Systems of Equations Word Problems

Write the following as algebraic equations involving 2 variables.

a) The sum of 2 numbers is 50

adding equal

equation 1

$x+y=50$

b) The difference between 2 numbers is 40

Subtraction

$x-y=40$

equation 2

$$\begin{array}{r} 1x+y=50 \\ +\,1x-y=40 \\ \hline 2x=90 \end{array}$$

$$\frac{2x}{2}=\frac{90}{2}$$

$$x=45$$

$45+y=50$

$y=50-45$

$y=5$

Write the following as algebraic equations involving 2 variables.

Ex.

a) The sum of 2 numbers is 50

addition

equation 1

$x + y = 50$

$x + 5 = 50$

$x = 50 - 5$

$x = 45$

b) The difference between 2 numbers is 40

equation 2

$x - y = 40$

$$\begin{array}{r} x+y=50 \\ -\ x-y=40 \\ \hline 2y=10 \end{array}$$

$\frac{2y}{2} = \frac{10}{2}$

$y = 5$

c) There are a total of 35 boys and girls in the class.

equation 2 $b+g=35$

There are 5 more boys then girls

$b-g=5$

$b+g=35$

$+\ b-g=5$

$2g=30$

$\frac{2g}{2}=\frac{30}{2}$

$g=15$

$b+15=35$

$b=35-15$

$b=20$

x - boy y - girl

c) There are a total of 35 boys and girls in the class.

B + 15 = 35

B = 35 - 15

B = 20

equation 1

x + y = 35

B + G = 35

There are 5 more boys then girls

equation 2

B - G = 5

B - 5 = G

B + G = 35

B - G = 5

$\frac{2G}{2} = \frac{30}{2}$

G = 15

Solving Problems in 2 variables

Some problems of business and industry are solved by expressing the problems as a system of equations.

Example 1:

The sum of two numbers is thirty and their difference is 174. Find the numbers.

$$x + y = 30$$
$$-(x - y = 174)$$

$$\frac{2y}{2} = \frac{-144}{2}$$

$$y = -72$$

$$x + (-72) = 30$$

$$x = 30 + 72$$

$$x = 102$$

Solving Problems in 2 variables

Some problems of business and industry are solved by expressing the problems as a system of equations.

Example 1:

The sum of two numbers is thirty and their difference is 174. Find the numbers.

