

Your Name

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Notes

Lesson 1.4 -
Solving Systems of
3 Variable Equations

Applications

Math Skill Objective:

- Write a system of 3 variable equations that represent real life scenarios and be able to solve and interpret your solutions

Life

Lesson: Why live life in 2D when you can live it in 3D? Are there other dimensions? Many areas use 3 variable graphs and equations.

Part Six

Who really uses this stuff anyway?



total
objects
and
cost

Yep, people really use this!

$$4 \text{ pandas} + 7 \text{ chameleons} + 10 \text{ macaws} = \$104$$

$$2 \text{ pandas} + 1 \text{ chameleon} - 3 \text{ macaws} = \$13$$

$$5 \text{ chameleons} + 1 \text{ macaw} = \$33$$

What is the price of each ^{stuffed} animal?

Question determines
Variable Definition
x: Price of pandas
y: Price of chameleon
z: Price of macaws

be specific

2nd look for Totals

104, 13, 33

became equations

$4 \cdot x$	$+ 7y$	$+ 10z$	$= 104$	Total spent
$2x$	$+ y$	$- 3z$	$= 13$	
$5y$	$+ z$		$= 33$	

total objects and cost

Pepe Le Pew has three dates and is ordering three bouquets of flowers from Beck's Florist in Peoria.

Three roses, 2 carnations, and 1 tulip cost \$14 while 6 roses, 2 carnations and 6 tulips cost \$38 and, 1 rose, 12 carnations and 1 tulip cost \$18.

What is the cost of each individual flower?



1st

Define variables

x : cost of a rose

y : cost of a carnation

z : cost of a tulip

Equations
Totals: 14, 38, 18

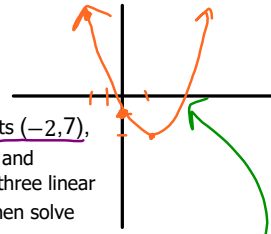
$$3x + 2y + z = 14$$

$$6x + 2y + 6z = 38$$

$$x + 12y + z = 18$$

Writing functions to model problems

1. A parabola passes through three points $(-2, 7)$, $(0, -1)$ and $(1, -2)$. Use these points and $y = ax^2 + bx + c$ to construct a system of three linear equations in terms of a , b , and c and then solve the system.



We want to create a quadratic equation

$$y = \frac{1}{2}x^2 + \frac{1}{2}x + \frac{-1}{1}$$

Variables are a, b, c

$$y = ax^2 + bx + c$$

Plug in $(-2, 7)$

$$7 = a(-2)^2 + b(-2) + c$$

$$4a - 2b + c = 7$$

Plug in $(0, -1)$

$$-1 = a(0)^2 + b(0) + c$$

$$c = -1$$

Plug in $(1, -2)$

$$-2 = a(1)^2 + b(1) + c$$

$$a + b + c = -2$$

Left, Right, and Ambidextrous Handed

The number of left-handed people in the world is one-tenth of the number of right handed people. The percent of right-handed people is nine times the percent of left-handed people and ambidextrous people combined. What percent of people ambidextrous?

x : % of ambidextrous people
 y : % of right handed
 z : % of left handed

$$z = \frac{1}{10} y$$

$$y = 9(z + x)$$

Percent Total

$$x + y + z = 1$$

100%

x is a decimal, turn in to percent

$$x = 0.05 \rightarrow 5\%$$

Ticket problem

Cornstock sold a total of 440 tickets for \$3940. Each regular ticket cost is \$5, each premium ticket is \$15 and each elite ticket cost \$25. The number of regular tickets was three times the number of premium and elite tickets combined. Write an algebraic model and determine how many of each ticket were sold?

x : # of reg. tickets
 y : # of prem. tickets
 z : # of elite tickets



Totals: 440 + \$3940
 Ticket equation

$$440 = x + y + z$$

Total Tickets = Tickets + Tickets + Tickets

Money Equation

$$3940 = 5x + 15y + 25z$$

money from reg money from P

Relationship Equation

Ask: which is bigger?

$$3x = y + z \quad \text{or} \quad x = 3(y + z)$$

reg = 3 (combined)

bigger smaller

Coin Problem



Uncle Scrooge claims he has a bag of 30 coins containing nickels, dimes and quarters. The total value of the coins is \$3. There are twice as many nickels as there are dimes. Is Scrooge correct? Explain your reasoning.

X : # of nickels

Y : # of dimes

Z : # of quarters

Totals: 30 & \$3

Coins Object Equation $30 = x + y + z$

money Value equation $3 = .05x + .1y + .25z$

dollars Value of nickels Value of dimes Value of quarters

cents $300 = 5x + 10y + 25z$

twice as many nickels as dimes

You have more: Nickels

$x = 2y$

bigger 2 smaller

total object cost

17. **MODELING WITH MATHEMATICS** Three orders are placed at a pizza shop. Two small pizzas, a liter of soda, and a salad cost \$14; one small pizza, a liter of soda, and three salads cost \$15; and three small pizzas, a liter of soda, and two salads cost \$22.

How much does each item cost?



P = PIZZA cost in \$

L = SODA cost in \$

S = SALAD cost in \$

$2P + 1L + 1S = 14$

$1P + 1L + 3S = 15$

$3P + 1L + 2S = 22$