

### 3.1-3.2 Notes Story Problems

Once you are comfortable solving systems, you can use these methods to solve actual problems.

#### Hints:

- Look for numbers that are totals to use at the end of the equations.
- Only use values in an equation that are measured in the same units as those totals.
- Percents generally have to be "connected" to something else.

Key

Use systems of equations to solve the applied problems.

- Write the equations necessary to solve the system
- Show your work
- Write the answer

$$= y$$

$$\times$$

**Example 1-** The sum of two numbers is 67. The smaller number is 3 less than the larger number. What are the two numbers?

A. 
$$\begin{aligned} x + y &= 67 \\ (x + 3) &= y \end{aligned}$$

B. 
$$\begin{aligned} x + x + 3 &= 67 \\ 2x &= 64 \\ x &= 32 \end{aligned}$$

c. Smaller 32  
larger 35

**Example 2** Sasha has \$1.65 in dimes and nickels. She has 21 coins. Find the number of each coin.

A. 
$$\begin{aligned} d + n &= 21 \\ .10d + .05n &= 1.65 \end{aligned}$$

B. 
$$\begin{aligned} -5(d + n) &= -5(21) \\ 10d + 5n &= 165 \\ \hline -5d - 5n &= -105 \\ 10d + 5n &= 165 \\ \hline 5d &= 60 \\ d &= 12 \end{aligned}$$

c. 12 dimes  
9 nickels

**Example 3-** The concession stand is selling hot dogs and hamburgers during a game. At halftime, they sold a total of 78 hot dogs and hamburgers and brought in \$105.50. How many of each item did they sell if hamburgers sold for \$1.50 and hot dogs sold for \$1.25?

A. 
$$\begin{aligned} d + b &= 78 \\ 1.25d + 1.50b &= 105.50 \\ \hline 125d + 150b &= 10550 \\ -125d - 125b &= -9750 \\ \hline 25b &= 800 \\ b &= 32 \end{aligned}$$

$$\begin{aligned} 78 \\ -32 \\ \hline \end{aligned}$$

c. 32 hamburgers  
46 hotdogs

**Example 4**-A sporting goods store sells right handed and left-handed gloves. In one month, 12 gloves were sold for a total revenue of \$561. Right handed gloves cost \$45 and left-handed gloves cost \$52. How many of each type of glove did they sell?

A. 
$$\begin{aligned} r+l &= 12 \\ 45r+52l &= 561 \end{aligned}$$

B. 
$$\begin{aligned} -45r-45l &= -540 \\ 45r+52l &= 561 \\ \hline 7l &= 21 \\ l &= 3 \end{aligned}$$

c. 3 left gloves  
9 right gloves

**Example 5**-Joe saved \$3000. He would like to earn \$216 per year by investing his money. He invests part in a low risk investment that pays 6% annual interest and a high risk investment that pays 10% annual interest. How much should he invest in each type to earn his goal?

A. 
$$\begin{aligned} x+y &= 3000 \\ .06x+.10y &= 216 \end{aligned}$$

B. 
$$\begin{aligned} \Rightarrow -6(x+y=3000) &\Rightarrow -6x-6y=-18000 \\ \Rightarrow 6x+10y=21600 &\Rightarrow \end{aligned}$$

$$\begin{aligned} -6x-6y &= -18000 \\ 6x+10y &= 21600 \\ \hline 4y &= 3600 \\ y &= 900 \end{aligned}$$

c. \$2100 in 6%  
\$900 in 10%

**Example 6** - A lab technician is mixing a 10% saline solution with a 4% saline solution. How much of each type should be used if 500 mL are needed of a 6% solution?

