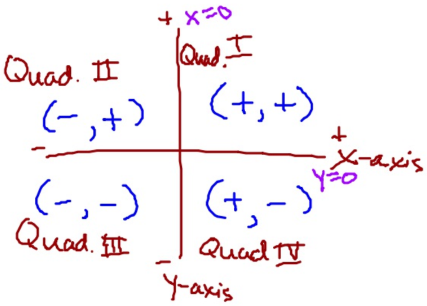
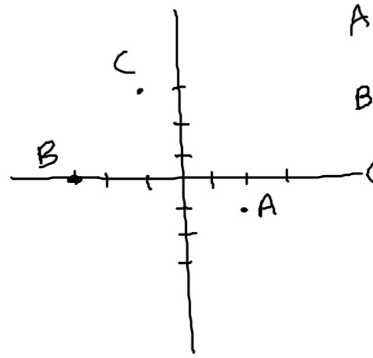
1.1 Rectangular coordinates





A(2, −1)

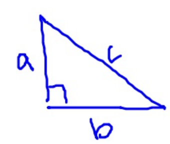
B(−3, 0)

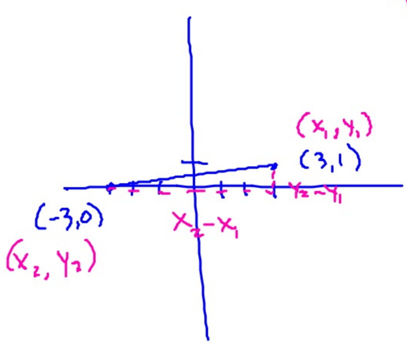
C(−1, 3)

(x, y) ordered pair

Pythagorean Theorem: $\sqrt{a^2+b^2}=\sqrt{c^2}$

$\sqrt{a^2+b^2}=c$





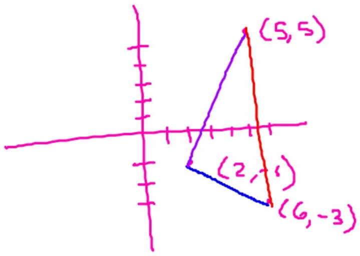
Distance Formula

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$\sqrt{(-3-3)^2+(0-1)^2}$$

$$\sqrt{(-6)^2+(-1)^2}$$

$$\sqrt{36+1}=\boxed{\sqrt{37}}$$



$$\sqrt{(2-6)^2+(-1 - -3)^2}$$
$$\sqrt{(-4)^2+(2)^2}$$
$$\sqrt{16+4}$$
$$\sqrt{20}$$
$$2\sqrt{5}$$

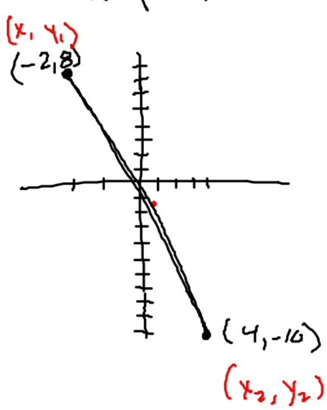
$$\sqrt{(5-2)^2+(5 - -1)^2}$$
$$\sqrt{(3)^2+(6)^2}$$
$$\sqrt{9+36}$$
$$\sqrt{45}$$
$$3\sqrt{5}$$

$$\sqrt{(5-6)^2+(5 - -3)^2}$$
$$\sqrt{(-1)^2+(8)^2}$$
$$\sqrt{1+64}$$
$$\sqrt{65}$$

$$(\sqrt{20})^2+(\sqrt{45})^2=(\sqrt{65})^2$$
$$20+45=65 \checkmark$$

midpoint

$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$



$$\left(\frac{-2+4}{2}, \frac{8+-10}{2}\right)$$
$$\left(\frac{2}{2}, \frac{-2}{2}\right)$$
$$(1, -1)$$

1.2 Graphs of Equations

$y = ax + b$

$y = 14 - 6x$

Is $(3,-5)$ a solution? NO

$(-2, 26)$? yes

$-5 = 14 - 6(3)$?

