

$$x_1 \quad y_1 \quad x_2 \quad y_2$$

1. Use the points (2, 3) and (6, 4) to calculate the following:

A. Slope

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

$$m = \frac{4 - 3}{6 - 2}$$

$$m = \frac{1}{4}$$

B. Midpoint

$$\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}$$

$$\frac{2 + 6}{2}, \frac{3 + 4}{2}$$

$$\frac{8}{2}, \frac{7}{2}$$

$$(4, 3.5)$$

C. Distance

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

$$d = \sqrt{(6 - 2)^2 + (4 - 3)^2}$$

$$d = \sqrt{(4)^2 + (1)^2}$$

$$d = \sqrt{16 + 1}$$

$$d = \sqrt{17}$$

2.) Write the equation of the line that passes through

(3, 2) and (4, 6).

$$x_1 \quad y_1 \quad x_2 \quad y_2$$

$$m = \frac{6 - 2}{4 - 3} = \frac{4}{1}$$

$$m = 4$$

$$y = mx + b$$

$$2 = 4(3) + b$$

$$2 = 12 + b$$

$$-12 \quad -12 \quad b = -10$$

$$y = 4x - 10$$

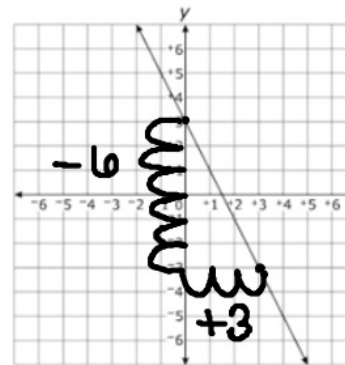
6.) A local hair salon charges a bridal party to style their hair for a wedding using the function $f(x) = 25x + 75$, where x is the number of hours it takes to style the hair. What does the slope represent in the context of the scenario?

- A. the initial fee
 B. additional cost per hour
 C. total cost
 D. total time spent on hair

$\rightarrow m = 25$

7.) Which choice is the equation of the graph below?

- ~~A. $8y + 24 = 16x$~~
 B. $24 - 8y = 16x$
 C. $8y + 24 = 16x$
 D. $8y = 16x - 24$



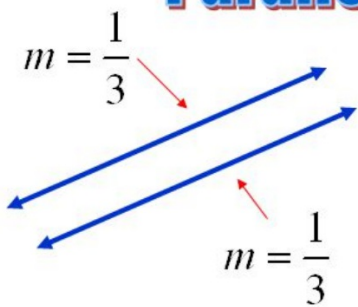
- Step 1: Find the y-intercept. $b = 3$
 Step 2: Find the slope. $m = -\frac{1}{3}$
 Step 3: Use the slope and y-intercept to write the equation of the line
 Step 4: Convert the answer choices to slope intercept form and select the choice that matches the equation in step 3.

(A) $\frac{8y}{8} = \frac{24}{8} + \frac{16x}{8}$
 $y = 3 + 2x$
 $y = 2x + 3$

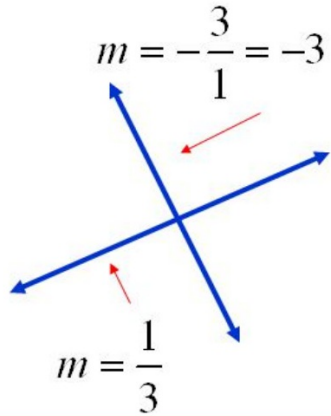
$y = -2x + 3$

(B) $\frac{24}{-24} - \frac{8y}{-24} = \frac{16x}{-24}$
 $\frac{-8y}{-8} = \frac{16x - 24}{-8}$
 $y = -2x + 3$

Parallel and Perpendicular



Remember parallel lines have the same slopes so if you need the slope of a line parallel to a given line, simply find the slope of the given line and the slope you want for a parallel line will be the same.



Perpendicular lines have negative reciprocal slopes so if you need the slope of a line perpendicular to a given line, simply find the slope of the given line, take its reciprocal (flip it over) and make it negative.

WRITING PARALLEL & PERPENDICULAR EQUATIONS

What is this? Given an equation, you must create ANOTHER equation that is either parallel or perpendicular to this line, passing through a certain point.

Keep in mind the following points:

- Parallel equations have equal slopes!
- Perpendicular equations have opposite reciprocal slopes!

Parallel Lines

EXAMPLE 1:

Write the equation of the line that passes through the point $(-2, 7)$ and is **PARALLEL** to the line $y = -4x + 1$

same slope!

$$m = -4$$

$$y = mx + b$$

$$7 = -4(-2) + b$$

$$\begin{array}{r} 7 = 8 + b \\ -8 \quad -8 \\ \hline -1 = b \end{array}$$

$$y = -4x - 1$$

EXAMPLE 2:

Write the equation of the line that passes through the point $(3, -1)$ and is **PARALLEL** to the line $x - 3y = 9$

same slope!

$$y = mx + b$$

$$-1 = \frac{1}{3}(3) + b$$

$$\begin{array}{r} -1 = 1 + b \\ -1 \quad -1 \\ \hline -2 = b \end{array}$$

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

$$\begin{array}{r} -x \quad -x \\ -3y = -x + 9 \\ \hline -3 \quad -3 \quad -3 \\ \hline y = \frac{1}{3}x - 3 \end{array}$$

$$m = \frac{1}{3}$$

EXAMPLE 3:

Write the equation of the line that passes through the point $(4, 3)$ and is **PERPENDICULAR** to the line $y = 2x - 4$

opp. REC. Slopes! $m = 2$ \perp $m = -\frac{1}{2}$

$y = mx + b$

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

$3 = -2 + b$

$5 = b$

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

(x, y) Perpendicular Lines

EXAMPLE 4:

Write the equation of the line that passes through the point $(-5, 1)$ and is **PERPENDICULAR** to the line $5x + 3y = -21$

opp. REC. Slopes!

$3y = -5x - 21$
 $\frac{3y}{3} = \frac{-5x - 21}{3}$

$y = -\frac{5}{3}x - 7$

$y = mx + b$

$1 = \frac{3}{5}(-5) + b$

$1 = -3 + b$

$4 = b$

$y = \frac{3}{5}x + 4$