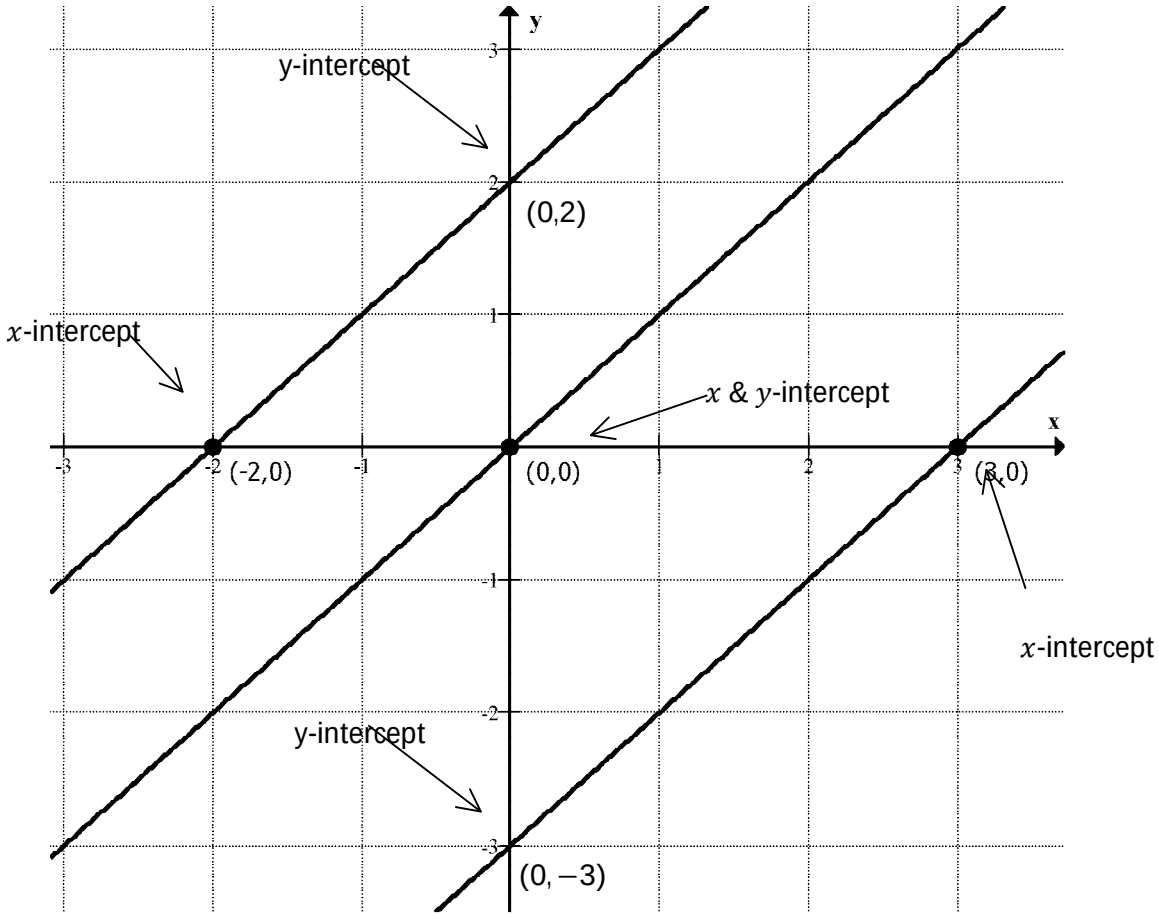
M10 - 7.1 - Finding x, y-intercept: Notes

Find x and $y-$ intercepts from a Graph



Find x and $y-$ intercepts from a Equation

y-intercept: the y value where the line crosses the y-axis. Set $\boldsymbol{x = 0}$ and solve.

$y = x - 3$
$y = (0) - 3$
$y = -3$

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

$5x + 4y = 20$
$5(0) + 4y = 20$
$4y = 20$
$\frac{4y}{4} = \frac{20}{4}$
$y = 5$

y-intercept: $(0,5)$

x-intercept: the x value where the line crosses the x-axis. Set $\boldsymbol{y = 0}$ and solve.

