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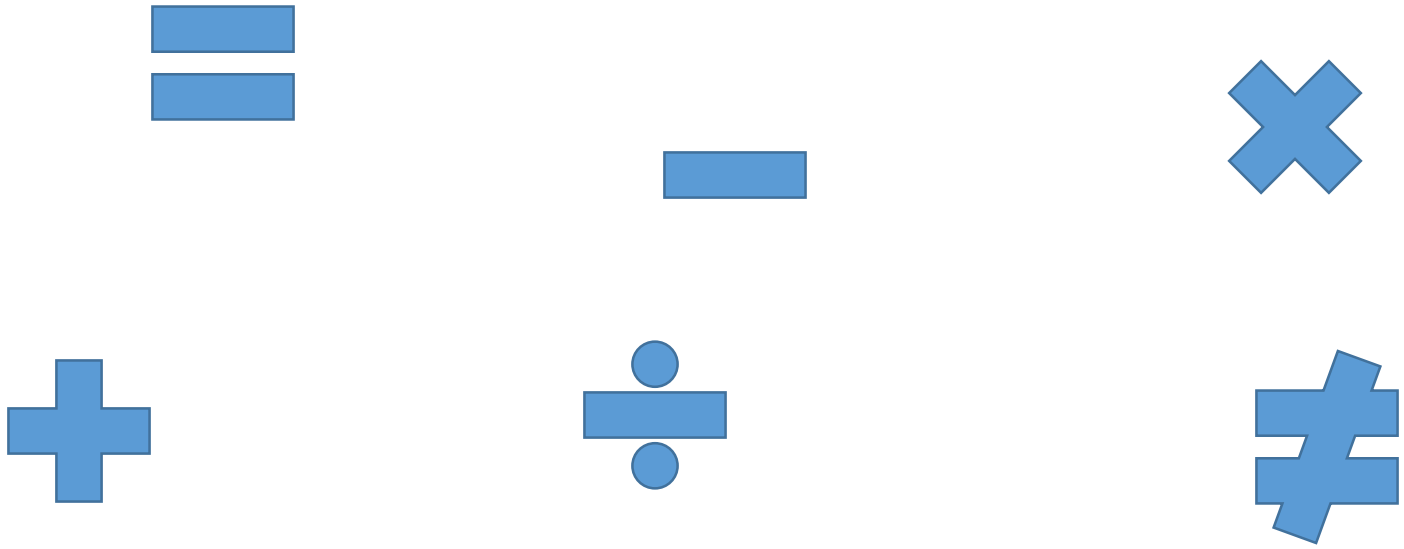
Graphs of Equations



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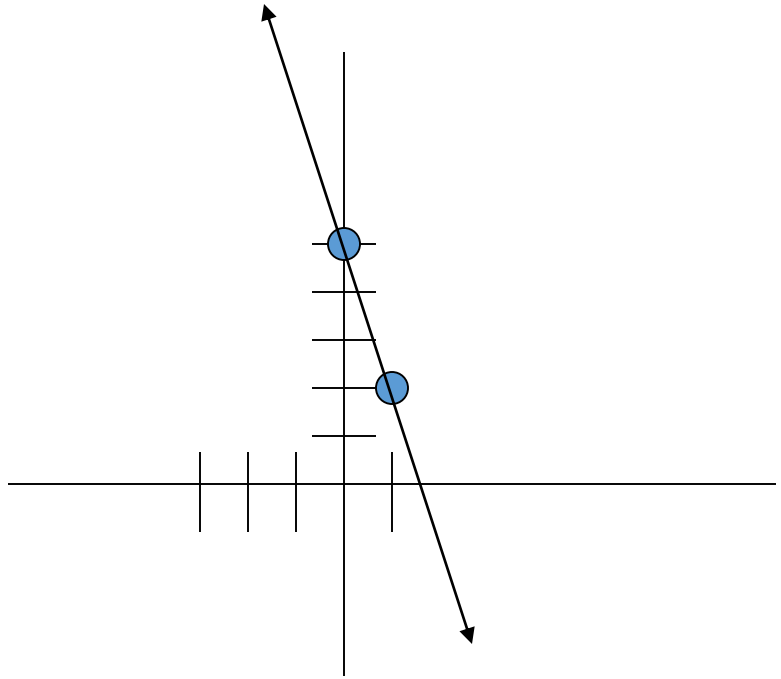
Ex. 1 Sketch the graph of the line

$$y = -3x + 5$$

Complete the t-graph

x	y
-2	11
-1	9
0	5
1	2
2	-1



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x and y-intercepts

To find the x-intercepts, let y be 0 and solve the equation for x.

To find the y-intercept, let x be 0 and solve the equation for y.

