Modeling Linear Equations Day 1 Notes Name: _____

*Objective: I can model linear equations from the given context and evaluate what the information means.*

**Modeling Linear Functions from Context**

1) Determine what information they are giving in the situation.

- Slope and y-intercept (initial value) m, b
- Slope and point m (x, y)
- Two points $(x_1, y_1)(x_2, y_2)$

2) Write equation in y = mx + b form

Many real-world functional relationships can be represented by equations, which can be used to find the solution(s) of a given real-world problem.

1. A babysitter's earnings *e* are a function of the number of hours *n* worked at a rate of $7.25 per hour.

b = 0, m = 7.25 $e(n) = 7.25n + 0$ $e(n) = 7.25n$

2. A plumber's fees *f* are $75 for a house call and $60 per hour *h* for each hour worked.

b = 75, m = 60 $f(h) = 60h + 75$

3. A hot dog *d* costs $1 more than one-half the cost of a hamburger *h*.

b = 1, $m = \frac{1}{2}$ $d(h) = \frac{1}{2}h + 1$

Ex 4.)

Computer repair companies use a fixed cost equation to determine how much to charge for an in-house repair. For example, a technician charges $85 for a house call (b) and $45 per hour (m).

a. Write an equation to represent this situation.

$y = 45x + 85$

b. Explain what the slope (rate of change) means in this linear model.

m = 45 $45 for every hour worked

c. Explain what the initial value(y-intercept) means in this problem.

b = 85 $85 is the initial cost that gets paid no matter how long they stay

Ex 5.) 2 points

Bathtub Problem: You pull out the plug from the bathtub. After 40 seconds, there are 13 gallons of water left in the tub. One minute after you pull the plug, there are 10 gallons left. Assume that the number of gallons varies linearly with the time since the plug was pulled.

a. Write the particular equation expressing the number of gallons (g) left in the tub in terms of the number of seconds (s) since you pulled the plug.

x - seconds $(40, 13)$ $x_1 \quad y_1$

y - gallons $(60, 10)$ $x_2 \quad y_2$

1 min = 60 sec

$m = \frac{10-13}{60-40} = \frac{-3}{20}$

$m = \frac{-3}{20}$ $(40, 13)$ $x \quad y$

$y = mx + b$

$13 = \frac{-3}{20}\left(\frac{40}{1}\right) + b$

$13 = -6 + b$

$+6 \quad +6$

$19 = b$

$y = \frac{-3}{20}x + 19$

b. How many gallons would be left after 20 seconds?

$x = 20$

$y = \frac{-3}{20}\left(\frac{20}{1}\right) + 19$

$y = -3 + 19 =$ 16 gallons

c. At what time will there be 7 gallons left in the tub?

$y = 7$

$7 = \frac{-3}{20}x + 19$

$-19 \quad -19$

$-12 = \frac{-3}{20}x$

$20(-12) = \left(\frac{-3}{20}x\right)\frac{20}{1}$

$\frac{-240}{-3} = \frac{-3x}{-3}$

$80 = x$

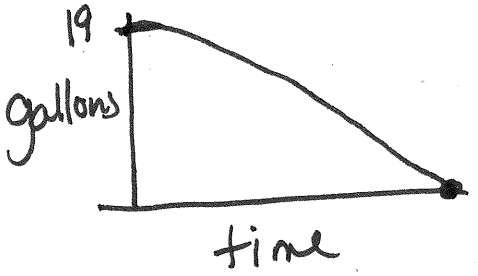
80 sec

d. Find the y-intercept (gallon-intercept). What does this number represent in the real world?

$b = 19$ tub can hold 19 gallons

e. What does the x-intercept represent in this situation?

$y = 0$, when the tub is empty




f. What is the slope? What does this number represent?

$m = \frac{-3}{20}$ a rate the tub get emptied gallons per sec.