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

x-int: $(-2,0)$

$5x + 4y = 20$
$5x + 4(0) = 20$
$5x = 20$
$\frac{5x}{5} = \frac{20}{5}$
$x = 4$

x-int: $(4,0)$

M10 - 7.1 - Graphing Standard Form Notes

Graph the line in Standard Form using the x and y intercept method

$5x + 4y = 20$

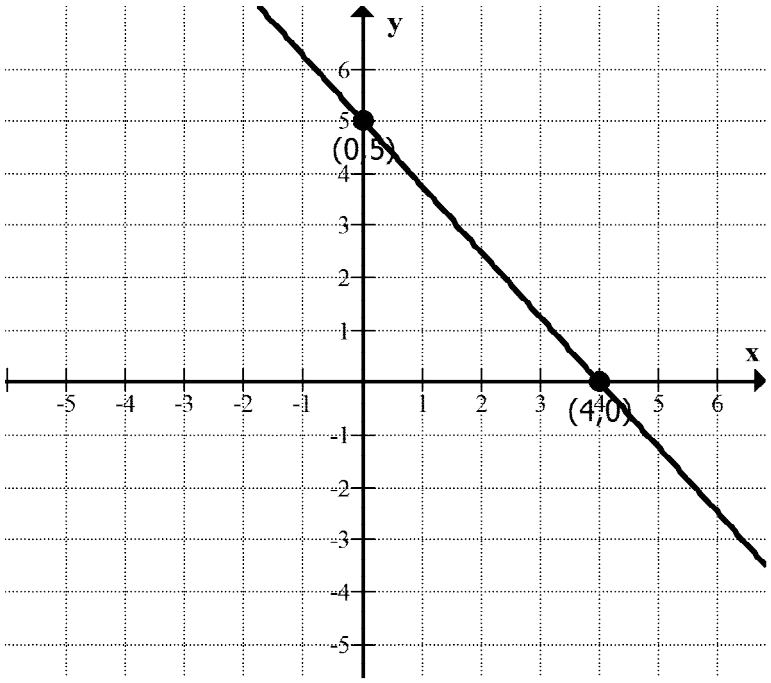
x	y
0	
	0

Y Intercept:

$5x + 4y = 20$
$5(0) + 4y = 20$
$4y = 20$
$\frac{4y}{4} = \frac{20}{4}$
$y = 5$ (0,5)

X Intercept:

$5x + 4y = 20$
$5x + 4(0) = 20$ (5,0)
$5x = 20$
$\frac{5x}{5} = \frac{20}{5}$
$x = 4$ (4,0)



$9x - 3y = 18$

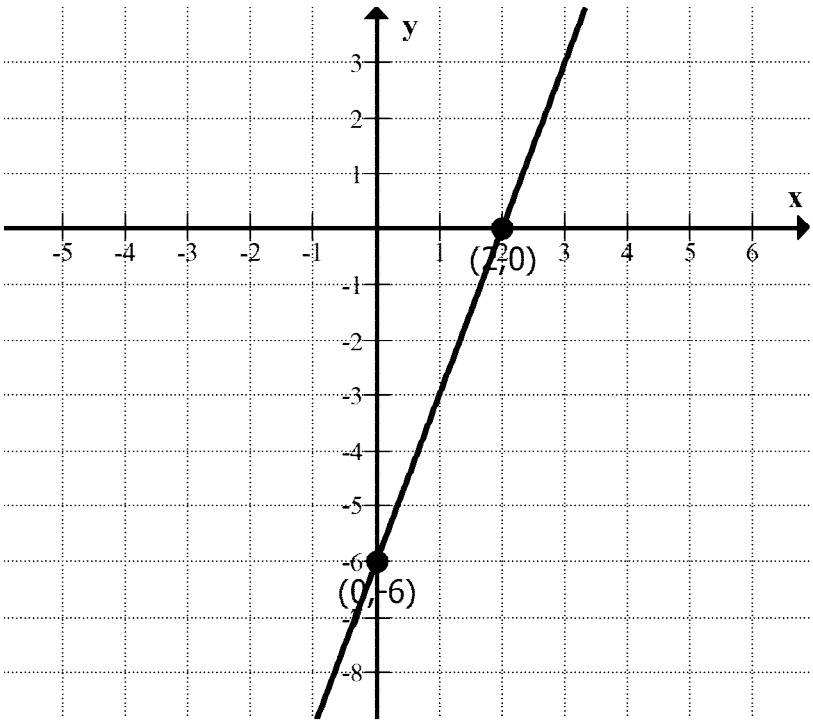
x	y
0	
	0

Y Intercept:

