

Substitution Word Problems

Mixture/Total Word Problems

1) Damani saves his dimes and nickels. He has 80 coins in all, and they are worth \$6.60. How many of each coin does he have? (# of)

X: Dimes
Y: Nickels

$$\begin{array}{r} X + Y = 80 \\ -X \qquad -X \\ \hline X = -X + 80 \end{array}$$

Money = money

$$10x + 0.05y = 6.60$$

$$10x + 0.05(-x + 80) = 6.60$$

$$10x + 0.05x - 4 = 6.60$$

$$0.05x + 4 = 6.60$$

$$\begin{array}{r} -4 \quad -4 \\ 0.05x = 2.6 \end{array}$$

$$x = 52 \text{ dimes}$$

$$y = -28 + 80$$

$$y = 28 \text{ nickels}$$

Damani
have save
52 dimes
and 28
nickels.

Key Steps

1. Define variables in WORDS.

UNKNOWN?

2. Write two equations for the system.

Units line
UP

3. Solve one of the equations for one variable (if necessary).

INVERSE operation

4. Use substitution.

5. Use units in your answer.

2) A snack bar sells two different sizes of snack packs. A large snack pack is \$5 and a small snack pack is \$3. In one day, the snack bar sold 60 snack packs for a total of \$220. How many small snack packs did the snack bar sell? How many large?

X: Large snack packs

Y: Small snack packs

$$5x + 3y = 220$$

$$x + y = 60$$

$$\begin{array}{r} -y \quad -y \\ \hline x = -y + 60 \end{array}$$

$$x = -y + 60$$

$$5(-y + 60) + 3y = 220$$

$$-5y + 300 + 3y = 220$$

$$-2y + 300 = 220$$

$$\begin{array}{r} -300 \quad -300 \\ -2y = -80 \end{array}$$

$$-2y = -80$$

$$-2y = -80$$

$$y = 40 \text{ small pack}$$

$$x = 40 + 60$$

$$x = 20 \text{ large snack pack}$$

They sold 20 large
snack packs and 40
small snack packs.

3) Adult tickets to a play cost \$22. Tickets for children cost \$15. Tickets for a group of 11 people cost a total \$228. How many adults attend the play? How many children attend?

X: Adult tickets
Y: Children tickets

$$\begin{array}{r} 22x + 15y = 228 \\ x + y = 11 \\ \hline -y - y \\ x = -y + 11 \end{array}$$

$$\begin{array}{r} x + y = 11 \\ -2 - 2 \\ \hline x = 9 \text{ Adult} \\ \text{tickets} \end{array}$$

you should
have 2 children
tickets and
9 Adults tickets

$$\begin{array}{r} 22(-y + 11) + 15y = 228 \\ -22y + 242 + 15y = 228 \\ -7y + 242 = 228 \\ \hline -242 - 242 \\ -7y = -14 \\ y = 2 \text{ child tickets} \end{array}$$

4) In a talent show of singing and comedy acts, singing acts are 5min long and comedy acts are 3min long. The show has 12 acts and lasts 50min. How many singing acts and how many comedy acts are in the show?

X: singing acts
Y: comedy acts

$$\begin{array}{r} 5x + 3y = 50 \\ x + y = 12 \\ \hline -x - x \\ y = -x + 12 \end{array}$$

$$\begin{array}{r} x + y = 12 \\ 7 + y = 12 \\ \hline -7 - 7 \\ y = 5 \end{array}$$

They have 7 singing
acts and 5 comedy
acts

$$\begin{array}{r} 5x + 3(-x + 12) = 50 \\ 5x - 3x + 36 = 50 \\ 2x + 36 = 50 \\ \hline -36 - 36 \\ 2x = 14 \\ x = 7 \end{array}$$