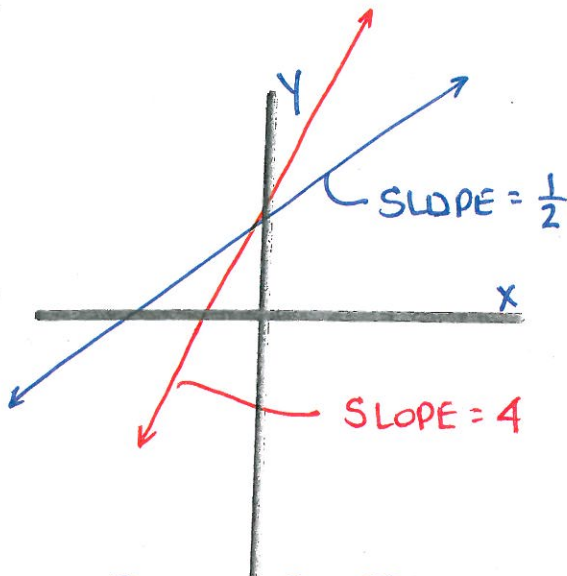


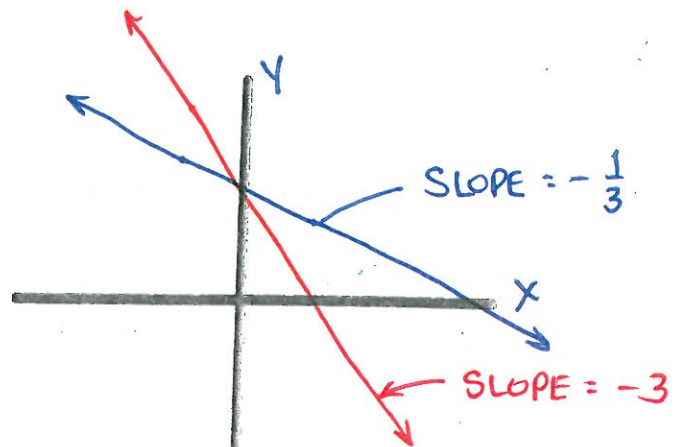
Section 1.4: Linear Model Graphs and Equations

A **linear** model is an equation and graph that increases or decreases at a constant rate called: **SLOPE (STEEPNESS)**

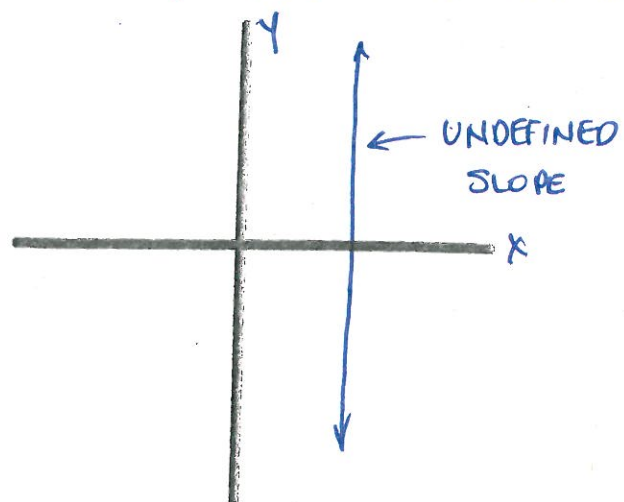
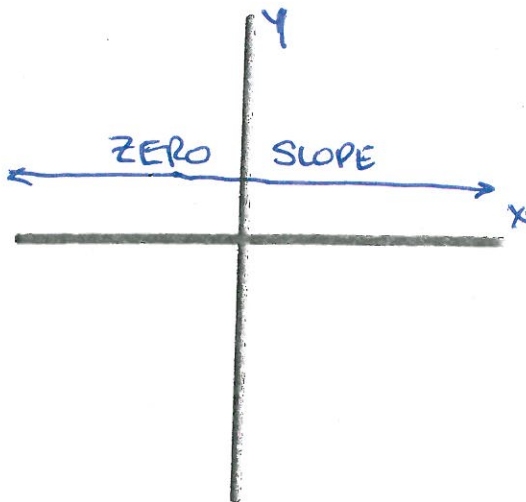
I. The concept of slope (steepness) of a linear model



POSITIVE SLOPES
(INCREASE FROM LEFT TO RIGHT)



NEGATIVE SLOPES
(DECREASE FROM LEFT TO RIGHT)



Part II: Equations of linear models

1. Finding the slope between two points on a line.

$$\text{SLOPE} = m = \frac{y_2 - y_1}{x_2 - x_1}$$

2. Slope-Intercept form of a line.

$$y = b + mx$$

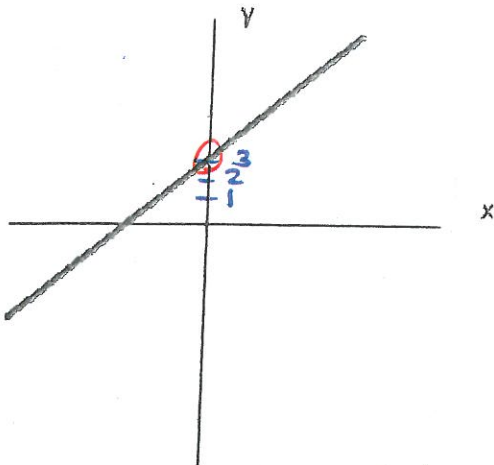
m = SLOPE (STEEPNESS)

b = y -INTERCEPT

(WHERE A LINE CROSSES THE y -AXIS).