$9x - 3y = 18$
$9(0) - 3y = 18$
$-3y = 18$
$\frac{-3y}{-3} = \frac{18}{-3}$
$y = -6$ $(0, -6)$

X Intercept:

$9x - 3y = 18$
$9x - 3(0) = 18$
$9x = 18$
$\frac{9x}{9} = \frac{18}{9}$
$x = 2$ (2,0)



M10 - 7.2 - Graphing Slope Intercept Form ($y = mx + b$) Review

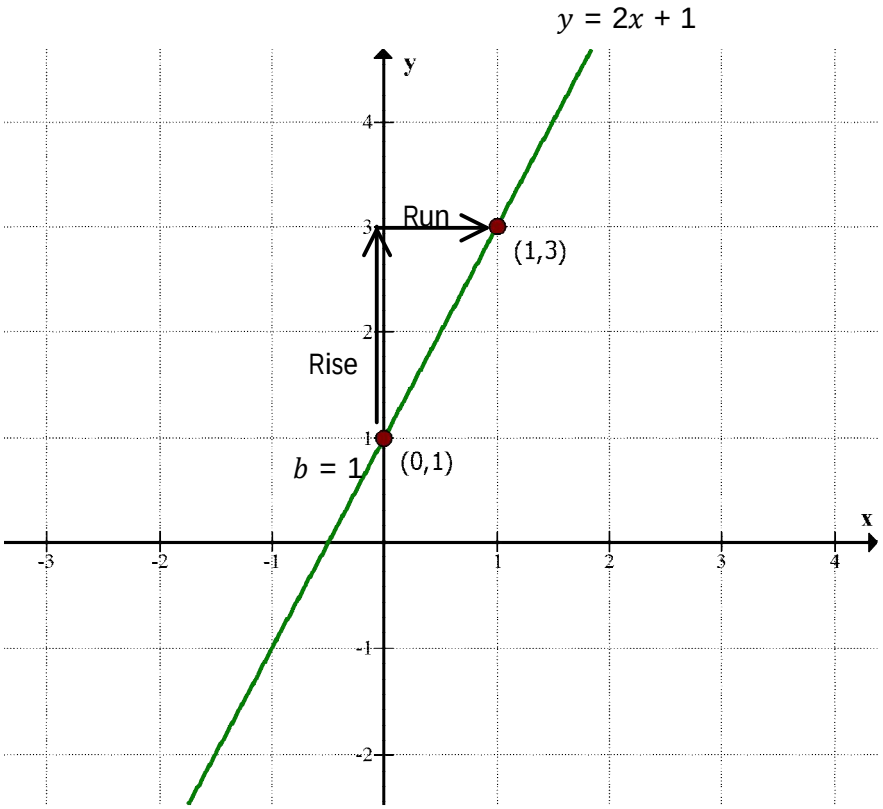
Graphing using b and m.

$y = 2x + 1$ ⟵ $y-intercept$: (0,1)

Slope

$y = mx + b$ ⟵ $y-intercept$: (0,b)

Slope = $\frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$ ⟵ Vertical distance ⟵ Horizontal distance



Steps:

Plot y-intercept: (0,1)

Use slope: $\frac{2}{1}$ ⟵ Rise ⟵ Run

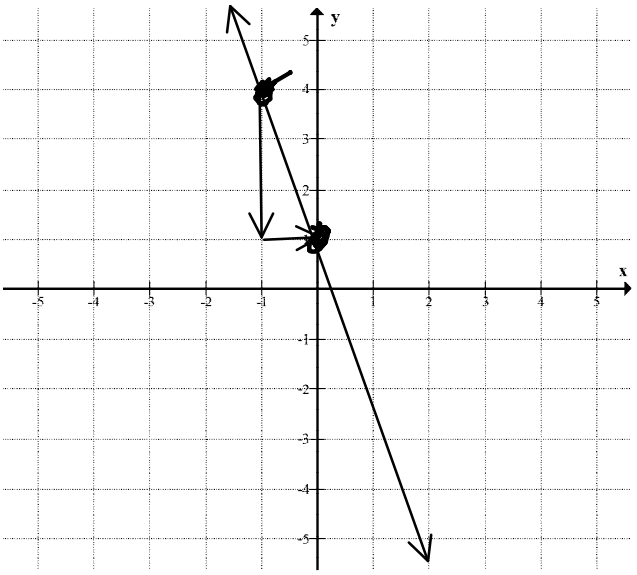
Plot new Point: (1,3)

