

5a- Word Problems

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5a) word problems part I

Warm-Up #1: Solve this system of linear equations, using either substitution or elimination.

$$\begin{cases} 0.2x - 0.3y = 0.5 \\ 0.3x - 0.2y = 0.5 \end{cases} \xrightarrow{\times 10 \text{ to remove decimal.}} \begin{cases} 2x - 3y = 5 \\ 3x - 2y = 5 \end{cases}$$

$$\begin{aligned} (2x - 3y = 5) \times 3 &\Rightarrow 6x - 9y = 15 \\ (3x - 2y = 5) \times (-2) &\Rightarrow -6x + 4y = -10 \\ \hline & -5y = 5 \\ & y = -1 \end{aligned}$$

$$\begin{aligned} 2x - 3(-1) &= 5 \\ 2x + 3 &= 5 \\ -3 & -3 \\ \hline 2x &= 2 \\ \frac{2x}{2} &= \frac{2}{2} \\ \boxed{x = 1} \end{aligned}$$

Solution: $(x, y) = (1, -1)$

Word Problems (Day 1):

1. The sum of two numbers is 752 and their difference is 174. Find the numbers.
- + let #1 = x
#2 = y
- $x = 463$ $y = 289$

Create system of Equations:

$$\begin{cases} x + y = 752 \\ x - y = 174 \end{cases}$$

$$\begin{aligned} 2x + 0y &= 926 \\ \frac{2x}{2} &= \frac{926}{2} \\ \boxed{x = 463} \end{aligned}$$

$$\begin{aligned} x + y &= 752 \\ (463) + y &= 752 \\ -463 & -463 \\ \hline y &= 289 \end{aligned}$$

The 2 numbers are 463 and 289

2. The sum of five times one number plus three times a second number is eight. The sum of three times the first number plus five times the second number is 24.
- let $x = 1^{\text{st}} \#$ $y = 2^{\text{nd}} \#$

$$\begin{cases} 5x + 3y = 8 \\ 3x + 5y = 24 \end{cases} \xrightarrow{\begin{matrix} \times (-3) \\ \times 5 \end{matrix}} \begin{cases} -15x - 9y = -24 \\ 15x + 25y = 120 \end{cases}$$

$$\begin{aligned} -15x - 9y &= -24 \\ + 15x + 25y &= 120 \\ \hline & 16y = 96 \\ & y = 6 \end{aligned}$$

Sub-in to solve for x

$$\begin{aligned} 5x + 3y &= 8 \\ 5x + 3(6) &= 8 \\ 5x + 18 &= 8 \\ -18 & -18 \\ \hline 5x &= -10 \\ \frac{5x}{5} &= \frac{-10}{5} \\ \boxed{x = -2} \end{aligned}$$

To save time, let's just set up the following systems of equations. DO NOT SOLVE.

3. Canada won 26 medals at the 2010 Winter Olympic Games, including 7 silver medals. The number of gold medals was 4 more than twice the number of bronze medals. How many gold and bronze medals did Canada win?

$$\begin{cases} x + 7 + y = 26 \\ -x + 2y = -4 \end{cases}$$

$$\begin{array}{r} +4 \\ \hline 2y + 4 = 2x \\ -x \quad -4 \quad -x \quad -4 \\ \hline -x + 2y = -4 \end{array}$$



4. Each time Ms. A went to for lunch, she bought either a bowl of soup or a main course. During the school year, she spent \$490 and bought 160 food items. How many times did she buy soup and a main course?

let $x = \# \text{ times soup}$
 $y = \# \text{ times main}$

$$\begin{cases} x + y = 160 \\ 1.75x + 4.75y = 490 \end{cases}$$

Soups.....	1.75
Chicken	
Green Pea	
Main Course.....	4.75
Spaghetti and Salad	
Vegetarian Pizza	

5. Nadine has a pink piggy bank of nickels and a blue piggy bank of dimes. The total number of coins is 300 and their value is \$23.25. How many coins are in each piggy bank?

$x = \# \text{ nickels}$
 $y = \# \text{ dimes}$

$$\begin{cases} x + y = 300 \\ 0.05x + 0.10y = 23.25 \end{cases}$$



ASSIGNMENT # 5a
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68. Write a system of 2 linear equations for the following problem.

The sum of two numbers is 65. The first number is 17 greater than the second.

69. Find the numbers in the problem to the left.

70. Write a system of 2 linear equations for the following problem.

One number is 12 less than another number. Their sum is 102.

71. Find the numbers in the problem to the left.

72. Write a system of 2 linear equations for the following problem.

Mr. J bought a total of 12 pairs of socks. Athletic socks cost \$5 per pair and dress socks cost \$7 per pair. He spent \$70 in total.

73. How many pairs of each type of socks did he buy?

98. Solve.

$$0.05x + 0.07y = 19$$

$$x + y = 300$$

99. Solve.

$$x + y = 1200$$

$$0.20x + 0.40y = 36$$

100. Two numbers have a sum of 25 and a difference of 7. What are the two numbers?

101. Anya has a pocket full of loonies (\$1 coins) and toonies (\$2 coins). She has \$41 in total. If she has 29 coins, how many of each does she have?

102. When three times one number is added to two times another number, the sum is 21. When 4 times the second number is subtracted from 10 times the first number, the difference is 38. What are the numbers?

103. The total cost (before taxes) for three coffees and two cookies is \$10.05. The cost for five coffees and three cookies is \$16.10. Find the individual cost for each item.