$-5 = 14 - 18$

$-5 = -4$ NO

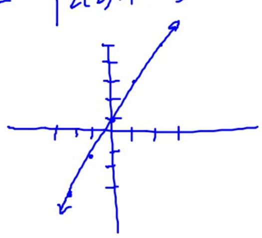
$26 = 14 - 6(-2)$?

$26 = 14 + 12$ ✓

Sketch the graph

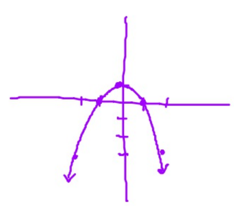
$y = 2x + 1$

x	y
-2	$2(-2)+1 = -3$
-1	$2(-1)+1 = -1$
0	$2(0)+1 = 1$
1	$2(1)+1 = 3$
2	$2(2)+1 = 5$



$y = 1 - x^2$

x	y
-2	$1-(-2)^2 = -3$
-1	$1-(-1)^2 = 0$
0	$1-(0)^2 = 1$
1	$1-(1)^2 = 0$
2	$1-(2)^2 = -3$



y-intercept $(0, b)$

x-intercept $(a, 0)$

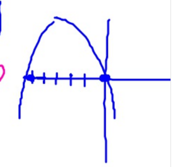
Find the intercepts

$y = -x^2 - 5x$

y-int: Let $x = 0$

$y = -(0)^2 - 5(0) = 0$

$\boxed{(0,0)}$



x-int: Let $y = 0$

$0 = -x^2 - 5x$

$0 = -x(x+5)$

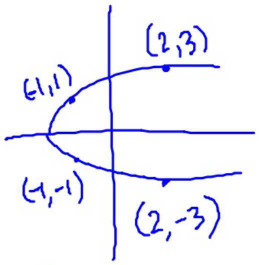
$-x = 0 \qquad x + 5 = 0$
$\qquad\qquad\quad -5 \;\; -5$

$x = 0 \qquad x = -5$

$\boxed{(0,0), \; (-5,0)}$

Symmetry

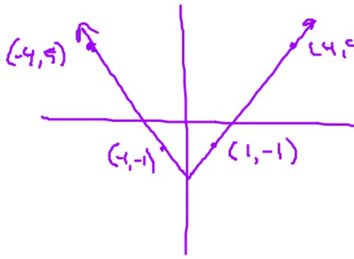
x-axis symmetry



(x, y)

$(x, -y)$

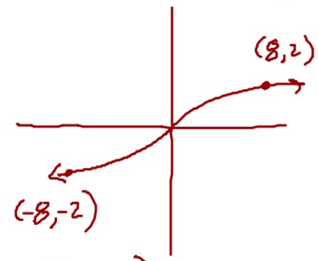
y-axis symmetry



(x, y)

$(-x, y)$

origin symmetry



(x, y)

$(-x, -y)$

Algebraic Test For Symmetry

$y^2 = 6 - x$

x-axis: $\left.\begin{array}{l} y^2 = 6 - x \\ (-y)^2 = 6 - x \\ y^2 = 6 - x \end{array}\right\}$ Same — x-axis symmetry

y-axis: $\left.\begin{array}{l} y^2 = 6 - x \\ y^2 = 6 - (-x) \\ y^2 = 6 + x \end{array}\right\}$ not same — no y-axis symmetry