Draw line.

x	y
-1	-1
0	1
1	3

M10 - 7.2 - Find Equation Slope Intercept Form: $y = mx + b$ Notes

Find Equation in Slope Intercept Form



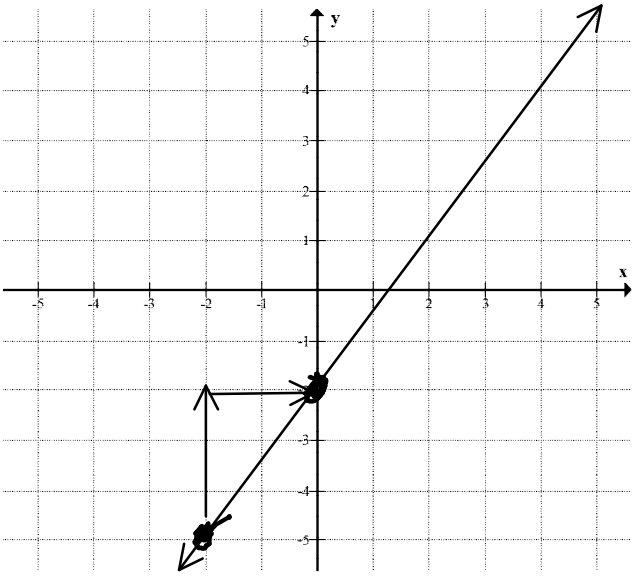
Steps:

Find Slope $m = -3$

Find y-intercept (0,1)

Substitute into: $y = mx + b$

$y = -3x + 1$



Steps:

Find Slope $m = \frac{2}{3}$

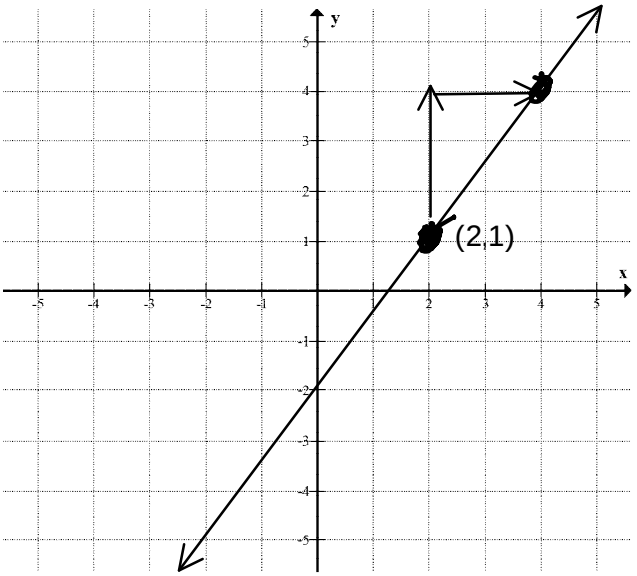
Find y-intercept $(0, -2)$

Substitute into: $y = mx + b$

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

M10 - 7.3 - Find Equation Slope Point Form $y-y_1 = m(x - x_1)$

Find Equation in Slope Intercept Form



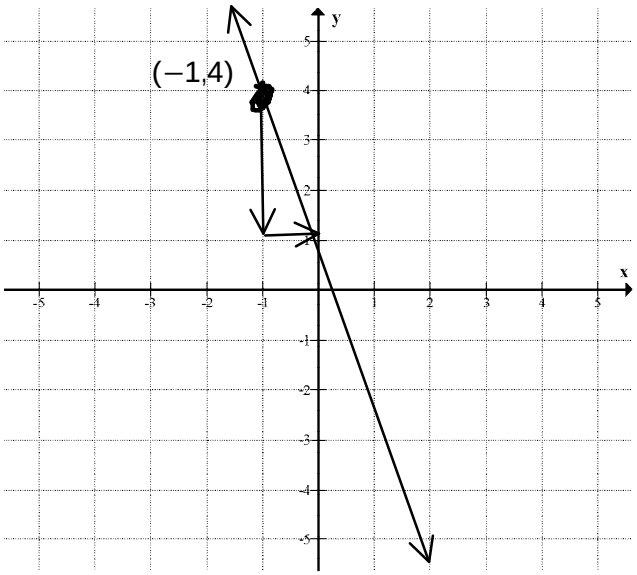
Steps:

Find Slope $m = \frac{3}{2}$

Find Point (2,1)

