

2-4 Writing Linear Equations

slope-intercept form: $y = mx + b$ — y int

Slope

Ex 1) Write an equation in slope-intercept form that has a slope of $-\frac{3}{5}$ and passes through $(5, -2)$.

$$\begin{aligned}
 y &= mx + b \\
 -2 &= -\frac{3}{5} \cdot 5 + b \\
 -2 &= -3 + b \\
 +3 &= +3 + b \\
 1 &= b
 \end{aligned}$$

$$y = mx + b$$

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

Point-Slope Form: $y - y_1 = m(x - x_1)$ where m = slope and (x_1, y_1) is a point on the graph

Ex 2) Write an equation in slope-intercept form of the line through $(2, -3)$ and $(-3, 7)$.

Way #1 $y = mx + b$

$$m = \frac{-3 - 7}{2 - (-3)} = \frac{-10}{5} = -2$$

$$y = -2x + b$$

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

$$-3 = -4 + b$$

$$+4 \quad +4$$

$$1 = b$$

$$y = -2x + 1$$

Way #2 $y = mx + b$

$$m = \frac{-3 - 7}{2 - (-3)} = \frac{-10}{5} = -2$$

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

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

$$y + 3 = -2x + 4$$

$$-3 \quad -3$$

$$y = -2x + 1$$

Parallel and Perpendicular Lines: Parallel lines have the same slope and perpendicular lines of the opposite reciprocal slope

Ex 3) Write an equation for the line that passes through $(3, -2)$ and parallel to the line whose equation is $y = -5x + 1$. Then, write an equation of the line that passes through $(3, -2)$ that is perpendicular to the equation $y = -5x + 1$.

Parallel $m = -5$

$$y = mx + b$$

$$y = -5x + b$$

$$-2 = -5(3) + b$$

$$-2 = -15 + b$$

$$13 = b$$

$$y = -5x + 13$$

Perpendicular $m = -5 \rightarrow m = \frac{1}{5}$

$$y = mx + b$$

$$y = \frac{1}{5}x + b$$

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

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

$$-\frac{3}{5} - \frac{3}{5}$$

$$-\frac{7}{5} = b$$

$$y = \frac{1}{5}x - \frac{7}{5}$$

* Ex 4) As a part-time salesperson, Jean Stock is paid a daily salary plus commission. When her sales are \$100, she makes \$58. When her sales are \$300, she makes \$78.

A) Write a linear equation representing this situation.

$y = mx + b$

$$m = \frac{78 - 58}{300 - 100} = \frac{20}{200} = \frac{1}{10}$$

$$y = \frac{1}{10}x + b$$

$$58 = \frac{1}{10}(100) + b$$

$$58 = 10 + b$$

$$48 = b$$

$$y = \frac{1}{10}x + 48$$

B) What is Ms. Stock's daily salary? commission rate? $m = \frac{1}{10} = .1 = 10\%$

without any sales $y = \frac{1}{10}(0) + 48 = 48$

C) How much would Jean make in a day if her sales were \$500?

$$y = \frac{1}{10}x + 48$$

$$y = \frac{1}{10}(500) + 48 = 50 + 48 = 98$$