

MATH 1311

Section 3.5

Systems of Equations

A system of equations is a group of related equations. You can solve a system for a unique answer (one number for each unknown) if you have as many equations as you have unknown quantities.

Example:

In your pocket, you have 15 coins, consisting of nickels and dimes. The total amount of money in your pocket is \$0.90. How many of each type of coin do you have?

Based on this situation, you have two unknown quantities: Number of Nickels and Number of Dimes.

Example:

In your pocket, you have 15 coins, consisting of nickels and dimes. The total amount of money in your pocket is \$0.90. How many of each type of coin do you have?

Begin by defining your variables:

n = Number of Nickels

d = Number of Dimes

Example:

In your pocket, you have 15 coins, consisting of nickels and dimes. The total amount of money in your pocket is \$0.90. How many of each type of coin do you have?

n = Number of Nickels

d = Number of Dimes

Determine your equations: The first sentence tells us we have 15 coins, consisting of nickels and dimes: $n + d = 15$

The second sentence tells us we have \$0.90 from those coins:

$$0.05n + 0.10d = 0.90$$

These are our two equations for our two unknown quantities.

Example:

In your pocket, you have 15 coins, consisting of nickels and dimes. The total amount of money in your pocket is \$0.90. How many of each type of coin do you have?

n = Number of Nickels

d = Number of Dimes

$$n + d = 15 \quad \rightarrow \quad n = 15 - d$$

$$0.05n + 0.10d = 0.90 \quad \rightarrow \quad n = (0.90 - 0.10d)/0.05$$

Solve both equations for one of the variables. It doesn't matter which.

We will solve for n.

Example:

In your pocket, you have 15 coins, consisting of nickels and dimes. The total amount of money in your pocket is \$0.90. How many of each type of coin do you have?

$y = \text{Number of Nickels}$

$x = \text{Number of Dimes}$

$$y = 15 - x$$

$$y = (0.90 - 0.10x)/0.05$$

Change your variables into y and x (y by itself on one side of the equal sign).

Example:

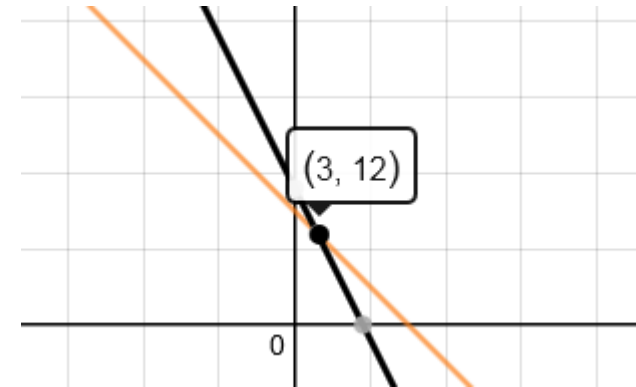
In your pocket, you have 15 coins, consisting of nickels and dimes. The total amount of money in your pocket is \$0.90. How many of each type of coin do you have?

$y = \text{Number of Nickels}$

$x = \text{Number of Dimes}$

$$y = 15 - x$$

$$y = (0.90 - 0.10x)/0.05$$



Graph both equations and use the Intersect Tool to find your answers.

You have 3 dimes (x-value) and 12 nickels (y-value).

A movie theater charges \$8 for an adult and \$5 for a child. You arrive to the theater in a group of 5 people and have a total bill of \$34.

1. Write an equation for the number of people.
2. Solve this equation for a .
3. Write an equation for the cost.
4. Solve this equation for a .
5. What is the point of intersection.
6. How many children attended?
7. How many adults attended?