Substitute into: $y - y_1 = m(x - x_1)$

$y - 1 = \frac{3}{2}(x - 2)$



Steps:

Find Slope $m = -3$

Find Point (−1,4)

Substitute into: $y - y_1 = m(x - x_1)$

$y - 4 = -3(x - (-1))$

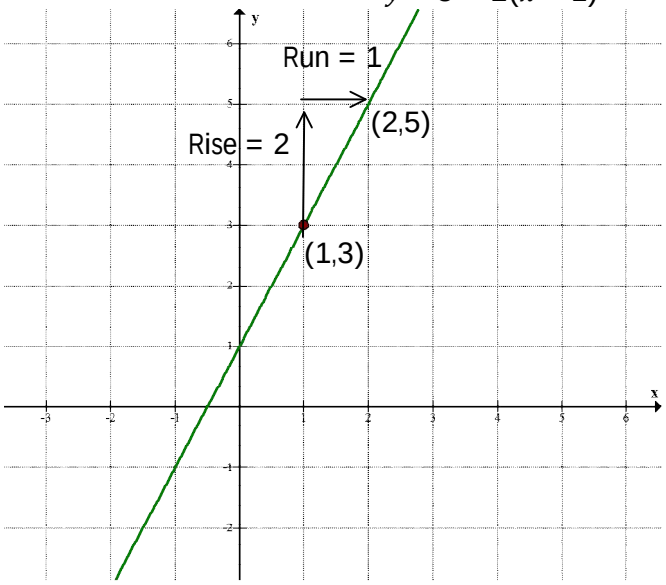
$y - 4 = -3(x + 1)$

M10 - 7.3 - Graphing Slope Point Form: $y - y_1 = m(x - x_1)$ Notes

State the equation of the line that passes through (1,3) and has a slope of 2, in slope point form, then graph the line.

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

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



Steps:

Plot the point (1,3)

Rise 2, Run 1

Plot new point (2,5)

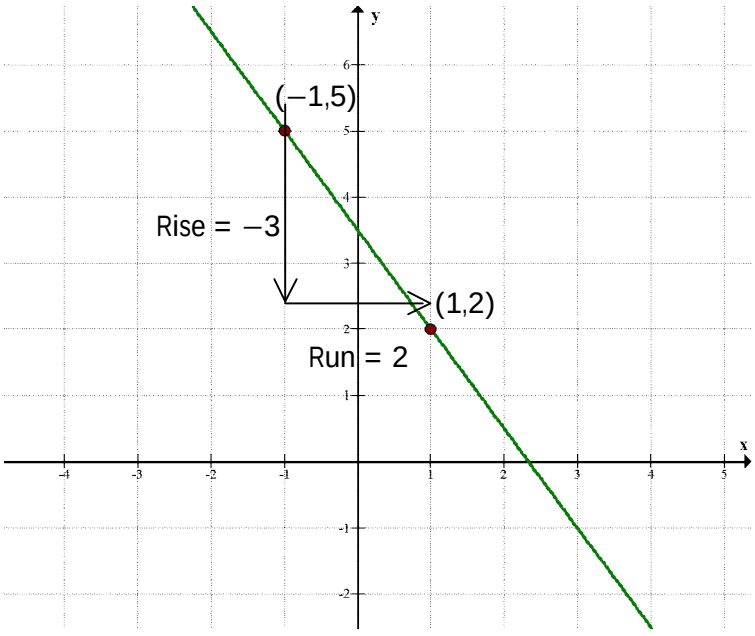
Draw a line

Graph the line that passes through $(-1,5)$ and has a slope of $-\frac{3}{2}$

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

$$y - 5 = -\frac{3}{2}(x - (-1))$$

$$y - 5 = -\frac{3}{2}(x + 1))$$



Steps:

Plot the point $(-1,5)$

Rise -3, Run 2

Plot new point (1,2)

