Solving Equations Word Problems

Translating Sentences into Equations

a) Five subtract 3 times a number is equal to 3.5 times the same number, subtract 8.

$$5 - 3n = 3.5n - 8$$
$$ +3n \qquad +3n$$
$$5 = 6.5n - 8$$
$$+8 \qquad\qquad +8$$
$$\frac{13}{6.5} = \frac{6.5n}{6.5}$$
$$\boxed{2 = n}$$

b) Fifteen divided by a number is -3.

$$\cancel{n}\left(\frac{15}{\cancel{n}}\right) = -3(n)$$
$$\frac{15}{-3} = \frac{\cancel{-3}n}{\cancel{-3}}$$
$$\boxed{-5 = n}$$

Word Problems

- Let your variable represent the unknown.
- Write an equation using this variable.
- Solve

Let x = number of toppings

A large pizza with tomato sauce and cheese costs $7.50, plus $1.50 for each additional topping. A customer orders a large pizza and is charged $16.50. How many toppings did the customer order?

a) Write an equation to solve the problem.

b) Solve the problem. Verify the solution.

$$(\text{Cost of base pizza}) + (\text{cost of toppings}) = \text{Total}$$
$$(7.50) + (1.50x) = 16.50$$

SOLVE

$$-7.50 \qquad\qquad -7.50$$
$$\frac{1.50x}{1.50} = \frac{9.00}{1.50}$$
$$x = 6$$

There were six toppings if the bill was $16.50

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Word Problems

- Let your variable represent the unknown.
- Write an equation using this variable.
- Solve

Assessment Focus Vianne took 4 bottles of water and 6 bottles of juice to a family picnic. Each bottle of juice contained 0.5 L. The total volume of water and juice was 4.42 L. What was the volume of 1 bottle of water?

a) Choose a variable and write an equation for this situation.

b) Solve the equation.

c) Verify the solution.

Show your work.

let x = volume of 1 bottle of water

$$[\text{Volume of all juice}] + [\text{Volume of all water}] = \text{Total vol.}$$

\# bottles   Volume of each

$$[(6)(0.5)] + [(4)(x)] = 4.42$$

$$3 + 4x = 4.42$$
$$-3 \qquad\qquad -3$$

$$4x = 1.42$$
$$\frac{4x}{4} = \frac{1.42}{4}$$

$$x = 0.355$$

One bottle of water was 0.355 L

Word Problems

- Let your variable represent the unknown.
- Write an equation using this variable.
- Solve

A cell phone company offers two plans.

   Plan A: 120 free minutes, $0.75 per additional minute

   Plan B: 30 free minutes, $0.25 per additional minute

Which time for calls will result in the same cost for both plans?

a) Model the problem with an equation.

b) Solve the problem.

c) Verify the solution.

Let m = total mins used for each plan

$$\text{Cost } A = \text{Cost } B$$

$$0.75(\text{\# paid mins}) = 0.25(\text{\# paid mins})$$

distribute $\quad 0.75(m - 120) = 0.25(m - 30)$

variables on one side $\quad 0.75m - 90 = 0.25m - 7.5$
$$-0.25m \qquad\qquad -0.25m$$

isolate "m" $\quad 0.5m - 90 = -7.5$
$$+90 \qquad +90$$

$$\frac{0.5m}{0.5} = \frac{82.5}{0.5}$$

$$m = 165$$

The cost will be the same when each plan uses 165 minutes.