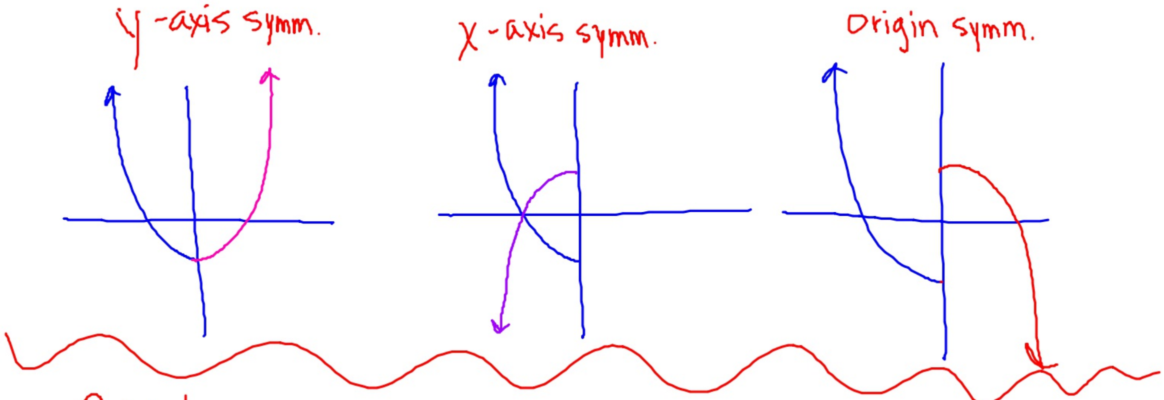
origin: $\left.\begin{array}{l} y^2 = 6 - x \\ (-y)^2 = 6 - (-x) \\ y^2 = 6 + x \end{array}\right\}$ not same — no origin symmetry

$y^2 = 4 - x^2$

x-axis: $\left.\begin{array}{l} y^2 = 4 - x^2 \\ (-y)^2 = 4 - x^2 \\ y^2 = 4 - x^2 \end{array}\right\}$ yes

y-axis: $\left.\begin{array}{l} y^2 = 4 - x^2 \\ y^2 = 4 - (-x)^2 \\ y^2 = 4 - x^2 \end{array}\right\}$ yes

origin: $\left.\begin{array}{l} y^2 = 4 - x^2 \\ (-y)^2 = 4 - (-x)^2 \\ y^2 = 4 - x^2 \end{array}\right\}$ yes



Circles

$x^2+y^2=r^2$ circle centered at the origin

r = radius

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

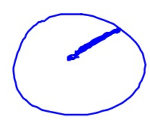
$\leftrightarrow \quad \updownarrow$

$(1,-2)$ lies on a circle whose center is $(-3,-5)$, write the standard form of the equation

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

$$(x-{}^{-}3)^2+(y-{}^{-}5)^2=5^2$$

$$\boxed{(x+3)^2+(y+5)^2=25}$$



$$r=\sqrt{(-3-1)^2+(-5-{}^{-}2)^2}$$

$$r=\sqrt{(-4)^2+(-3)^2}$$

$$=\sqrt{16+9}$$

$$=\sqrt{25}$$

$$=5$$

Endpoints of the diameter are:

$(-4,-1)$ $(4,1)$, find the eq.

Center: midpoint $\left(\frac{-4+4}{2}, \frac{-1+1}{2}\right)$

$$\left(\frac{0}{2},\frac{0}{2}\right)=(0,0)$$

$$(x-0)^2+(y-0)^2=(\sqrt{17})^2$$

$$\boxed{x^2+y^2=17}$$

diameter length $=\sqrt{(4-{}^{-}4)^2+(1-{}^{-}1)^2}$

$=\sqrt{(8)^2+(2)^2}$

$=\sqrt{64+4}$

$=\sqrt{68}$

$=2\sqrt{17}$

radius $=\frac{\cancel{2}\sqrt{17}}{\cancel{2}}=\sqrt{17}$

Endpoints:

$(-2,4) \qquad (6,-8)$

center: $\left(\frac{-2+6}{2}, \frac{4+-8}{2}\right)$

$\left(\frac{4}{2}, \frac{-4}{2}\right)$

$(2,-2)$

$(x-2)^2+(y--2)^2=(2\sqrt{13})^2$

$\underset{}{} 4 \cdot 13$

$$\boxed{(x-2)^2+(y+2)^2=52}$$

diameter length $=\sqrt{(6--2)^2+(-8-4)^2}$

$=\sqrt{(8)^2+(-12)^2}$

$=\sqrt{64+144}$

$=\sqrt{208}$

$=4\sqrt{13}$

radius $=\frac{\cancel{4}^{2}\sqrt{13}}{\cancel{2}}=2\sqrt{13}$