle on a coordinate grid.

The definition of a **circle** is a set of points equidistant from a fixed point.

(1) The fixed point is called the _____ of the circle. In the figure to the right, label this point $C(h, k)$.

(2) Pick a point anywhere on the boundary of the circle and label it $P(x, y)$.

(3) The distance between the center and any point on the circle is called the _____. Draw a segment from the point C to point P and label it r.

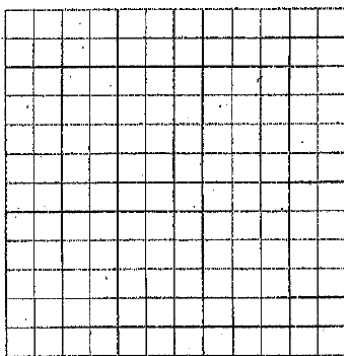(4) Use the Pythagorean Theorem to solve for r^2.
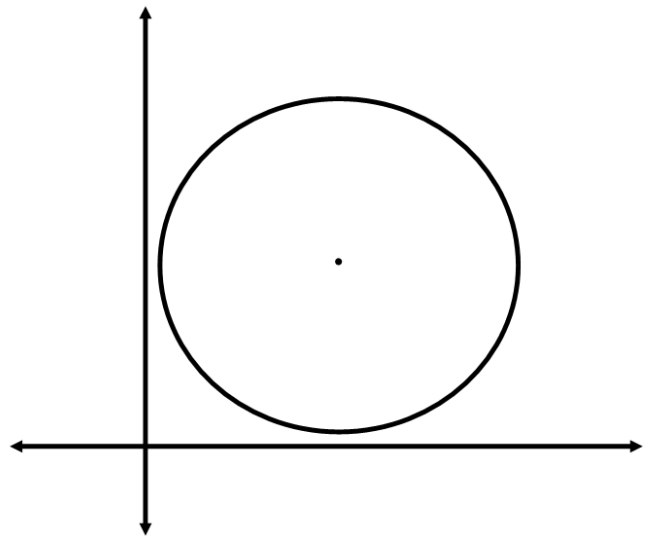
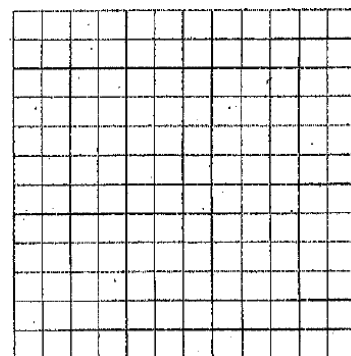The equation in question 4 is the equation of a circle with center _____ and radius _____.
EXAMPLES

(A) Identify the center and radius of the circle and then graph on the coordinate grid provided.
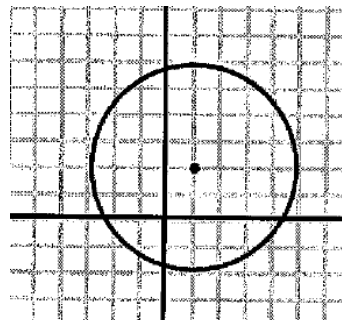
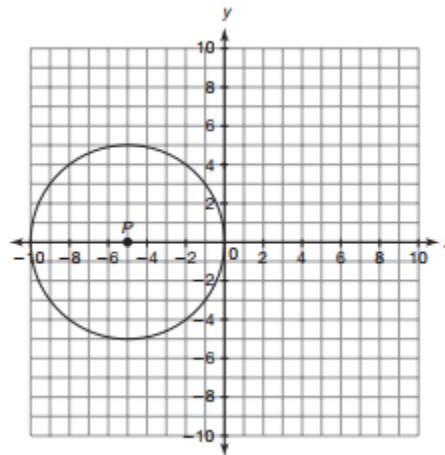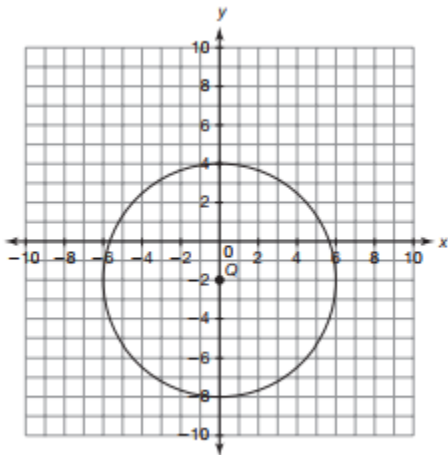$(x - 3)^2 + (y - 2)^2 = 9$ $x^2 + (y + 3)^2 = 4$

(B) Determine the center and radius of the circle graphed to the right and write the equation.

1. Write an equation for:
   a. A circle with center at the origin and r = 8.

   b. A circle with center (3,-5) and r = 6.

   c. Circle Q.

   d. Circle P.

Recall that the formula for the circumference of a circle is $C = 2\pi r$ *and the formula for the area of a circle is* $A = \pi r^2$.

2. Circle P is represented by the equation $(x - 4)^2 + (y + 1)^2 = 36$.
   a. Determine the equation of a circle that has the same center as circle P but whose circumference is twice that of circle P.

   b. Determine the equation of a circle that has the same center as circle P but whose circumference is three times that of circle P.

   c. Determine the equation of a circle that has the same center as circle P but whose area is twice that of circle P.

   d. Determine the equation of a circle that has the same center as circle P but whose area is three times that of circle P.