

Algebra RH

Essential Question: How do we solve systems word problems?

Do Now: Solve the following word problem. *Make sure you define the variables.*

The perimeter of a rectangle is 94 cm. The length is 7 cm more than the width. Find the length and the width of the rectangle.

$$\begin{aligned}x &= \text{width} \\ x + 7 &= \text{length}\end{aligned}$$

$$\begin{aligned}2x + 2(x + 7) &= 94 \\ 2x + 2x + 14 &= 94 \\ 4x &= 80 \\ x &= 20\end{aligned}$$

$$\begin{aligned}20 & \text{ width} \\ 27 & \text{ length}\end{aligned}$$

2nd Method (Using a linear system)

$$\begin{aligned}20 \quad x &= \text{width} \\ 27 \quad y &= \text{length}\end{aligned}$$

$$\begin{aligned}2x + 2y &= 94 && \text{Substitution} \\ y &= x + 7\end{aligned}$$

$$\begin{aligned}2x + 2(x + 7) &= 94 \\ 2x + 2x + 14 &= 94 \\ 4x &= 80 \\ x &= 20\end{aligned}$$

$$\begin{aligned}y &= x + 7 \\ y &= 20 + 7 \\ y &= 27\end{aligned}$$

How do we solve a problem using a linear system?

- Define variables
- Write two equations
- Solve algebraically (Substitution or elimination)
- Make sure answers are reasonable

1. The sum of two numbers is 7. Three times one of the numbers is 17 more than the other. Find both numbers.

$$\begin{aligned}x &= \text{1st \#} \\ y &= \text{2nd \#}\end{aligned}$$

$$\begin{aligned}x + y &= 7 \\ 3x &= y + 17\end{aligned}$$

$$\begin{array}{r}x + y = 7 \\ 3x - y = 17 \\ \hline 4x = 24 \\ x = 6\end{array}$$
$$\begin{aligned}x + y &= 7 \\ 6 + y &= 7 \\ y &= 1\end{aligned}$$

$$\begin{aligned}x &= 6 \\ y &= 1\end{aligned}$$

2. Nancy and Pete were selling tickets to the upcoming Spotlight show, The Sound of Music. Pete sold 6 adult and 15 student tickets for a total of \$96.00. Nancy sold 8 adult and 7 student tickets for a total of \$76.00. What was the price of each ticket?

$x = \$ \text{ of each adult ticket}$
 $y = \$ \text{ of each child ticket}$

$$\begin{aligned}
 & -4(6x + 15y = 96) & -24x - 60y = -384 \\
 & 3(8x + 7y = 76) & 24x + 21y = 228 \\
 \hline
 & & -39y = -156 \\
 & & y = 4 \\
 \end{aligned}$$

4 / child ticket
 # 6 / adult ticket

$$\begin{aligned}
 6x + 15(4) &= 96 \\
 6x + 60 &= 96 \\
 6x &= 36 \\
 x &= 6
 \end{aligned}$$

3. Maggie has 15 coins in her pocket consisting of dimes and quarters. If Maggie has \$2.25 in her pocket, find the number of each type of coin.

$x = \# \text{ of dimes}$
 $y = \# \text{ of quarters}$

$$\begin{aligned}
 & -10(x + y = 15) & x + y = 15 \\
 & 10x + 25y = 225 & x = 10 \\
 \hline
 & -10x - 10y = -150 & \\
 \hline
 & & 15y = 75 \\
 & & y = 5
 \end{aligned}$$

10 dimes
 5 quarters

4. Alex invested \$10,000 in stocks and bonds. The bonds earned 5% and the stocks earned 7%. The total income from these investments is \$540.00. How much money was invested at each rate?

$\$ 8000 \quad x = \$ \text{ invested in bonds}$
 $\$ 2000 \quad y = \$ \text{ invested in stocks}$

$$\begin{aligned}
 & -0.05(x + y = 10000) \\
 & 0.05x + 0.07y = 540 \\
 \hline
 & -0.05x - 0.05y = -500 \\
 \hline
 & & .02y = 40 \\
 & & y = 2000 \\
 \end{aligned}$$

$$\begin{aligned}
 x + 2000 &= 10000 \\
 x &= 8000
 \end{aligned}$$

5. A sporting goods store sells 12 baseball gloves, some of which are right handed and some of which are left handed. Right handed gloves cost \$45.00 each and left handed gloves cost \$52.00 each. The total revenue from the gloves sold was \$561.00. How many of each type was sold?

$9 \quad x = \# \text{ of right handed gloves}$
 $3 \quad y = \# \text{ of left handed gloves}$

$$\begin{aligned}
 & -45(x + y = 12) & x + y = 12 \\
 & 45x + 52y = 561 & x = 9 \\
 \hline
 & -45x - 45y = -540 & \\
 \hline
 & & 7y = 21 \\
 & & y = 3
 \end{aligned}$$