

General Equation of a Circle



Preliminaries and Objectives

Preliminaries

- Pythagorean Theorem
- Transformation of graphs (shifting horizontally and vertically)

Objectives

- Find the equation of a circle, given the center and the radius.

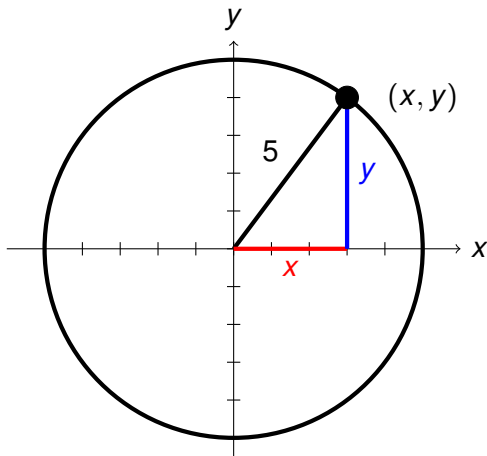
Geometric Definition

A circle is the set of all points located a fixed distance from some fixed point.

The fixed distance is called the **radius** of the circle.

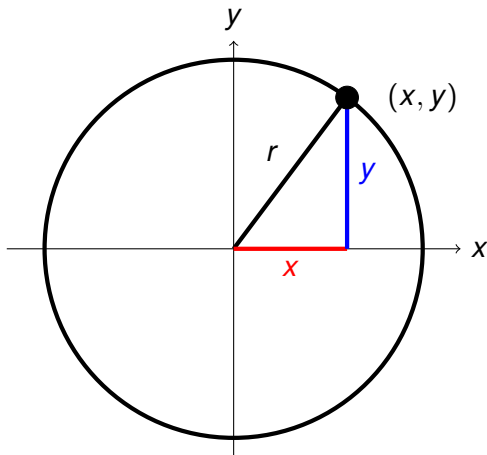
The fixed point is called the **center** of the circle.

Circle centered at the origin



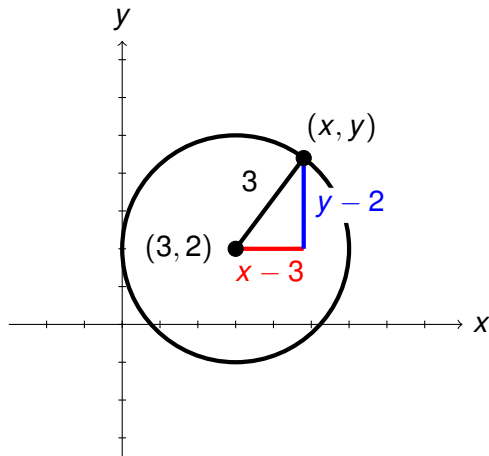
$$x^2 + y^2 = 25$$

Circle centered at the origin



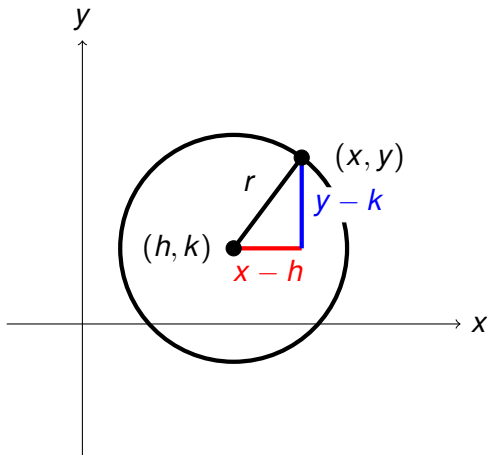
$$x^2 + y^2 = r^2$$

Center at (h, k)



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

Center at (h, k)



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

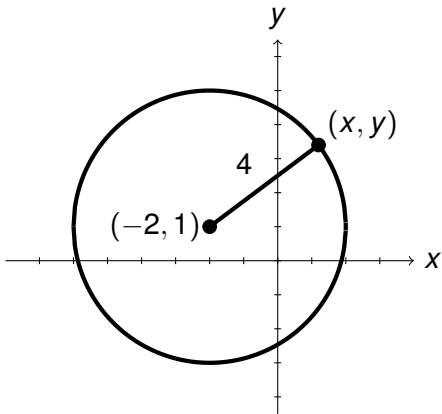
General Form of a Circle

The circle with center at (h, k) and radius r has the equation

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

Sample Problem 1

Find the equation of a circle with center at $(-2, 1)$ and radius 4.



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

Sample Problem 2

Find the center and radius of a circle given by the equation

$$(x + 6)^2 + (y + 3)^2 = 4$$

Solution:

Center = $(-6, -3)$; Radius = 2