$$\begin{array}{r} x+y=30 \\ -\,(x-y=174) \end{array}$$

$$\frac{2y}{2}=\frac{-144}{2}$$

$$y=-72$$

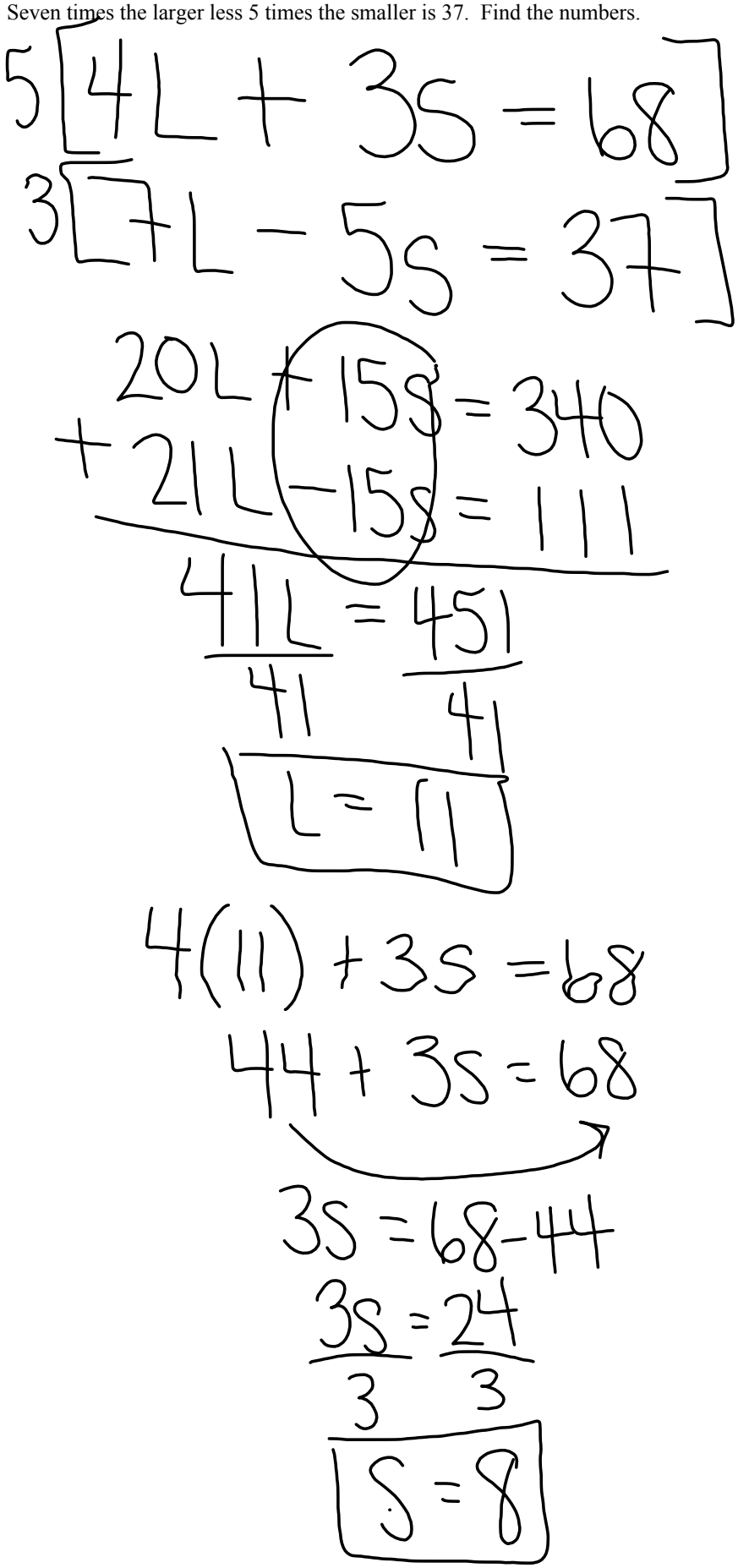
$$x+(-72)=30$$

$$x=30+72$$

$$x=102$$

Example 2:

When 4 times the larger of 2 numbers is added to 3 times the smaller the result is 68. Seven times the larger less 5 times the smaller is 37. Find the numbers.



Example 2: X-larger # Y-smaller

When 4 times the larger of 2 numbers is added to 3 times the smaller the result is 68. Seven times the larger less 5 times the smaller is 37. Find the numbers.

$5(4L + 3S = 68)$

$3(7L - 5S = 37)$

$+\ 20L + 15S = 340$

$\quad 21L - 15S = 111$

$41L = 451$

$\frac{41L}{41} = \frac{451}{41}$

$L = 11$

$4(11) + 3y = 68$

$44 + 3y = 68$

$3y = 68 - 44$

$\frac{3y}{3} = \frac{24}{3}$

$y = 8$

9. Talise folded 545 metal lids to make cones for jingle dresses for herself and her younger sister. Her dress had 185 more cones than her sister's dress. How many cones are on each dress?

$t + s = 545$

equation 2

$t - s = 185$

$T = 365$

$S = 180$

9. Talise folded 545 metal lids to make cones for jingle dresses for herself and her younger sister. Her dress had 185 more cones than her sister's dress. How many cones are on each dress? X - Talise 'y - sis

equation 1

$X + y = 545$

$T + S = 545$

equation 2

$T - S = 185$

$T + 180 = 545$

$T = 545 - 180$

$T = 365$

$\frac{2S}{2} = \frac{360}{2}$ $S = 180$

The vending machine contains a total of 395 quarters and dimes. The total value of the coins is $66.80. How many of each are there?

substitution

$$Q + D = 395$$

$$0.25Q + 0.1D = 66.80$$

$$Q = 395 - D$$

$$0.25(395 - D) + 0.1D = 66.80$$

$$98.75 - 0.25D + 0.1D = 66.80$$

$$-0.15D = -31.95$$

$$-0.15 \quad -0.15$$

$$\boxed{D = 213}$$

$$Q + 213 = 395$$

$$Q = 395 - 213$$

$$\boxed{Q = 182}$$

The vending machine contains a total of 395 quarters and dimes. The total value of the coins is $66.80. How many of each are there?

$Q + D = 395$

$0.25Q + 0.1D = \$66.80$

$Q = 395 - D$

$0.25(395 - D) + 0.1D = 66.80$

$98.75 - 0.25D + 0.1D = 66.80$

$-0.15D = -31.95$

$\frac{-0.15D}{-0.15} = \frac{-31.95}{-0.15}$

$D = 213$

$Q + 213 = 395$

$Q = 395 - 213$

$Q = 182$

Solving System of Equations Word Problems

1) Michelle is making goodie bags for Christmas filled with chocolates and candy. Chocolates cost $2.50 per lb and candy cost $3.00 per lb. Michelle spent a total of $40.00 on chocolates and candy. She bought a total of 15 lbs of chocolate and candy. How many lbs of each did she buy?

2) 20 000 tickets were sold to the Green Day concert. Stage level seats cost $105 and higher level seats cost $75. If the total money collected from selling tickets was $1 740 000, how many of each type were sold?

3) Kaitlyn's Gourmet Pretzel Shop specializes in selling the very finest chocolate covered pretzels. Thomas bought 4 white chocolate pretzels and 6 dark chocolate pretzels for $10.50. Tyson bought 8 white chocolate and 3 dark chocolate pretzels for $9.75. What is the cost of each type of pretzel?

4) Tyler is catering a banquet for 250 people. Each person will be served either chicken or beef. The chicken cost $5.00 per person and the beef cost $7.00 per person. Tyler spent $1500. How many dishes of each type did he serve?

5) Your teacher is giving a test worth 100 points containing 40 questions. There are two points and four points question on the test. How many of each type of questions are on the test?

6) The Music club and the Drama club had fundraiser's to buy supplies. The Music club spent $135 buying six cases of juice and one case of bottle water. The Drama club spent $110 buying four cases of juice and two cases of bottled water. How much did each type of drink cost?

7) Suppose you bought supplies for a party. Three rolls of streamers and 15 party hats that cost $30. Later, you bought 2 rolls of streamers and 4 party hats for $11. How much did each roll of streamers cost? How much did each party hat cost?

Answers:

1) Chocolate = 10
Candy = 5

2) Stage Level = 8000
Higher Level = 12 000

3) Dark = $1.25
White= $0.75

4) Chicken = 125
Beef = 125

5) Two point = 30
Four point = 10

6) Juice = $20
Water = $15

7) Streamers = $2.50
Hats = $1.50