1.4 Rate of Change & Linear Equations

Slope formula: \( \frac{y_2 - y_1}{x_2 - x_1} \)

Ex 1: Find the slope of a line that contains points \( P(-7, 2) \) and \( Q(-3, -1) \)

\[
\frac{-1 - 2}{-3 - (-7)} = \frac{-3}{4} \quad \text{Slope} = \frac{3}{4}
\]

Try a) \((-3, -2)\) and \((-1, 2)\)  b) \((-4, 6)\) and \((-4, -2)\)

\[
\frac{2 - (-2)}{-1 - (-3)} = \frac{4}{2} = 2 \quad \frac{-2 - 6}{-4 - (-4)} = \frac{-8}{0}
\]

Slope 2

Slope-intercept form \( y = mx + b \)

Slope undefined

Ex 2: Write an equation in slope-intercept form for a line that has a slope of \( \frac{4}{3} \) and passes through \((0, -5)\)

\[
-5 = \frac{4}{3}(0) + b \quad m
\]

\[
-5 = 0 + b \quad \rightarrow \quad y = \frac{4}{3}x - 13
\]

Try... slope of \( -\frac{1}{2} \) point \((-10, 7)\)

\[
7 = -\frac{1}{2}(-6) + b \quad \rightarrow \quad y = -\frac{1}{2}x + 4
\]

\[
7 = 3 + b \quad -3 -3 \quad 4 = b
\]
Point-Slope form \( y - y_1 = m(x - x_1) \)

\((x_1, y_1)\) coordinate point

Ex 3: It takes 16 minutes to swim 4 laps, and 28 minutes to swim 7 laps. Write an equation in point-slope form.

\((16, 4)\) \((28, 7)\)

\[ m = \frac{7 - 4}{28 - 16} = \frac{3}{12} = \frac{1}{4} \]

\[ y - 4 = \frac{1}{4}(x - 16) \]

\[ y - 7 = \frac{1}{4}(x - 28) \]

Try... write an equation in point-slope form for a line that passes through \((-5, 9)\) and \((8, -1)\)

\[ m = \frac{-1 - 9}{8 - (-5)} = \frac{-10}{13} \]

\[ y - 9 = \frac{-10}{13}(x + 5) \]

\[ y + 1 = \frac{-10}{13}(x - 8) \]

HW: Pg 27 #5-31 odd