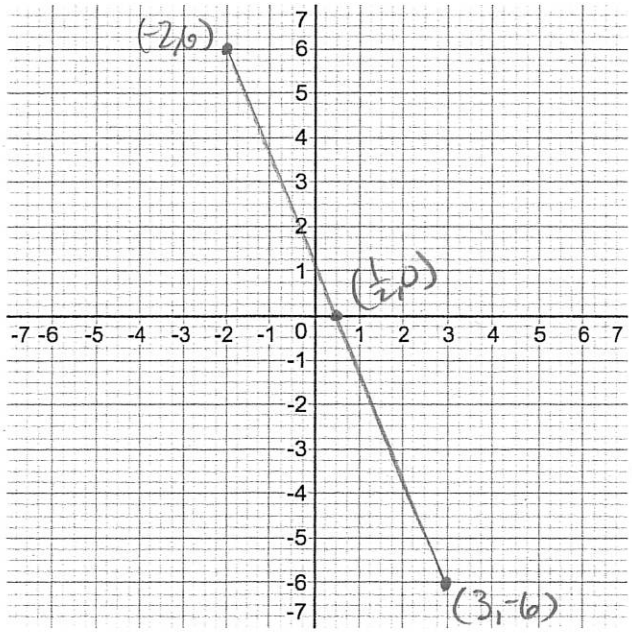
§P.3 & P.4: The Cartesian Plane, Graphs, & Lines

1.] Plot the points $(-2, 6)$ and $(3, -6)$ on the Cartesian plane and find the distance between them. Find the midpoint and label it on the plane.



Distance: $d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$= \sqrt{(3-(-2))^2+(-6-6)^2}$

$= \sqrt{5^2+(-12)^2}$

$= \sqrt{25+144}$

$= \sqrt{169}$

$\boxed{d = 13}$

Midpoint: $\left(\frac{-2+3}{2}, \frac{6+(-6)}{2}\right) = \boxed{\left(\frac{1}{2}, 0\right)}$

2.] Consider the equation given by $y = x^2 - 3x + 2$.

a.) Does the point $(-2, 8)$ lie on the graph of this equation?

$8 \stackrel{?}{=} (-2)^2 - 3(-2) + 2$

$\Rightarrow 8 \stackrel{?}{=} 4 + 6 + 2$ No, it does not lie on graph.

$\Rightarrow 8 \neq 12$

b.) Find all x-intercepts of this graph.

x-ints: Set $y = 0$, and solve for x:

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

$\Rightarrow x^2 - 3x + 2 = 0$

$(x-2)(x-1) = 0$

$x = 1, 2$

x-ints: $\boxed{(1,0), (2,0)}$

c.) Find the y-intercept of this graph.

y-int: Set $x = 0$, and solve for y:

$y = 0^2 - 3(0) + 2$

$y = 2$

y-int: $\boxed{(0,2)}$

3.] Graph the following linear equations on the plane below:

a.) $y = 2x - 3$

Slope: $m = 2$

y-int: $(0, -3)$

b.) $y + 2x - 4 = 0$

$y = -2x + 4$

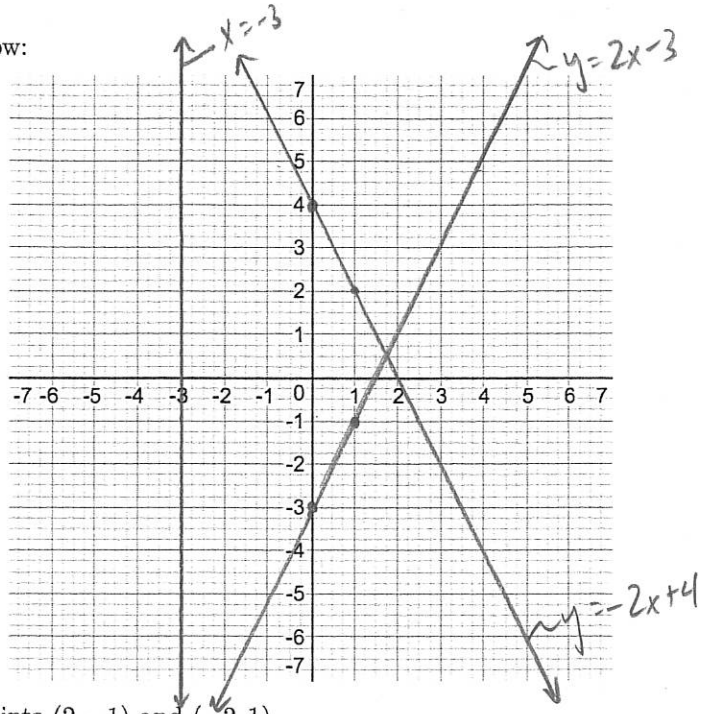
Slope: $m = -2$

y-int: $(0, 4)$

c.) $x = -3$

Vertical line at $x = -3$

(All points with x coord of -3)



4.] Find the equation of the line that goes through the points $(2, -1)$ and $(-2, 1)$.

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-(-1)}{-2-2} = \frac{2}{-4} = -\frac{1}{2}$

point: $(x_1, y_1) = (2, -1)$

Line: $y - y_1 = m(x - x_1) \Rightarrow y-(-1) = -\frac{1}{2}(x-2) \Rightarrow y+1 = -\frac{1}{2}x+1 \Rightarrow \boxed{y = -\frac{1}{2}x}$

5.] Find the equation of the line that is *a*) parallel and *b*) perpendicular to the line $4x - 2y = 3$ and goes through the point $(2, 1)$.

Original Line:

$4x - 2y = 3$

$\Rightarrow -2y = -4x + 3$

$\Rightarrow y = 2x - \frac{3}{2}$

Slope: $m = 2$

a) Parallel:

Slope: $m = 2$

point: $(x_1, y_1) = (2, 1)$

$y - y_1 = m(x - x_1)$

$\Rightarrow y - 1 = 2(x-2)$

$\Rightarrow y - 1 = 2x - 4$

$\Rightarrow \boxed{y = 2x - 3}$

b) Perpendicular:

Slope: $m = -\frac{1}{2}$

point: $(x_1, y_1) = (2, 1)$

$y - y_1 = m(x - x_1)$

$\Rightarrow y - 1 = -\frac{1}{2}(x-2)$

$\Rightarrow y - 1 = -\frac{1}{2}x + 1$

$\Rightarrow \boxed{y = -\frac{1}{2}x + 2}$