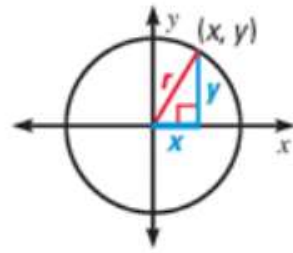# 10.7 Write and Graph Equations of Circles

Let (x, y) represent any point on a circle with center at the origin and radius r. By the Pythagorean Theorem,

$$x^2 + y^2 = r^2.$$

This is the equation of a circle with radius r and center at the origin.

CIRCLES CENTERED AT (h, k) You can write the equation of *any* circle if you know its radius and the coordinates of its center.

Suppose a circle has radius r and center (h, k). Let (x, y) be a point on the circle. The distance between (x, y) and (h, k) is r, so by the Distance Formula

$$\sqrt{(x - h)^2 + (y - k)^2} = r.$$

Square both sides to find the **standard equation of a circle**.
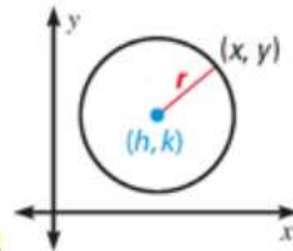
Standard Equation of a Circle

The standard equation of a circle with center (h, k) and radius r is:

$$(x - h)^2 + (y - k)^2 = r^2$$