Draw a line

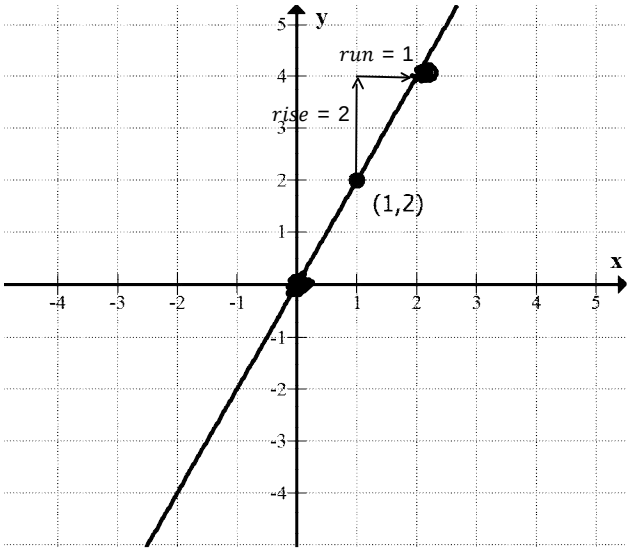
M10 - 7.3 - Graphing Slope Point Form: $y - y_1 = m(x - x_1)$ Notes

Graph the following lines.

$y - 2 = 2(x - 1)$
$y - y_1 = m(x - x_1)$

(x_1, y_1)
$(1, 2)$

$slope = \frac{rise}{run} = m = \frac{2}{1}$



Steps

Plot point: (1,2)

Graph Slope

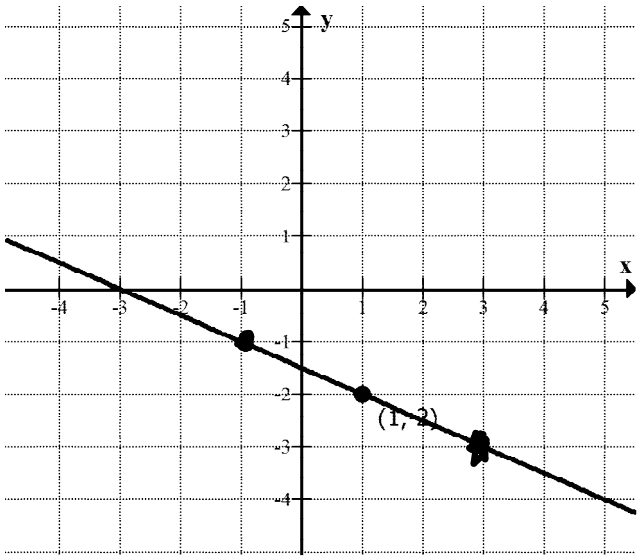
Plot point new point

Draw line.

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

(x_1, y_1)
$(1, -2)$

$y - (-2) = -\frac{1}{2}(x - 1)$
(y_1 over y, x_1 over x)



Steps

Plot Point $(1, -2)$

Graph Slope

Plot point new point

Draw line.

M10 - 7.23 - Find Equation Slope Pt/Slope Intercept Notes

Given a point and the slope: (1,3) $m = 2$

Slope point form:

$y - y_1 = m(x - x_1)$
$y - (3) = (2)(x - (1))$ Plug in values
$y - 3 = 2(x - 1)$

Proving equality

$y - 3 = 2(x - 1)$
$y - 3 = 2x - 2$
$+3 \quad +3$
$y = 2x + 1$ ⟵ They are equal ⟶ $y = 2x + 1$

Slope intercept form:

$y = mx + b$
$y = (2)x + b$ Substitute m
$(3) = (2)(1) + b$ Substitute x and y
$3 = 2 + b$
$-2 \quad -2$
$1 = b$ Solve for b.

$y = mx + b$ Write the equation.
$y = (2)x + (1)$ Substitute m and b.
$y = 2x + 1$

Given two points: $(-1, -1)$ and (1,5)
$(x_1, y_1) \quad (x_2, y_2)$

Slope point form:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{(5 - (-1))}{1 - (-1)}$$
$$m = \frac{5 + 1}{1 + 1}$$
$$m = \frac{6}{2}$$
$$m = 3$$

Find m with slope equation.

$y - y_1 = 3(x - x_1)$

Substitute (1,5) OR Substitute $(-1, -1)$

$y - y_1 = 3(x - x_1)$
$y - (5) = 3(x - (1))$
$y - 5 = 3(x - 1)$

$y - y_1 = 3(x - x_1)$
$y - (-1) = 3(x - (-1))$
$y + 1 = 3(x + 1)$

Proving equality

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

$y + 1 = 3(x + 1)$
$y + 1 = 3x + 3$
$-1 \quad -1$
$y = 3x + 2$

They are equal.