Ex. 2 Find the x- and y-intercepts of the graph of $x = y^2 - 3$

x-int.
Let y = 0

$x = 0^2 - 3$
$x = -3$

(-3,0)

y-int.
Let x = 0

$0 = y^2 - 3$ $3 = y^2$ $y = \pm\sqrt{3}$

$(0, \pm\sqrt{3})$

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Ex. 3 **Find the x and y-intercepts of $y = x^3 - 4x$**

x-int.
Let y = 0

$0 = x^3 - 4x$ **Factor**

$0 = x(x - 2)(x + 2)$

0 2 -2

(0,0) (2,0) (-2,0)

y-int.
Let x = 0

$y = 0^3 - 4(0) = 0$

(0,0)

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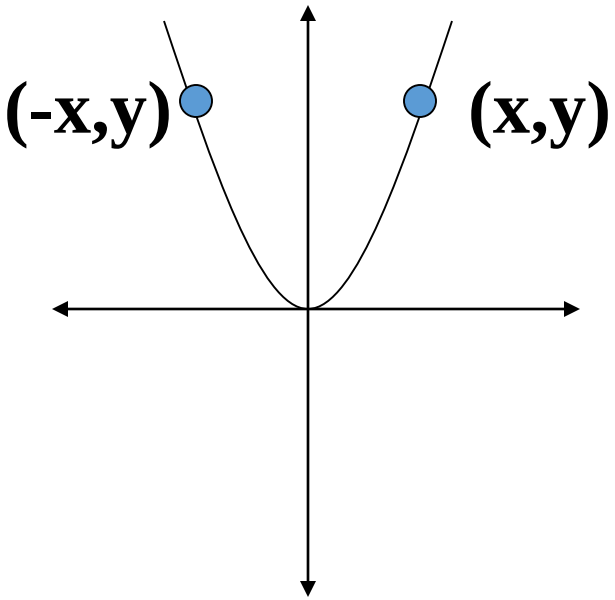
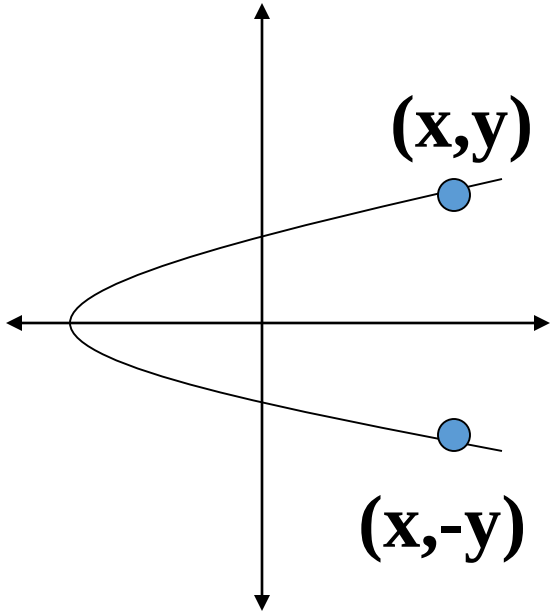
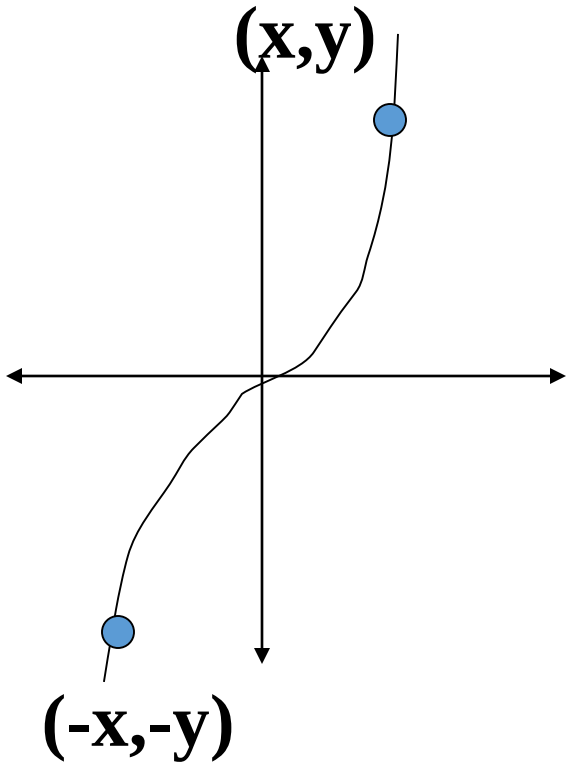
Symmetry



y-axis



x-axis



origin

(-x,y) , (x,-y) , and (-x,-y) are the key points in determining symmetry.

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Check for symmetry with respect to both axes and the origin.

Ex. 4 $xy^3 + 10 = 0$

Plug in the three ordered pairs. If you can get it to look like the original equation, it has that symmetry.

y-axis (-x,y) $(-x)y^3 + 10 = 0$

$-xy^3 + 10 = 0$

Is this, or can we get this to look like the original? No.

x-axis (x,-y) $x(-y)^3 + 10 = 0$

$-xy^3 + 10 = 0$

Not like the original.

origin (-x,-y) $(-x)(-y)^3 + 10 = 0$

$xy^3 + 10 = 0$

This graph has origin symmetry.