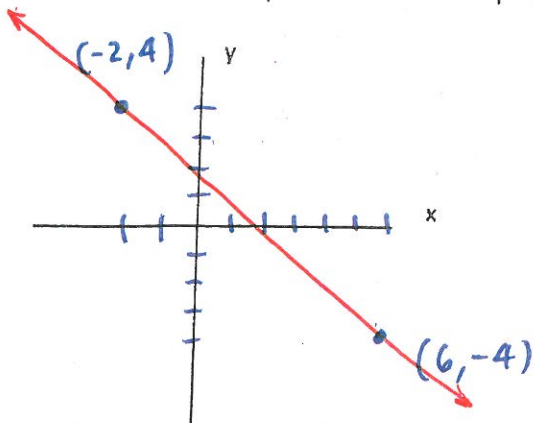
Part III: Examples of Linear Models (Algebraic)

1. Estimate in $y = b + mx$ form the equation of the line given below.



$$y = b + mx$$
$$y = 3 + 2x$$

2. Find the slope of the line that passes through the points $(-2, 4)$ and $(6, -4)$.



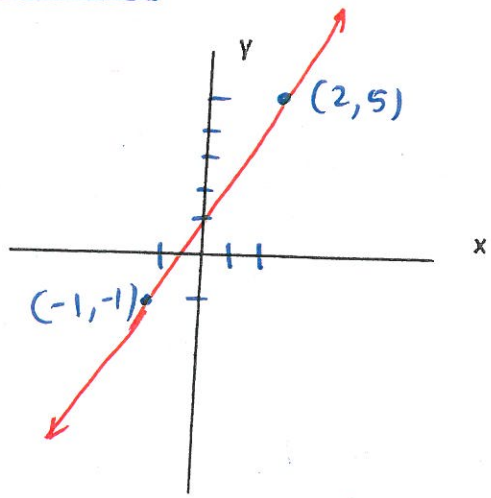
ESTIMATE: -2

$$\text{SLOPE} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - 4}{6 - (-2)} = \frac{-8}{8}$$

$$\text{SLOPE} = m = -1$$

3. Find the equation of the line that passes through the points (2, 5) and (-1, -1) in the form $y = b + mx$.

$y = b + mx$



$$\text{SLOPE} = m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 5}{-1 - 2} = \frac{-6}{-3}$$

SLOPE = $m = 2$

Y-INTERCEPT: $y = b + mx$
 $5 = b + 2(2)$
 $5 = b + 4$
 $\frac{-4 \quad -4}{1 = b}$

ESTIMATE: $y = b + mx$
 $y = 1 + 3x$

ACTUAL: $y = 1 + 2x$

4. What is the slope and y-intercept for the line $3x - 2y = 6$?

SLOPE = $\frac{3}{2}$

Y-INTERCEPT = -3

$y = b + mx$
 $\frac{-2y = 6 - 3x}{-2 \quad -2 \quad -2}$
 $y = -3 + \frac{3}{2}x$

Part II: Linear Model Examples (Applications)

1. Given the graph and model below, find the "alertness level" of a person in class after 20 minutes.

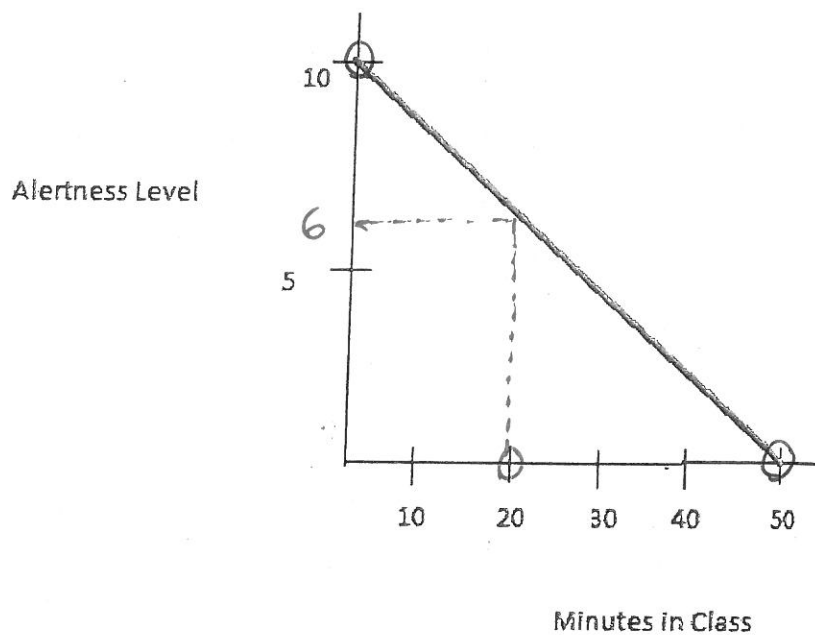
$$y = b + mx$$

$$A(t) = 10 - \frac{1}{5}t$$

$$A(20) = 10 - \frac{1}{5}(20)$$

$$A(20) = 10 - 4$$

$$A(20) = 6$$



2. Create a linear model to predict a teacher's salary in Radford City Public Schools in the form

$y = b + mx$ form.

$S(t) = \$38,000 + \$500t$

What is the teacher's salary after 17 years of experience?

$S(17) = \$38,000 + \$500(17)$

$S(17) = \$38,000 + \8600

$S(17) = \$46,500$

How long will it take for a teacher to earn \$ 100,000 per year?

$S(t) = \$38,000 + \$500t$

$\$100,000 = \cancel{\$38,000} + \$500t$

$-\$38,000 \quad -\cancel{\$38,000}$

$\$62,000 = \$500t$

$\$500$

$\$500$

$124 \text{ YRS} = t$