Slope intercept form:

$y = mx + b$
$y = 3x + b$

$y = (3)x + b$
$(5) = 3(1) + b$
$5 = 3 + b$
$-3 \quad -3$
$2 = b$

Find b by plugging in values.

$y = mx + b$

$y = 3x + 2$

They are equal

M10 - 7.4 - Converting Between Forms Notes

Slope Point Form to Slope Intercept Form

$y - y_1 = m(x - x_1) \longrightarrow y = mx + b$

$y - 2 = 3(x - 1)$
$+2 \qquad +2$
$y = 3(x - 1) + 2$
$y = 3x - 3 + 2$
$y = 3x - 1$

Slope Point Form to General Form

$y - y_1 = m(x - x_1) \longrightarrow Ax + By + C = 0$

$y - 1 = 2(x - 3)$
$y - 1 = 2x - 6$
$-2x \quad -2x$
$y - 2x - 1 = -6$
$+6 \quad +6$
$y - 2x + 5 = 0$
$2x - y - 5 = 0$

No Fractions
$+x, y, \# = 0$

Slope Intercept Form to Slope Point Form

$y = mx + b \longrightarrow y - y_1 = m(x - x_1)$

(N/A)

Slope Intercept Form to General Form

$y = mx + b \longrightarrow Ax + By + C = 0$

$y = -3x + 2$
$+3x \quad +3x$
$3x + y = 2$
$-2 \quad -2$
$3x + y - 2 = 0 \longrightarrow 3x - 2y - 2 = 0$

General Form to Slope Point Form

$Ax + By + C = 0 \longrightarrow y - y_1 = m(x - x_1)$

(N/A)

