

Equation of a line: $y = mx + b$

How to write an equation of line if given slope and a point?

1. Write $y = mx + b$ with m that is given.
2. Plug in the point for x and y $y = mx + b$
3. Solve for b .
4. Write $y = mx + b$ with m and b

Example 1: Write the equation of the line in slope-intercept form given the slope and one point on the line.

A. $m = 3$ and $(4, 5)$

$$y = 3x + b$$

$$5 = 3(4) + b$$

$$5 = 12 + b$$

$$\begin{array}{r} -12 \\ -12 \end{array}$$

$$-7 = b$$

$$y = 3x - 7$$

B. $m = \frac{3}{2}$ and $(-4, 1)$

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

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

$$1 = -6 + b$$

$$\begin{array}{r} +6 \\ +6 \end{array}$$

$$7 = b$$

$$y = \frac{3}{2}x + 7$$

How to write an equation of a line if given 2 points?

1. Find $m = \frac{y_2 - y_1}{x_2 - x_1}$
2. Write $y = mx + b$ with m
3. Pick one of the points to plug in for x and y
4. Solve for b $y = mx + b$
5. Write $y = mx + b$ with m and b .

Example 2: Write the equation of the line in slope-intercept form given two points on the line.

A. $(0, 7)$ and $(-4, 1)$

$$m = \frac{7 - 1}{0 - (-4)} = \frac{6}{4} = \frac{3}{2}$$

$$7 = \frac{3}{2}(0) + b$$

$$7 = b$$

$$y = \frac{3}{2}x + 7$$

B. $(1, -3)$ and $(0, 0)$

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

$$-3 = -6 + b$$

$$7 = b$$

Ex. 3: Write an equation in slope-intercept form of the line with slope $-\frac{3}{4}$ that contains $(-2, 5)$.

Ex. 4:

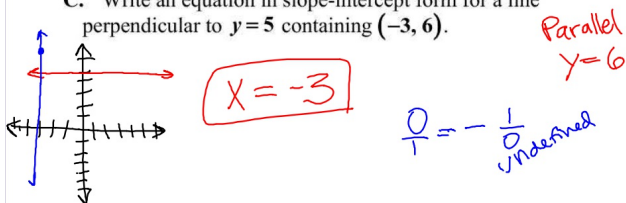
A. Write an equation in slope-intercept form for a line parallel to $y = -\frac{3}{4}x + 3$ containing $(-3, 6)$.

$M = -\frac{3}{4}$ $y = -\frac{3}{4}x + b$ $y = -\frac{3}{4}x + \frac{15}{4}$
 $6 = -\frac{3}{4}(-3) + b$ $\frac{15}{4} = b$
 $6 = \frac{9}{4} + b$

B. Write an equation in slope-intercept form for a line perpendicular to $y = -\frac{3}{4}x + 3$ containing $(-3, 6)$.

$M = \frac{4}{3}$ $y = \frac{4}{3}x + b$ $y = \frac{4}{3}x + 10$
 $6 = \frac{4}{3}(-3) + b$
 $6 = -4 + b$
 $+4 \quad +4$
 $10 = b$

C. Write an equation in slope-intercept form for a line perpendicular to $y = 5$ containing $(-3, 6)$.



Ex. 5:

A. Write an equation in slope-intercept form for a line parallel to $6x + 2y = 4$ containing $(4, 0)$.

$6x + 2y = 4$
 $-6x \quad -6x$
 $2y = -6x + 4$
 $\frac{2y}{2} = \frac{-6x + 4}{2}$
 $y = -3x + 2$ $M = -3$ $y = -3x + b$
 $0 = -3(4) + b$
 $0 = -12 + b$
 $+12 \quad +12$
 $12 = b$
 $y = -3x + 12$

B. Write an equation in slope-intercept form for a line perpendicular to $6x + 2y = 4$ containing $(4, 0)$.

$M = \frac{1}{3}$ $y = \frac{1}{3}x + b$ $y = \frac{1}{3}x - \frac{4}{3}$
 $0 = \frac{1}{3}(4) + b$
 $0 = \frac{4}{3} + b$
 $-\frac{4}{3} = b$

C. Write an equation in slope-intercept form for a line parallel to $y = 5$ containing $(-3, 6)$.

$y = 6$

Ex. 6:

A. Write the equation of a line that contains the point (12, 15) that is parallel to the line containing the points (-4, -5) and (8, 4).

$$\frac{-5 - 4}{-4 - 8} = \frac{3}{4}$$

$$M = \frac{3}{4}$$

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

$$15 = \frac{3}{4}(12) + b$$

$$15 = 9 + b$$

$$6 = b$$

$$y = \frac{3}{4}x + 6$$

B. Write the equation of a line that contains the point (9, -13) that is perpendicular to the line containing the points (-4, -5) and (8, 4).

$$\frac{3}{4} \quad M = -\frac{4}{3}$$

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

$$-13 = -\frac{4}{3}(9) + b$$

$$-13 = -12 + b$$

$$-1 = b$$

$$y = -\frac{4}{3}x - 1$$

