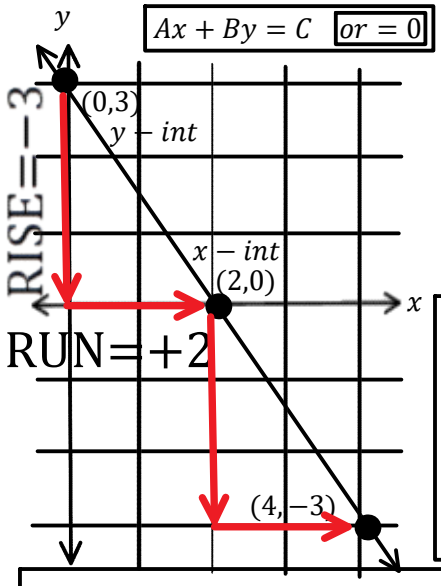
M10 - 7.0 - Form Notes

$6 to spend on $3 Burgers (let $x = \#$) and $2 Fries (let $y = \#$).

Graph : $3x + 2y = 6$

$Ax + By = C$ $or = 0$



Intercept Method :

x	y
0	
	0

Table Of Values (TOV) 2

3 Substitution

$y - int$:

$3x + 2y = 6$
$3(0) + 2y = 6$
$2y = 6$
$\frac{2y}{2} = \frac{6}{2}$
$y = 3$
$(0,3)$ $y - int$

Put Zero in for x/y Solve 1

$x - int$:

$3x + 2y = 6$
$3x + 2(0) = 6$
$3x = 6$
$\frac{3x}{3} = \frac{6}{3}$
$x = 2$
$(2,0)$ $x - int$

Slope : $m = \frac{y_2 - y_1}{x_2 - x_1}$ Slope Equation 4

$m = \frac{(0) - (-3)}{(2) - (4)}$ Substitute Points With (Brackets)

$m = -\frac{3}{2}$ $m = Slope = \frac{rise}{run} = \frac{-3}{+2}$

Point #1 (x_1, y_1) $(4, -3)$

Point #2 (x_2, y_2) $(2,0)$

Horizontal ↔ $m = 0$, $y = \#$

Vertical ↕ $m = und$, $x = \#$

Given a point and the slope: $(4, -3)$ $m = -\frac{3}{2}$

(x, y)

We don't go to slope point!

Slope Intercept Form:

$y = mx + b$ Slope Intercept Form

$y = (-\frac{3}{2})x + b$ Substitute m 5

$(-3) = \left(-\frac{3}{2}\right)(4) + b$ Substitute x and y

$-3 = -6 + b$ Subtract 6 to Both Sides

$+6 \quad +6$ Mirror

$b = 3$ Solve for b

$y = mx + b$ Slope Intercept Form

$y = -\frac{3}{2}x + 3$ Substitute m and b

Slope Point Form: **& to Slope Intercept Form**

$y - y_1 = m(x - x_1)$ Slope Point Form

$y - y_1 = -\frac{3}{2}(x - x_1)$ Substitute m

$y - (-3) = -\frac{3}{2}(x - (4))$ Substitute x and y

Point #1 $(4, -3)$ (x_1, y_1)

$y + 3 = -\frac{3}{2}(x - 4)$ Slope Point Form

$y + 3 = -\frac{3}{2}x + 6$ Distribute

$-3 \quad -3$ Subtract 3 from Both Sides

$y = -\frac{3}{2}x + 3$ Solve for y

Slope Intercept Form

They are equal

Standard to Slope Intercept Form : 6

$3x + 2y = 6$
$-3x \quad -3x$ Subtract $3x$ from Both Sides
$2y = -3x + 6$
$\frac{2y}{2} = -\frac{3x}{2} + \frac{6}{2}$ Divide Both Sides by 2
$y = -\frac{3}{2}x + 3$ Slope Intercept Form

Slope Intercept to Standard Form :

$y = -\frac{3}{2}x + 3$
$\left(y = -\frac{3}{2}x + 3\right) \times 2$ Multiply Both Sides by 2 (LCD^*)
$2y = -3x + 6$
$+3x \quad +3x$ Add $3x$ to Both Sides
$3x + 2y = 6$ Standard Form Equations
$-6 \quad -6$ Subtract 6 from Both Sides
$3x + 2y - 6 = 0$

$+x$ coefficient
$Order: x, y, \# \; or = 0$
No Fractions

$y = mx + b \leftarrow y - intercept: (0,b)$

$m = Slope = \frac{rise}{run}$

$Slope = -\frac{3}{2}$ $y - int: (0,3)$

Function Notation $f(2) = ?, f(x) = -3, x = ?.$

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$f(x) = -\frac{3}{2}x + 3$

$f(2) = -\frac{3}{2}(2) + 3$

$f(2) = 0$

x	y
2	0
4	−3

$f(x) = -\frac{3}{2}x + 3$

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

...