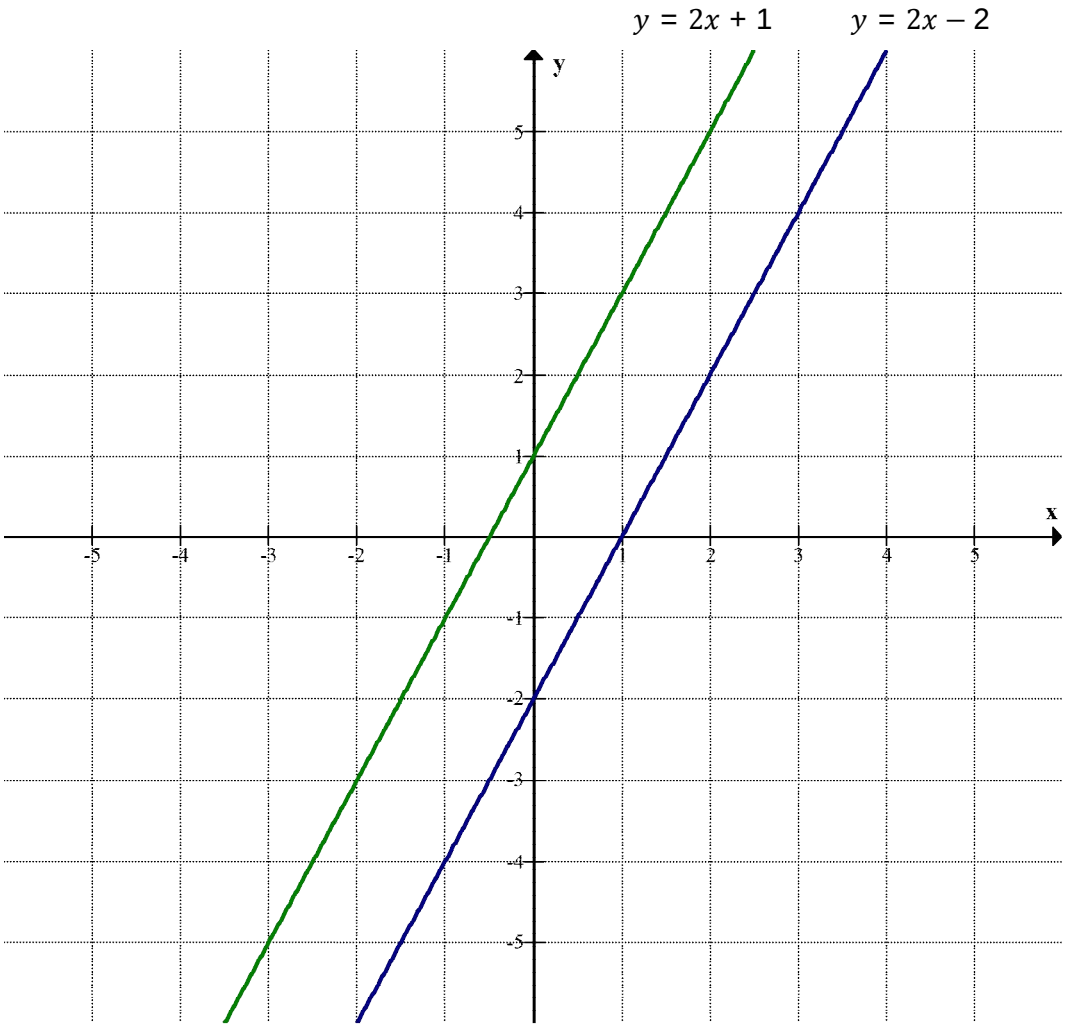
General Form to Slope Intercept Form

$Ax + By + C = 0 \longrightarrow y = mx + b$

$4x + 2y + 6 = 0$
$-4x \qquad -4x$
$2y + 6 = -4x$
$-6 \quad -6$
$2y = -4x - 6$
$\frac{2y}{2} = -\frac{4x}{2} - \frac{6}{2}$
$y = -2x - 3 \longrightarrow y = -2x - 3$

M10 - 7.5 - Parallel Lines: $m = m$ Notes

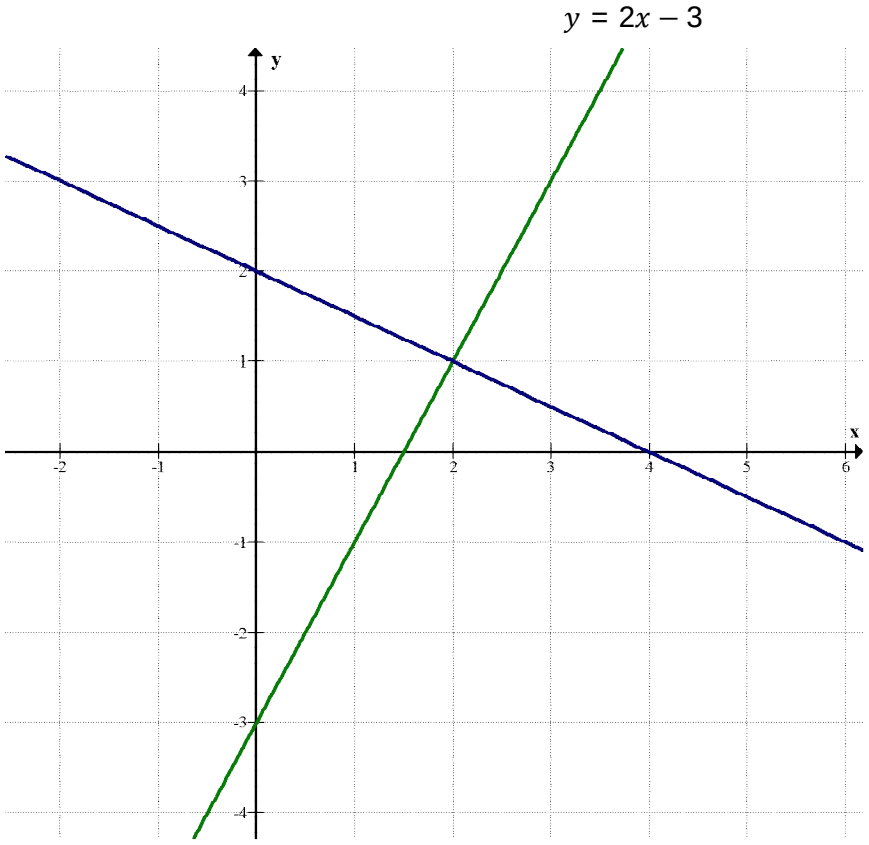
Parallel Lines: lines which never cross. Lines with the same slope. $m = m$



Notice: the graph of $y = 2x - 2$ and $y = 2x + 1$ are parallel because they have the same slope ($m = 2$).

M10 - 7.5 - Perpendicular Lines: $m = -\frac{1}{m}$ Notes

Perpendicular Lines: two lines which have **<u>negative reciprocal</u>** slopes and meet at 90º. $m = -\frac{1}{m}$



These two lines meet at a are perpendicular at a 90 degree angle because $2 \rightarrow -\frac{1}{2}$. The slope of the blue line is the negative reciprocal of the slope of the green line.