General Equation of a Circle

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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.

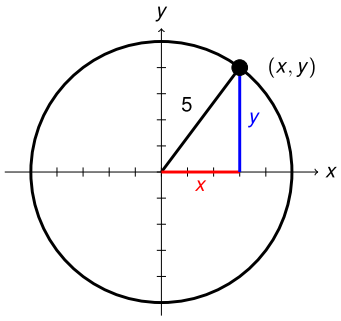
Geometric Definition

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.

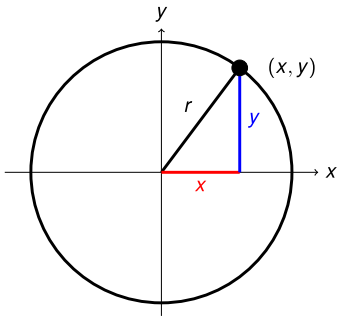
The fixed point is called the **center** of the circle.

Circle centered at the origin



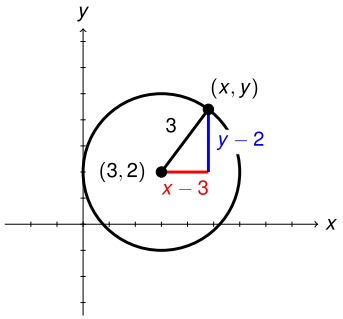
$x^2 + y^2 = 25$

Circle centered at the origin



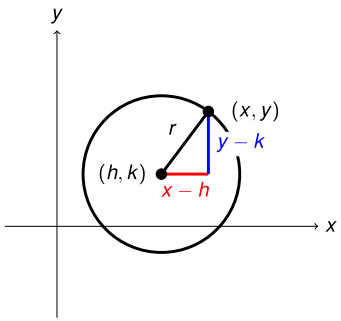
$x^2 + y^2 = r^2$

Center at (h, k)



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

Center at (h, k)



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

Recap

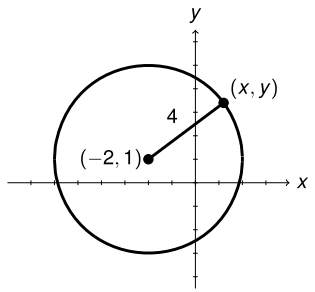
General Form of a Circle

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 $= 2$