$x = 4$

Graph Steps
1) Table of Values (TOV)
2) Intercept Method
3) Graph Point/Rise Run Slope

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Find Equation (3 Forms)
1) Find y −int/Point
2) Find Slope
3) Substitute*
4) Algebra*

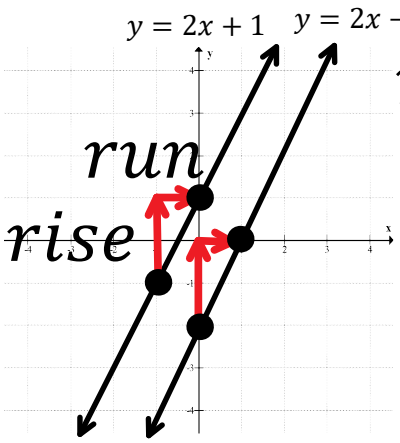
Parallel Same Slope $m = -\frac{3}{2}$ Perpendicular Negative Flip $m = \frac{2}{3}$ 8

M10 -·7.0 - Parallel/Perpendicular Notes

$m_{||}$: parallel
$m_{\perp}$: perpendicular

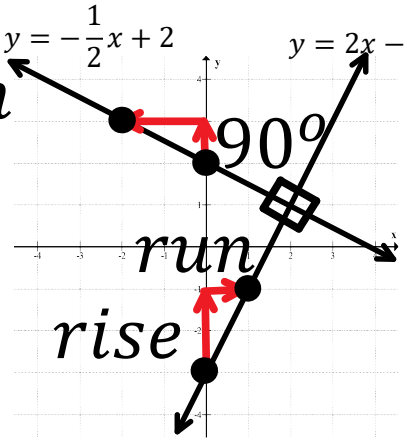
Parallel Lines: lines which never cross. Lines with the **Same Slope**. $m = m$

Perpendicular Lines: two lines which have N**egative Reciprocal** slopes and meet at 90°. $m = -\frac{1}{m}$



$$m = m$$
$$\frac{2}{1} = \frac{2}{1}$$

Same Slope



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

Negative Flip

Notice: the graph of $y = 2x - 2$ and $y = 2x + 1$ are parallel because they have the same slope and never intersect.

Perpendicular Lines meet at a 90 degree.

Notice: The slope of the one line is the negative reciprocal of the slope of the other. Multiply it by -1 and flip it.

Find Equation Parallel to $y = 2x + 1$, or $(2x - y = -1)$ through $(1,0)$.
$m = 2, point\ (1,0)$.
...
$y = 2x - 2$

Find Equation Perpendicular to $y = \frac{1}{2}x + 1$, through $y\text{-}int = -4$, $(0, -4)$.
$m = -\frac{2}{1}, pt\ (1,0)$.
...
$y = -\frac{2}{1}x - 4$

Find "p" if the lines are parallel/perpendicular. Flip one and multiply it by -1

$m = \frac{p}{5}, m = 2$

$\frac{p}{5} = 2$

$5 \times \frac{p}{5} = 2 \times 5$

$p = 10$

Algebra

$\frac{10}{5} = 2$ ✓

$m = \frac{8}{p}, m = -\frac{1}{2}$

$\frac{8}{p} = \frac{-1}{2}$

$2 \times 8 = -1 \times p$

$\frac{16}{-1} = \frac{-p}{-1}$

$p = -16$

Cross Multiply

$\frac{8}{-16} = -\frac{1}{2}$ ✓

$m = \frac{p}{5}, m = 2$

$\frac{p}{5} = -\frac{1}{2}$

$5 \times \frac{p}{5} = -\frac{1}{2} \times 5$

$p = -\frac{5}{2}$

$-\frac{\frac{5}{2}}{5} \times \frac{1}{5} = -\frac{1}{2}$ ✓

$\frac{5}{2} \div \frac{5}{1} = \frac{5}{2} \times \frac{1}{5}$

$m = \frac{8}{p}, m = \frac{-1}{2}$

$-\frac{p}{8} = -\frac{1}{2}$

$-8 \times -\frac{p}{8} = -\frac{1}{2} \times -8$

$p = 4$

$\frac{1}{2} \times \frac{8}{1} = \frac{8}{2} = 4$

$\frac{1}{2} \times \frac{8}{1} = 4$ ✓

M10 - 7.0 - Given Slope Solve for x/y Notes

(x_1, y_1) (x_2, y_2)

