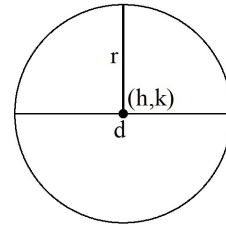


2.2 Circles

▼ Definition of a Circle

A **circle** is the collection of points that are equidistant to a center point. The distance from the center to the points on the circle is the **radius** denoted r . The center is denoted (h, k) . The **diameter** is the distance between two points on the circle passing through the center.



▼ Standard Form of a Circle

The standard form of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where r is the radius and (h, k) is the center.

▼ General Form of a Circle

The general form of a circle is $Ax^2 + By^2 + Cx + Dy + E = 0$, where $A, B, C, D,$ and E are real numbers and $A = B \neq 0$.

▼ Examples: Find the Center and Radius

▼ Example 1: Find the center and Radius

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

▼ Example 2: Find the center and Radius

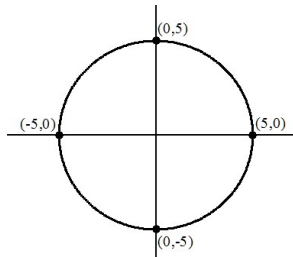
$$(x + 1)^2 + (y - 2)^2 = 16$$

▼ Example 3: Find the center and Radius

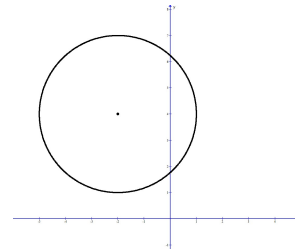
$$(x - 3)^2 + y^2 = 12$$

▼ Graphs of a Circles

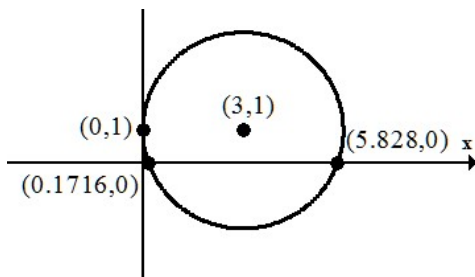
2 x-intercepts & 2 y-intercepts



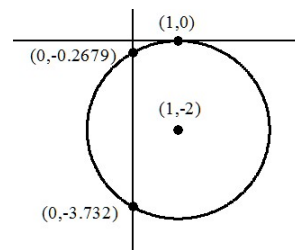
0 x-intercepts & 2 y-intercepts



Tangent to the y-axis: 1 y-int



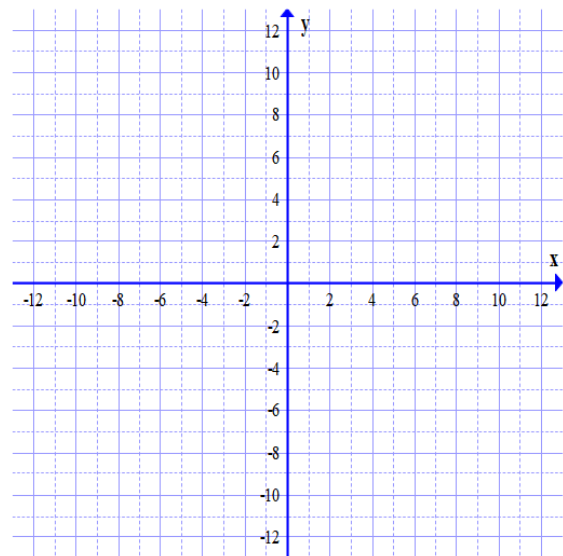
Tangent to the x-axis: 1 x-int



▼ Example: Graph a Circle

Graph the circle in standard form.

$$(x - 2)^2 + (y + 3)^2 = 16$$



▼ Example: Find the Intercepts of the Circle

Find the x and y intercepts of the circle. $(x + 2)^2 + (y - 3)^2 = 9$

Find the x and y intercepts of the circle. $x^2 + (y - 4)^2 = 4$

▼ Examples: Write the Standard or General Form of the Circle

▼ Example 1: Write the standard form of the circle given the center and radius.

Center: $(2, -3)$ and radius: $r = 4$

▼ Example 2: Write the general form of the circle given the center and a point on the circle

Center: $(1, -3)$ and a point on the circle $(1, 0)$

▼ Example 3: Write the standard form of the circle given endpoints of the diameter

Endpoints of the diameter: $(7, 6)$ and $(-9, 8)$

▼ Example 4: Write the standard form of the circle given the center and tangent to an x-axis

Center: $(-6, 8)$ and tangent to the x-axis

▼ Examples: Use completing the square to write the equation of a circle in Standard Form

$$x^2 + y^2 + 4x - 2y + 1 = 0$$