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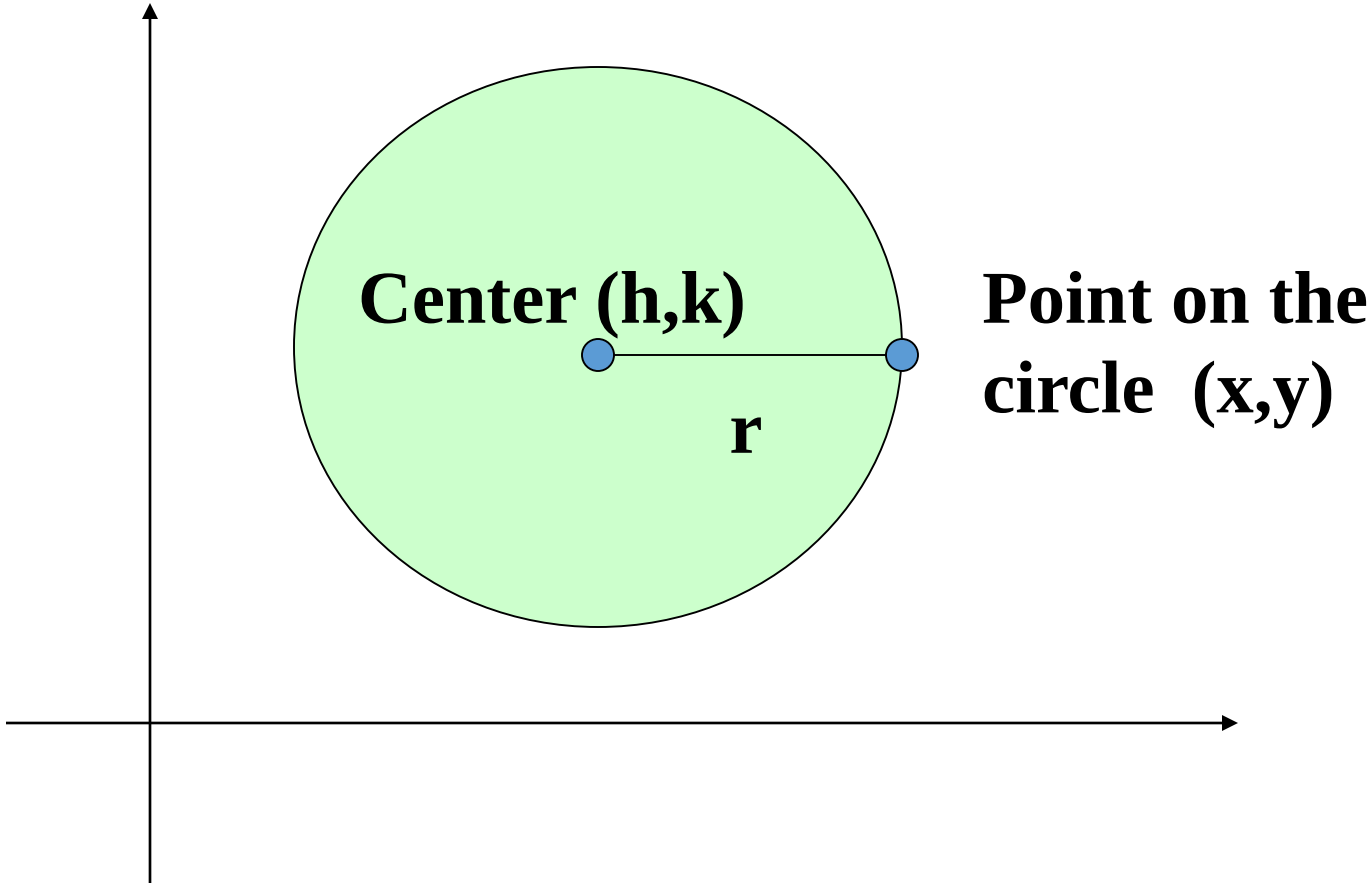
Standard Form of the Equation of a Circle

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



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Ex. 5 **The point (3,4) lies on a circle whose center is at (-1,2). Find an equation of the circle.**

First, find the radius of the circle.

$r = \sqrt{20}$ **Write the equation.**

$$(x + 1)^2 + (y - 2)^2 = 20$$

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Ex. 6 Completing the Square to find a circle's center and radius.

$4x^2 + 4y^2 + 20x - 16y + 37 = 0$

First, divide by 4

$x^2 + 5x \quad + y^2 - 4y \quad = \frac{-37}{4}$

Now complete the square.

$x^2 + 5x + \frac{25}{4} + y^2 - 4y + 4 = \frac{-37}{4} + \frac{25}{4} + 4$

$$\left(x+\frac{5}{2}\right)^2+(y-2)^2=1 \quad Center \left(-\frac{5}{2},2\right)$$

$$r=\sqrt{1}=1$$