

Date: _____

5.3 Slope-Point Form**Recall:**

Slope-Intercept Form: $y = mx + b$ ex. $y = -2x + 6$

General Form: $Ax + By + C = 0$ ex. $2x + y - 6 = 0$

Slope-Point Form: The equation of a non-vertical line in the form
 $y - y_1 = m(x - x_1)$
 ↑
 slope (x_1, y_1) is a point on the line

Ex. Use slope-point form to write an equation of the line through $(-2, 5)$ with slope -3 , then express the equation in slope intercept form.

$$\begin{aligned} \overbrace{y - y_1}^{(x_1, y_1)} &= \overbrace{m}^m (x - x_1) \\ y - 5 &= -3(x - (-2)) \\ \boxed{y - 5 = -3(x + 2)} &\quad \text{slope-point form} \\ \swarrow & \\ \boxed{y = -3x - 1} &\quad \text{slope-intercept} \end{aligned}$$

$$\boxed{3x + y + 1 = 0}$$

Ex. Determine the slope and a point on the line: $y - 5 = -2(x + 3)$.

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ \boxed{m = -2} &\quad \text{point } (-3, 5) \end{aligned}$$

General

Ex. Use the slope-point form to write an equation of the line through $(3, -4)$ and $(5, -1)$, then rewrite the equation in general form.

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - (-4)}{5 - 3} = \frac{-3}{-2} = \frac{3}{2} \\ y - y_1 &= m(x - x_1) \\ y - (-4) &= \frac{3}{2}(x - 3) \\ \boxed{y + 4 = \frac{3}{2}(x - 3)} \end{aligned}$$

$$\begin{aligned} 2[y + 4] &= 2\left[\frac{3}{2}(x - 3)\right] \\ \cancel{2}y + \cancel{8} &= \cancel{2} \cdot \frac{3}{\cancel{2}} (x - 3) \\ 0 &= 3x - 2y - 17 \\ \boxed{3x - 2y - 17 = 0} \end{aligned}$$

Ex. Suppose Brad climbed 660 m to the top of Stawamus Chief moving at a constant rate in 11 pitches (sections). Each pitch was approximately 60 m in height. At 5:45 am Brad started his climb 60 m below the top of his first pitch. By 5:55 am he was 40 m below the top of the first pitch.

- a. Write an equation that describes Brad's distance, d , in metres, below the top of the first pitch in terms of t minutes (past 5:45 am). Express the equation in $y = mx + b$ form.

$t = 0$ $(0, 60)$ $(10, 40)$
 $\therefore b = 60$ $m = \frac{40 - 60}{10 - 0} = \frac{-20}{10} = -2 \text{ m/min}$
 $d = -2t + 60$

- b. How long did it take Brad to reach the top of the first pitch?

$d = 0$
 $0 = -2t + 60$
 $-60 = -2t$
 $\frac{-60}{-2} = \frac{-2t}{-2}$
 $t = 30 \text{ minutes}$

- c. In total, Brad spent 8.5 h changing ropes between pitches. How long did it take Brad to climb Stawamus Chief?

11 sections at 0.5 h each + 8.5 hours
 $= 11(0.5) + 8.5$
 $= 5.5 + 8.5$
 $= 14 \text{ hrs}$