

Solving a System of Equations by Substitution...

A snack bar sells two 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?

$x = \text{large}$
 $y = \text{small}$

$$5x + 3y = 220$$

$$x + y = 60$$

$$\rightarrow x = 60 - y$$

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

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

$$-2y = -80$$

$$y = 40$$

40 small snack packs were sold.

You pay \$22 to rent 6 video games. The store charges \$4 for new games and \$2 for older games. How many new games did you rent?

$x = \text{new games}$
 $y = \text{old games}$

$$4x + 2y = 22$$

$$x + y = 6$$

$$\rightarrow y = 6 - x$$

$$4x + 2(6 - x) = 22$$

$$4x + 12 - 2x = 22$$

$$2x = 10$$

$$x = 5$$

You rented 5 new games.

At the end of the 2000-2001 football season, 31 Super Bowl games had been played with the current two football leagues, the AFC and the NFC. The NFC won five more games than the AFC. How many games did each conference win?

$x = \text{AFC}$
 $y = \text{NFC}$

$$y = x + 5$$

$$x + y = 31$$

$$x + x + 5 = 31$$

$$2x = 26$$

$$x = 13$$

$$y = 13 + 5$$

$$y = 18$$

The AFC won 13 games, the NFC won 18 games.

Karen sells athletic shoes part-time at a department store. She can either earn \$500 per month plus a 4% commission on her total sales, or \$400 per month plus a 5% commission on total sales. Write a system of equations to find the total price of shoes that she will have to sell to earn the same income from each pay scale. What will her monthly salary be?

$y = 500 + 0.04x$ $x = \text{sales}$
 $y = 400 + 0.05x$ $y = \text{salary}$

$$500 + 0.04x = 400 + 0.05x$$

$$100 = 0.01x$$

$$10,000 = x$$

$$y = 500 + 0.04(10,000)$$

$$y = 500 + 400$$

$$y = 900$$

She would need to sell \$10,000 of shoes and she would earn \$900.

The second of two numbers is 10 more than 3 times the first. Their sum is 70. Find the numbers.

$x = 1^{\text{st}} \#$
 $y = 2^{\text{nd}} \#$

$$y = 10 + 3x$$

$$x + y = 70$$

$$x + 10 + 3x = 70$$

$$4x = 60$$

$$x = 15$$

$$y = 10 + 3(15)$$

$$y = 10 + 45$$

$$y = 55$$

The 1st # is 15 and the 2nd # is 55.

Kate cut a 100-foot rope into two pieces. One piece was 5 feet longer than 4 times the length of the other. Find the length of each piece.

$x = 1^{\text{st}} \text{ piece}$
 $y = 2^{\text{nd}} \text{ piece}$

$$x = 5 + 4y$$

$$x + y = 100$$

$$5 + 4y + y = 100$$

$$5y = 95$$

$$y = 19$$

$$x = 5 + 4(19)$$

$$x = 5 + 76$$

$$x = 81$$

The 1st piece is 81 ft and the 2nd piece is 19 ft.