$(2,4)$ & $(1, n)$, $m = \frac{3}{1}$

Make variable point #2.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$3 = \frac{(n) - (4)}{(1) - (2)}$$

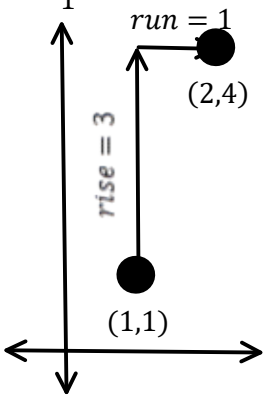
$$3 = \frac{n - 4}{-1}$$

$$-1 \times 3 = \frac{n - 4}{-1} \times -1$$

$$-3 = n - 4$$

$$+4 \quad +4$$

$$n = 1$$



(x_1, y_1) (x_2, y_2)

$(-4, -2)$ $(x, 1)$ $m = \frac{1}{2}$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{1}{2} = \frac{(1) - (-2)}{(x) - (-4)}$$

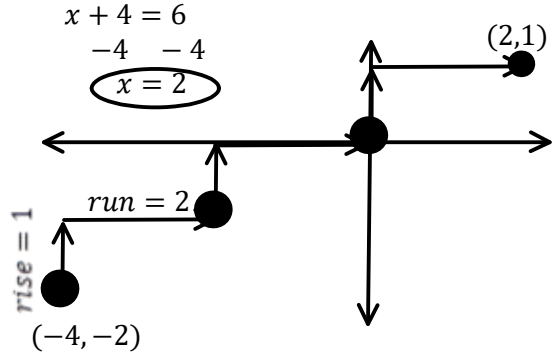
$$\frac{1}{2} = \frac{3}{x + 4}$$

$$(x + 4) \times 1 = 3 \times 2$$

$$x + 4 = 6$$

$$-4 \quad -4$$

$$x = 2$$



(x_1, y_1) (x_2, y_2) $m = \frac{5}{4}$

$(-2, -8)$ $(x, 2)$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{5}{4} = \frac{2 - (-8)}{x - (-2)}$$

$$\frac{5}{4} = \frac{10}{x + 2}$$

$$(x + 2)5 = 10(4)$$

$$5x + 10 = 40$$

$$-10 \quad -10$$

$$\frac{5x}{5} = \frac{30}{5}$$

$$x = 6$$

Find Equation
2 points
Point & Slope
Equation Information
Change Forms to $y = mx + b$
Parallel/Perpendicular Info

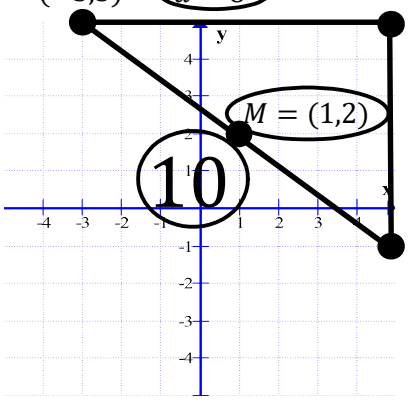
M10 - 7.0 - Midpoint/Distance Notes

let $M = midpoint$ *let* $a = horizontal\ distance$
let $d = distance$ *let* $b = vertical\ distance$

$(-3,5)$ $(5,-1)$

(x_1, y_1)
$(-3,5)$

$a = x_2 - x_1$
$a = (5) - (-3)$
$a = 8$



$b = y_2 - y_1$
$b = (-1) - (5)$
$b = -6$
$b = 6$

(x_2, y_2)
$(5,-1)$

Average the $x's$ *and* $y's$

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

$$M = \left(\frac{(-3) + (5)}{2}, \frac{(5) + (-1)}{2}\right)$$

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

$$M = (1,2)$$

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

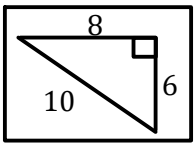
$$d = \sqrt{((5) - (-3))^2 + ((-1) - (5))^2}$$

$$d = \sqrt{(8)^2 + (-6)^2}$$

$$d = \sqrt{64 + 36}$$

$$d = \sqrt{100}$$

$$d = 10$$



$a^2 + b^2 = c^2$

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

$$c = \sqrt{8^2 + 6^2}$$

$$c = 10$$

$a^2 + b^2 = c^2$
$6^2 + 8^2 = 10^2$
$100 = 100$