Geometry Info Sheet #44

Equations of Circles in Coordinate Planes

Definitions

Circle: The set of all points in a plane equidistant from a given point (the **center**)

Radius: A line segment from the center of a circle to any point on the circle

X-Intercept: The point(s) where a figure in a coordinate plane intersects (touches or crosses) the x-axis; at an x-intercept, the y-value is zero

Y-Intercept: The point(s) where a figure in a coordinate plane intersects (touches or crosses) the y-axis; at a y-intercept, the x-value is zero

Forms of Circles in Coordinate Planes

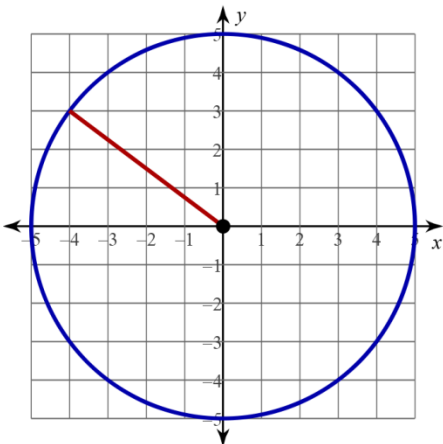The **standard form** of an equation of a circle containing point (x, y), with radius r, and centered at point (h, k), is given by: $(x - h)^2 + (y - k)^2 = r^2$

For a circle centered at the origin, the **standard form** is given by: $x^2 + y^2 = r^2$

The **general form** of an equation of a circle containing point (x, y) is given by: $x^2 + y^2 + Ax + By + C = 0$

Examples
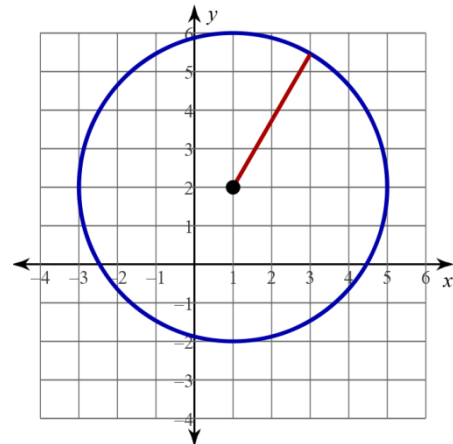

Center: $(0, 0)$ **X-Intercepts:** -5 and 5

Radius: 5 **Y-Intercepts:** -5 and 5

Standard Form Equation:

$x^2 + y^2 = 5^2$

General Form Equation:

$x^2 + y^2 - 25 = 0$

Center: $(1, 2)$ **X-Intercepts:** $\pm\sqrt{12} + 1$

Radius: 4 **Y-Intercepts:** $\pm\sqrt{15} + 2$

Standard Form Equation:

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

General Form Equation:

$x^2 + y^2 - 2x - 4y - 11 = 0$