

Thursday, February 6, 2020

1.1 Representing Linear Relations

Bellwork:

① Description

Chloe has a job in a clothing store. She gets paid a weekly salary of \$400 plus 4.5% commission on her sales.



1. Create three different representations for this relationship. If you get stuck, talk to the people you sit near!
2. Determine Chloe's earnings if she sold \$2600 in clothing last week.

③ Equation

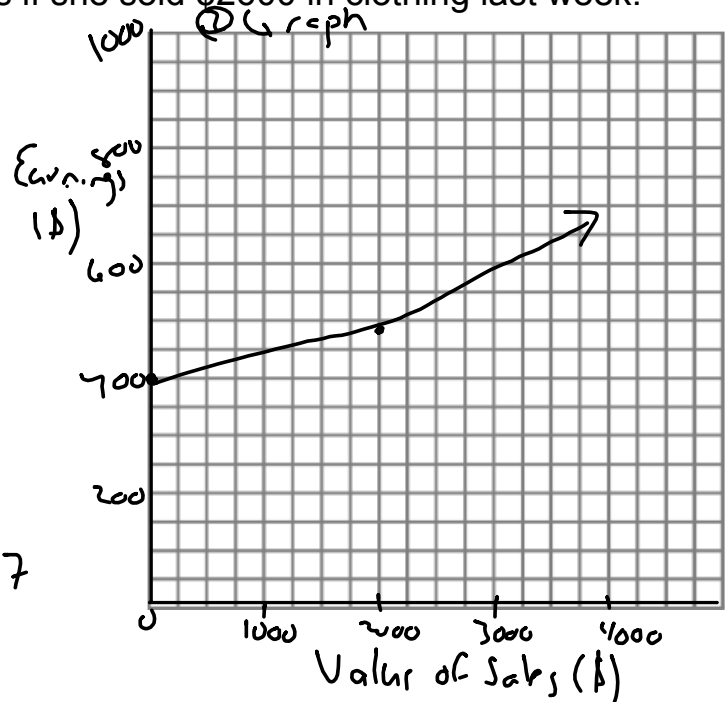
$$y = 0.045x + 400$$

④ Table of Values

Sales	Earnings
0	400
1000	445
2000	490
3000	535

$$2. 0.045(2600) + 400 = 517$$

$$0.045 \times 1000 = 45$$



Review: The Characteristics of a Linear Relation

- First differences are equal.
- The equation can be written in standard form or slope-y-intercept form.
- The graph of a linear relation is always a straight line.
- A line with a positive slope rises to the right.
- A line with a negative slope falls to the right.
- The slope of a horizontal line is zero, and the slope of a vertical line is undefined.

Practice Problems:

- 1) Show that the relationship represented in the table is linear.

x	y
-4	12
-3	9
-2	6
-1	3
0	0

9 - 12 = -3
6 - 9 = -3
3 - 6 = -3
0 - 3 = -3

∴ The relationship is linear

Are these examples of direct or partial variation? Explain.

Direct variation because the graph would pass through (0, 0)

- 2) Rewrite $2x - 5y + 3 = 0$ in slope - y - intercept form.

$$\begin{aligned} 2x - 5y + 3 &= 0 \\ 2x + 3 &= 5y \\ \frac{2x + 3}{5} &= \frac{5y}{5} \\ \frac{2}{5}x + \frac{3}{5} &= y \\ y &= \frac{2}{5}x + \frac{3}{5} \end{aligned}$$

Partial variation because the graph passes through $(0, \frac{3}{5})$, not $(0, 0)$.

Writing Equations from Words

- You MUST assign variables before you can write an equation. Remember that variables represent something that can change, so DO NOT let x represent a known value!
- Once you have assigned the appropriate number of variables (usually two), watch for words that tell you what operations to use (ie/ sum/total is add; less/difference is subtract)
- After you write your equation, look at it to see if it makes sense! Replace your variable with words or try a number.

Practice Problems:

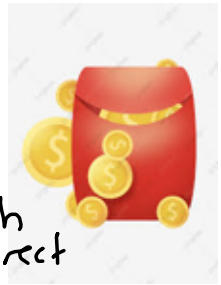
Define variables and create equations for each of the following.

- 1) Sydney has \$5.75 made up of nickels and dimes. Write an equation to model her total amount of money.

Let x be the # of nickels.

Let y be the # of dimes.

$$0.05x + 0.10y = 5.75 \quad \left. \begin{array}{l} \text{both} \\ \text{correct} \end{array} \right\}$$
$$5x + 10y = 575$$



- 2) A rental car company charges \$35 per day plus \$0.35 per kilometre driven. Write an equation for the daily cost.

Let x be km's driven

$$y = 35 + 0.35x$$

Let y be the daily cost.

Odds and Ends with Linear Relations

- how do we determine if an ordered pair satisfies (is a solution to) a linear equation?

ex/ Determine if $(-1, 3)$ and $(2, 5)$ satisfy $2y = 10 + 4x$.

For $(-1, 3)$: $2(3) \stackrel{?}{=} 10 + 4(-1)$ For $(2, 5)$: $2(5) \stackrel{?}{=} 10 + 4(2)$

on the line!

$$6 \stackrel{?}{=} 10 - 4$$

$$6 = 6 \text{ "}$$

not on the line

$$10 \stackrel{?}{=} 10 + 8$$

$$10 \neq 18 \text{ "}$$

- Once you have written an equation with two unknowns, you can solve for one unknown by subbing in a given value. Be careful to place it in the appropriate place!

ex/ If Sydney had 30 dimes, how many nickels did she have?

$$y = 30$$

$$0.05x + 0.10y = 5.75$$

$$0.05x + 0.10(30) = 5.75$$

$$0.05x + 3 \stackrel{?}{=} 5.75 \rightarrow$$

$$\frac{0.05x}{0.05} = \frac{2.75}{0.05}$$

$$x = 55$$

\therefore She has 55 nickels.