A. 
$$\begin{aligned} x+y &= 500 \\ .10x+.04y &= 30 \end{aligned}$$

B. 
$$\begin{aligned} -10x-10y &= -5000 \\ 10x+4y &= 3000 \\ \hline -6y &= -2000 \\ y &= 333\frac{1}{3} \\ x &= 166\frac{2}{3} \end{aligned}$$

c. 166<sup>2</sup>/<sub>3</sub> of 10%  
333<sup>1</sup>/<sub>3</sub> of 4%

**Example 7** -You are getting ready to move and have asked some friends to help. For lunch, you buy the following sandwiches at the local deli for \$30: six tuna sandwiches and six ham sandwiches. Later at night, everyone is hungry again and you buy four tuna sandwiches and eight ham sandwiches for \$30.60. What is the price for each sandwich

A. 
$$\begin{aligned} 6t+6h &= 30 \\ -3(4t+8h=30.60) &\Rightarrow \end{aligned}$$

B. 
$$\begin{aligned} 12t+12h &= 60 \\ -12t-24h &= -91.80 \end{aligned}$$

$$\begin{aligned} -12h &= -31.80 \\ h &= 2.65 \end{aligned}$$

c. \$2.65 ham  
\$2.35 tuna

$$\begin{aligned} 6t+6(2.65) &= 30 \\ 6t+15.90 &= 30 \\ 6t &= 14.10 \end{aligned}$$

1. The sum of two numbers is 128. Their difference is 44. What are the two numbers?

A. 
$$\begin{array}{r} x+y=128 \\ x-y=44 \end{array}$$
 B.

C. \_\_\_\_\_

2. The sum of two numbers is 23. If one of the numbers is halved, the sum of the numbers will be 17. What are the numbers?

A. 
$$\begin{array}{r} x+y=23 \\ \frac{1}{2}x+y=17 \end{array}$$
 B.

C. \_\_\_\_\_

3. Jocelyn has \$1.50 in her pocket made up of 23 nickels and dimes. How many of each type of coin does she have?

A. 
$$\begin{array}{r} n+d=23 \\ .05n+.10d=1.50 \end{array}$$
 B.

C. \_\_\_\_\_

4. When Jim cleaned out the reflecting pool at the library, he found 20 nickels and quarters. The collection of nickels and quarters totaled \$2.60. How many quarters did Jim find in the pool?

A. 
$$\begin{array}{r} n+q=20 \\ .05n+.25q=2.60 \end{array}$$
 B.

C. \_\_\_\_\_

5. A sporting goods store sells soccer and baseball shoes. In one month, 50 pairs of shoes were sold for a total revenue of \$1340. Soccer shoes sold for \$25 a pair and baseball shoes are sold for \$30 a pair. How many of each type of shoe were sold?

A. 
$$\begin{array}{r} s+b=50 \\ 25s+30b=1340 \end{array}$$
 B.

C. \_\_\_\_\_

6. You are buying meat for a cookout. You need 8 packages of meat. A package of hot dogs cost \$1.60 and a package of hamburger costs \$5.00. If you spend a total of \$23.00, how many packages of each can you buy?

A.  $d + b = 8$  B.

$1.60d + 5b = 23$

C. \_\_\_\_\_

7. At your fundraiser, you served an all-you-can-eat barbeque. You served 210 people and raised \$930. If the amount for each adult was \$6 and for each child was \$3, find out how many adults and children were served at this fundraiser.

A.  $a + c = 210$  B.

$6a + 3c = 930$

C. \_\_\_\_\_

8. You have \$6000 to invest in two stocks funds. The first fund pays 5% annual interest and the second account pays 9% annual interest. If after a year you have made \$380 in interest, how much money did you invest in each account?

A.  $x + y = 6000$  B.

$.05x + .09y = 380 \Rightarrow 5x + 9y = 38000$

C. \_\_\_\_\_

9. A student invested \$5000 in two different savings accounts. The first account pays an annual interest of 3%. The second account pays an annual interest rate of 4%. At the end of one year, she had earned \$185 in interest. How much money did she invest in each account?

A.  $x + y = 5000$  B.

$.03x + .04y = 185$

C. \_\_\_\_\_

10. In a chemistry lab, you have two types of vinegars. One is 5% acetic acid, and one is 6.5% acetic acid. You want to make 200 ml of a new vinegar that is 6% acetic acid. How many ml of each vinegar do you need to mix together?

A.  $x + y = 200$  B.

$.05x + .065y = 12$

$(200)(.06)$