2 unknowns
$(x \& y)$

2 different
totals

Lesson 29: Word Problems

Classwork

Example 1

unknowns total   total

The sum of two numbers is 361 and the difference between the two numbers is 173. What are the two numbers?

+1 Let x be one of the numbers   +1 One of the numbers is 267.

+1 Let y be the other number   +1 The other number is 94.

$$+1 \begin{cases} x + y = 361 \\ x - y = 173 \end{cases}$$

$$\frac{2x}{2} = \frac{534}{2}$$

$$267 + y = 361$$
$$-267 \qquad -267$$

$$+1 \ y = 94$$

Example 2

$+1 \ x = 267$

There are 356 eighth-grade students at Euclid's Middle School. Thirty-four more than four times the number of girls is equal to half the number of boys. How many boys are in eighth grade at Euclid's Middle School? How many girls?

Example 3

value
total

A family member has some five-dollar bills and one-dollar bills in her wallet. Altogether she has 18 bills and a total of $62. How many of each bill does she have?

18 $62

Let x be the number of five-dollar bills. There are 11 $5 bills.
Let y be the number of one-dollar bills. There are 7 $1 bills.

$$-1 \begin{cases} x + y = 18 \\ 5x + y = 62 \end{cases} \quad +\begin{cases} -x - y = -18 \\ 5x + y = 62 \end{cases}$$

$$\frac{4x}{4} = \frac{44}{4}$$

$$11 + y = 18$$

$$y = 7$$

total $x = 11$

Example 4

A friend bought 2 boxes of pencils and 8 notebooks for school, and it cost him $11. He went back to the store the same day to buy school supplies for his younger brother. He spent $11.25 on 3 boxes of pencils and 5 notebooks. How much would 7 notebooks cost?

total

Let x be the cost of each box of pencils. Each box of pencils costs $2.50.
Let y be the cost of each notebook. Each notebook costs $0.75.

$$3 \begin{cases} 2x + 8y = 11 \\ -2 \begin{cases} 3x + 5y = 11.25 \end{cases} \end{cases} \quad +\begin{cases} 6x + 24y = 33 \\ -6x - 10y = -22.5 \end{cases}$$

$$\frac{14y}{14} = \frac{10.5}{14}$$

$$y = \$0.75$$

7 notebooks
would cost $5.25

$$7(0.75) = 5.25$$

$$2x + 8(0.75) = 11$$
$$2x + 6 = 11$$
$$ - 6 - 6$$

$$2x = 5$$
$$x = 2.50$$

NYS COMMON CORE MATHEMATICS CURRICULUM   Lesson 29   8•4

Exercises

1. A farm raises cows and chickens. The farmer has a total of 42 animals. One day he counts the legs of all of his
    animals and realizes he has a total of 114. How many cows does the farmer have? How many chickens?

Let x be the number of cows   The farm has 15 cows and
Let y be the number of chickens   27 chickens

$$-2\begin{cases} x+y = 42 \\ 4x + 2y = 114 \end{cases}$$

$$-2x - 2y = -84$$
$$\underline{4x + 2y = 114}$$
$$2x = 30$$
$$x = 15$$

$$15 + y = 42$$
$$-15 \quad\quad -15$$
$$y = 27$$

2. The length of a rectangle is 4 times the width. The perimeter of the rectangle is 45 inches. What is the area of the
    rectangle?

1.) Let x be the number of small boxes containing DVD's.
Let y be the number of large boxes containing a gaming machine.

$$\begin{cases} 3y + x = 48 \\ 3y + 5x = 72 \end{cases}$$

2.) Let x be the number of spelling questions
Let y be the number of vocabulary questions

$$\begin{cases} 2x + 5y = 100 \\ x + y = 26 \end{cases}$$

3. The sum of the measures of angles x and y is 127°. If the measure of $\angle x$ is 34° more than half the measure of $\angle y$, what is the measure of each angle?

Problem Set

1. Two numbers have a sum of 1,212 and a difference of 518. What are the two numbers?

2. The sum of the ages of two brothers is 46. The younger brother is 10 more than a third of the older brother's age. How old is the younger brother?

3. One angle measures 54 more degrees than 3 times another angle. The angles are supplementary. What are their measures?

4. Some friends went to the local movie theater and bought four buckets of large popcorn and six boxes of candy. The total for the snacks was $46.50. The last time you were at the theater, you bought a large popcorn and a box of candy and the total was $9.75. How much would 2 large buckets of popcorn and 3 boxes of candy cost?

5. You have 59 total coins for a total of $12.05. You only have quarters and dimes. How many of each coin do you have?

6. A piece of string is 112 inches long. Isabel wants to cut it into 2 pieces so that one piece is three times as long as the other. How long is each piece?

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