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Prof. Lacaste 7-Oct/2019

2.5 Applications of Linear Equation and Modeling

- Apply the point-Slope Formula

Point-Slope Formula

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

Allows you to write the equation of the line; need two things to use it: the slope(m) and the point (x_1, y_1)

Problems (Answer)

③ A line passes through the point $(4, -2)$ and has a slope of $-\frac{5}{4}$. write an equation in "point-slope form for this line"

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

$$y - (-2) = -\frac{5}{4}(x - 4)$$

$$\boxed{y + 2 = -\frac{5}{4}(x - 4)}$$

① point $(2, 7)$; slope 9

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

$$\boxed{y - 7 = 9(x - 2)}$$

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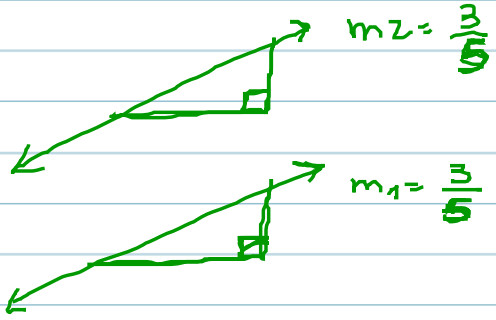
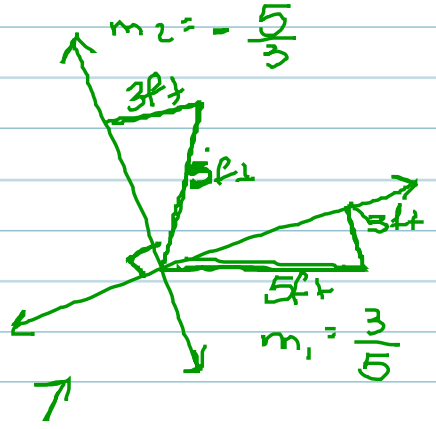
- Determine the Slope of Parallel and Perpendicular Lines

Parallel Lines



Perpendicular Lines



opposite reciprocals of each other

→ Problems (Answer)

② Line 1 = Line 2 Line 3

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

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

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

$y = \boxed{-\frac{2}{3}}x - 8$

$6x - 4y = 6$

$\frac{-4y}{-4} = \frac{(-6x+6)}{-4}$

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

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

- Line 1 (slope $-\frac{2}{3}$) and Line 2 (slope $-\frac{2}{3}$) are parallel
- Line 1 (slope $-\frac{2}{3}$) and Line 3 (slope $\frac{3}{2}$) are perpendicular
- same with line 2 and Line 3.

① Line 1 Line 2 Line 3

$y = -3x - 7$ $y = 3x - 1$ $6x + 2y = 4$

$\frac{2y}{2} = \frac{-6x + 4}{2}$

- Line 1 (slope -3) and Line 2 (slope 3) are neither

$y = \frac{-6x}{2} + \frac{4}{2}$

- Line 1 (slope -3) and Line 3 (slope -3) are parallel

$y = -3x + 2$

- Line 2 (slope 3) and Line 3 (slope -3) are neither.

• Create Linear Function to Model Data

→ Writing Equation of Tilted / Slanted Lines

you need a slope and a point

Follow the Flowchart

→ Problems (Answers)

① Their Line $y = \frac{7}{8}x + 7$ → throw away

(a) parallel and thru point $(-7, 3)$ (x_1, y_1)

$m = \frac{7}{8}$

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

$y - 3 = \frac{7}{8}(x + (7))$

$y - 3 = \frac{7}{8}(x + 7)$

(b) perpendicular and thru point $(-7, 3)$, x_1, y_1

$m = -\frac{8}{7}$

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

$y - 3 = -\frac{8}{7}(x + 7)$

$\boxed{y - 3 = -\frac{8}{7}(x + 7)}$

③ Find the an equation for the line that passes through the points $(-3, -2)$, x_1, y_1 and $(3, 1)$, x_2, y_2

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 + 2}{3 + 3} = \frac{3}{6} = \frac{1}{2}$

$(-3, -2)$; $m = \frac{1}{2}$

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

$\boxed{y + 2 = \frac{1}{2}(x + 3)}$

$(3, 1)$; $m = 1/2$

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

→ Creating Linear Functions to Model Data

★Example in Lecture Notes★

→ Problems (Answer)

① $(28, 46)$; $(54, 27.8)$

x: minutes ; y: miles

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{27.8 - 46}{54 - 28} = \frac{-18.2}{26} = -0.7 \Rightarrow m = -0.7$

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

$\boxed{y - 46 = -0.7(x - 28)}$ model