

Algebra RH

Essential Question: How can we represent linear relationships symbolically given a table of values or verbal description?

Do Now: Craig is saving to buy an MP3 player. His parents provide him with a weekly allowance of \$10. He also earns money from mowing his neighbor's lawns. He charges \$20 per lawn.

a) Complete the table below that represents Craig's earnings (y) in one week after mowing x lawns.

Number of Lawns (x)	0	1	2	3	4	5
Earnings (y)	10	30	50	70	90	110

$(0, 10)$ $(2, 50)$
 x_1, y_1 x_2, y_2

b) Write an equation that represents Craig's weekly income.

R.O.C. $\frac{\Delta y}{\Delta x} = \frac{50 - 10}{2 - 0} = 20$

y int: $x = 0$
 $(0, y)$
 $(0, 10)$

$y = 20x + 10$

Modeling Linear Relationships

1) Tom works at an aquarium shop on Saturdays. One Saturday, he is asked to clean one of the tanks. Before cleaning the tank, he has to transfer the fish into another tank and then drain the tank. In order to drain the tank, he puts a hose into the tank and starts a siphon. The table below represents the relationship between the gallons of water remaining in the tank after x hours.

X Time (hours)	0	1	2	3	4	5	6	7
Y Water (gallons)	175	150	125	100	75	50	25	0

a) Identify the x and y-intercepts in the table. Explain their meaning in the context of the situation.

x int: $(x, 0)$ y int: $(0, y)$
 $(7, 0)$ $(0, 175)$
 hours gallons

x int: It took 7 hours to empty the tank of water.

y int: Initially, the tank had 175 gallons of water.

b) Write an equation that represents the relationship displayed by the table. What does the rate of change tell us?

$y = -25x + 175$

$(7, 0)$ $(0, 175)$

R.O.C. $\frac{\Delta y}{\Delta x} = \frac{175 - 0}{0 - 7} = \frac{-175}{-7} = 25$ gallons per hour

The tank is emptied at the rate of 25 gallons of water per hour. every hour, the tank is emptied of 25 gallons of water

- 2) Pictured below are two receipts from Super Clean Car Wash. There is a linear relationship that exists between the charge and the time spent (in minutes) to wash a car.

SUPER CLEAN CAR WASH	
Date:	12 - 2 - 13
Start Time:	01:55 pm
Stop Time:	02:05 pm
Charge:	\$7.00 \$
	(10, 7)

SUPER CLEAN CAR WASH	
Date:	12 - 7 - 13
Start Time:	09:30 am
Stop Time:	09:50 am
Charge:	\$12.00 \$
	(20, 12)

Write a linear equation relating the time it takes (x) and the charge incurred (y) by a person getting his/her car washed at Super Clean. What does the slope and y-intercept represent in your equation?

$$\begin{matrix} x & y \\ (10, 7) & (20, 12) \end{matrix}$$

$$\frac{\Delta y}{\Delta x} = \frac{7-12}{10-20}$$

$$= \frac{1\$}{2 \text{ min}}$$

$$= \frac{.5}{1}$$

The cost to wash a car is \$1 for every 2 minutes or 50¢ per minute.

$$y = mx + b$$

$$(20, 12)$$

$$12 = \frac{1}{2}(20) + b$$

$$12 = 10 + b$$

$$b = 2$$

The initial charge to wash a car is \$2. $y = \frac{1}{2}x + 2$

- 3) A truck driver is traveling from Sacramento to Reno. After 1 hour, the driver is 84 miles from Reno. After 2 hours, the driver is 36 miles from Reno. Assuming the driver is traveling at a constant rate, write a linear equation that relates the time passed since leaving Sacramento to the driver's distance from Reno. Explain the meaning of the slope and y-intercept in your equation.

$$(1, 84) \quad (2, 36)$$

$$\frac{\Delta y}{\Delta x} = \frac{84-36}{1-2}$$

$$= \frac{48}{-1}$$

$$= -48$$

Every hour, the driver gets 48 miles (less away) closer to Reno.

$$y = mx + b$$

$$(1, 84)$$

$$84 = -48(1) + b$$

$$84 = -48 + b$$

$$b = 132$$

$$y = -48x + 132$$

At the beginning of the trip, the driver was 132 miles from Reno.