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System of Equations Word Problems

Aim: *I can write a system of equations to model a real-world situation.*

Warm Up: Create an algebraic equation given the following scenarios:

(a) The cost of renting a canoe includes a starting fee of $8.00 plus $4.50 per hour.

$$C = 8 + 4.50h$$

Let:
C = cost of rental
h = hours

(b) At Starbucks you buy 2 Frappuccino's, *f*, and 3 chocolate chip cookies, *c*, for a total of $12.33

$$2f + 3c = 12.33$$

(c) LA Fitness charges a joining fee of $50 plus $30 per month.

$$30m$$

$$C = 50 + 30m$$

Let:
C = cost of gym
m = months

Key Components to look for when setting up a System of Equations:
- Two different items or objects that we are talking about
- When we see "*at the same*"
- "Per" "each" goes with the variable as the **coefficient**
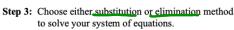- an initial fee or starting value is the **Constant**

(1) Kaylie and her friends visit the concession stand at a football game. The stand charges $3 for a hot dog and $2 for a drink. The friends buy a total of 9 items for $20. Determine how many hot dogs and how many drinks they bought.

Let: h = # hot dogs
d = # drinks

Step 1: Create **"Let Statements"**
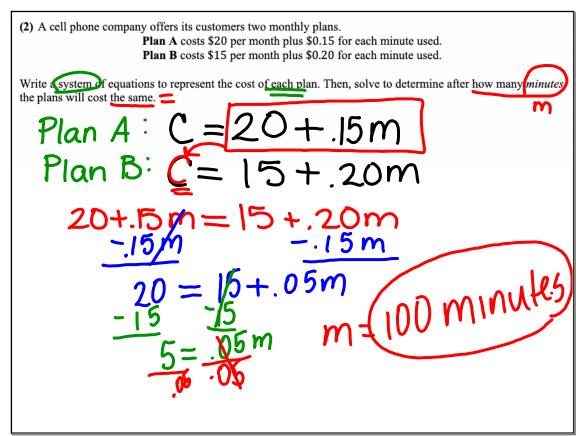Choose a variable to represent each unknown.

Step 2: Write an equation to represent the number of items they purchased.

$$-3(h + d = 9)$$

Write an equation to represent the money spent on the items.

$$3h + 2d = 20$$

Step 3: Choose either substitution or elimination method to solve your system of equations.

$$-3h - 3d = -27$$
$$+ \quad 3h + 2d = 20$$
$$\overline{-1d = -7}$$
$$\frac{-1d}{-1} = \frac{-7}{-1}$$

Step 4: Solve and find **both variables**.

$$9 - 7 = \boxed{2}$$

$$\boxed{d = 7}$$

Kaylie bought 7 drinks and 2 hot dogs!

(2) A cell phone company offers its customers two monthly plans.

Plan A costs \$20 per month plus \$0.15 for each minute used.
Plan B costs \$15 per month plus \$0.20 for each minute used.

Write a system of equations to represent the cost of each plan. Then, solve to determine after how many minutes the plans will cost the same.

Plan A: $C = 20 + .15m$

Plan B: $C = 15 + .20m$

$$20 + .15m = 15 + .20m$$
$$-.15m \qquad\qquad -.15m$$
$$20 = 15 + .05m$$
$$-15 \quad -15$$
$$5 = .05m$$
$$\overline{.05} \quad \overline{.05}$$

$$m = 100 \text{ minutes}$$

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(3) Mr. Smith is buying 2 types of gift cards to give as prizes to employees at a company meeting. He will buy restaurant gift cards, x, that each cost \$50. He will also buy movie theater, y, gift cards that each cost \$20. He has a total of \$450 to spend on the gift cards and he will buy a total of 15 gift cards.

How many of each type of gift card can Mr. Boss buy? **Write a system and solve algebraically**.