

2:4 Writing Linear Equations

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Date: _____

Slope-Intercept Form

$$y = mx + b \rightarrow y\text{-int}$$

↳ slope

EX1: Write an equation of a line in slope-intercept form that crosses through $(-4, 1)$ and has a slope of $-\frac{3}{2}$. $y = mx + b$

* put in calc. () → fractions

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

$$\begin{array}{r} 1 = 6 + b \\ -6 \quad -6 \\ \hline b = -5 \end{array}$$

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

□ What about through $(9, 5)$ and $m = \frac{5}{3}$?

$$5 = \frac{5}{3}(9) + b$$

$$\begin{array}{r} 5 = 15 + b \\ -15 \quad -15 \\ \hline b = -10 \end{array}$$

$$y = \frac{5}{3}x - 10$$

EX2: Write an equation of a line in slope-intercept form that crosses through:

$$\begin{array}{l} 1 \ (4, 1) \\ 2 \ (8, 4) \end{array} \quad m = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{4 - 1}{8 - 4} = \frac{3}{4}$$

$$y = mx + b$$

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

$$\begin{array}{r} 1 = 3 + b \\ -3 \quad -3 \\ \hline -2 = b \end{array}$$

$$y = \frac{3}{4}x - 2$$

$$\square \begin{array}{l} (7, -2) \\ (3, -1) \end{array} \quad \frac{-2 - (-1)}{7 - 3} = \frac{-1}{4} = -\frac{1}{4}$$

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

$$\begin{array}{r} -1 = -\frac{3}{4} + b \\ +\frac{3}{4} \quad +\frac{3}{4} \\ \hline b = -\frac{1}{4} \end{array}$$

$$y = \frac{1}{4}x - \frac{1}{4}$$

EX3: Write an equation of a line in slope-intercept form that passes through $(-8, -7)$ and is perpendicular to $y = 4x - 3$.

$$-7 = -\frac{1}{4}(-8) + b$$

$$-7 = 2 + b$$

$$\begin{array}{r} -7 = 2 + b \\ -2 \quad -2 \\ \hline -9 = b \end{array}$$

$$m = 4$$

$$\perp = -\frac{1}{4}$$

$$y = -\frac{1}{4}x - 9$$

Now through $(2, 3)$ and is perpendicular to

$$y = -\frac{4}{3}x + 5. \quad \perp = \frac{3}{4}$$

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

$$\begin{array}{r} 3 = \frac{3}{2} + b \\ -\frac{3}{2} \quad -\frac{3}{2} \\ \hline b = \frac{3}{2} \end{array}$$

$$b = \frac{3}{2}$$

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

EX4: Write an equation of a line in slope-intercept form that crosses through

$(-5, 8)$ and is parallel to $y = -\frac{2}{5}x + 3$.

* Same Slope

$$8 = -\frac{2}{5}(-5) + b$$

$$8 = 2 + b$$

$$\begin{array}{r} 8 = 2 + b \\ -2 \quad -2 \\ \hline 6 = b \end{array}$$

$$y = -\frac{2}{5}x + 6$$

Now through $(6, -3)$ and is parallel to

$$y = \frac{5}{6}x + 20. \quad m = \frac{5}{6}$$

$$-3 = \frac{5}{6}(6) + b$$

$$\begin{array}{r} -3 = 5 + b \\ -5 \quad -5 \\ \hline b = -8 \end{array}$$

$$b = -8$$

$$y = \frac{5}{6}x - 8$$

Point-Slope Form

EX5: Write an equation of a line in point-slope form that has a slope of $\frac{2}{3}$ and passes through $(5, -3)$.

$$-3 = \frac{2}{3}(5) + b$$

$$\begin{array}{r} -3 = \frac{10}{3} + b \\ -\frac{10}{3} \quad -\frac{10}{3} \\ \hline b = -\frac{19}{3} \end{array}$$

$$y = \frac{2}{3}x - \frac{19}{3}$$

Write an equation of a line in slope intercept form given the information provided:

1.) $m = -5; (-3, -8)$

$$-8 = -5(-3) + b$$

$$-8 = 15 + b$$

$$b = -23$$

$$y = -5x - 23$$

2.) $m = \frac{4}{5}; (10, -3)$

$$-3 = \frac{4}{5}(10) + b$$

$$-3 = 8 + b$$

$$b = -11$$

$$y = \frac{4}{5}x - 11$$

3.) $m = -\frac{2}{3}; (6, -8)$

$$-8 = -\frac{2}{3}(6) + b$$

$$-8 = -4 + b$$

$$b = -4$$

$$y = -\frac{2}{3}x - 4$$

4.) $(3, 11)$

$(-6, 5)$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{11 - 5}{3 - (-6)} = \frac{6}{9} = \frac{2}{3}$$

$$11 = \frac{2}{3}(3) + b$$

$$11 = 2 + b$$

$$b = 9$$

$$y = \frac{2}{3}x + 9$$

5.) $(3, -4)$

$(6, -2)$

$$\frac{-4 - (-2)}{3 - 6} = \frac{-2}{-3} = \frac{2}{3}$$

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

$$-4 = 2 + b$$

$$b = -6$$

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

6.) $(-5, 1)$
 $(-1, -7)$

$$\frac{1 - (-7)}{-5 - (-1)} = \frac{8}{-4} = -2$$

$$1 = -2(-5) + b$$

$$1 = 10 + b$$

$$b = -9$$

$$y = -2x - 9$$

7.) x-int at 3; y-int at 2

$(3, 0)$

$b \rightarrow (0, 2)$

$$\frac{0 - 2}{3 - 0} = -\frac{2}{3}$$

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

8.) Through $(3, -1) \perp y = -\frac{1}{3}x - 4$

$$\perp \rightarrow 3$$

$$-1 = 3(3) + b$$

$$-1 = 9 + b$$

$$b = -10$$

$$y = 3x - 10$$

9.) Through $(5, -2) \perp y = \frac{3}{4}x - 2 \rightarrow -\frac{4}{3}$

$$-2 = -\frac{4}{3}(5) + b$$

$$-2 = -\frac{20}{3} + b$$

$$b = \frac{14}{3}$$

$$y = -\frac{4}{3}x + \frac{14}{3}$$

10.) Through $(2, -4) \parallel y = -\frac{3}{2}x + 5 \rightarrow -\frac{3}{2}$

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

$$-4 = -3 + b$$

$$b = -1$$

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

11.) Through $(5, 6) \parallel y = \frac{3}{4}x - 1 \rightarrow \frac{3}{4}$

$$6 = \frac{3}{4}(5) + b$$

$$6 = \frac{15}{4} + b$$

$$b = \frac{9}{4}$$

$$y = \frac{3}{4}x + \frac{9}{4}$$

Write an equation of a line in slope intercept form given the information provided:

12.) $m = \frac{2}{3}; (-5, 4)$

$$4 = \frac{2}{3}(-5) + b$$

$$4 = -\frac{10}{3} + b$$

$$b = \frac{22}{3}$$

$$y = \frac{2}{3}x + \frac{22}{3}$$

13.) $m = -\frac{5}{3}; (1, 6)$

$$6 = -\frac{5}{3}(1) + b$$

$$6 = -\frac{5}{3} + b$$

$$b = \frac{23}{3}$$

$$y = -\frac{5}{3}x + \frac{23}{3}$$