

## Writing and Solving Word Problems with Algebra

### STEPS:

- 1) Determine the unknown and set a variable to represent it. Use a "let" statement. Only one variable can be used, so write other unknowns in terms of that same variable.
- 2) Using key words develop an equation to represent the situation. Write a "then" statement.
- 3) Solve the equation, showing all work.
- 4) Check your answer. Does it seem reasonable?
- 5) Write a short statement answer to the question.

### A. Number Problems

1. Five times a number subtract two is equal to three times the number increased by four. Find the number.

LET:  $x = \text{A NUMBER}$

THEN:  $5x - 2 = 3x + 4$

$$\begin{array}{r|l} 5x - 2 & = & 3x + 4 \\ -3x & & -3x \\ \hline 2x - 2 & = & 4 \\ +2 & & +2 \\ \hline 2x & = & 6 \\ \hline \frac{2x}{2} & = & \frac{6}{2} \Rightarrow x = 3 \end{array}$$

THE NUMBER IS 3

2. Mike's CD collection has 6 more CD's than Ellen's. Together they have 48 CD's. How many do they each have?

LET:  $n = \text{\# OF ELLEN'S CDS}$

$n + 6 = \text{\# OF MIKE'S CDS}$

THEN:  $n + (n + 6) = 48$

$$\begin{array}{r|l} 2n + 6 & = & 48 \\ -6 & & -6 \\ \hline 2n & = & 42 \\ \hline \frac{2n}{2} & = & \frac{42}{2} \\ n & = & 21 \\ n + 6 & = & 27 \end{array}$$

MIKE HAS 27 CDS  
& ELLEN HAS 21 CDS.

## B. Consecutive Numbers

3. Find three consecutive integers with a sum of 159.

LET:  $x$   
 $x+1$   
 $x+2$  } BE THE NUMBERS

THEN:  $x + (x+1) + (x+2) = 159$

$$\begin{array}{r} 3x + 3 = 159 \\ \underline{-3} \quad \underline{-3} \\ 3x = 156 \\ \underline{\quad} \quad \underline{\quad} \\ x = 52 \end{array} \quad \begin{array}{l} x+1 = 53 \\ x+2 = 54 \end{array}$$

THE #S ARE 52, 53, & 54

4. The sum of three consecutive **even** numbers is 30. What are the numbers?

LET:  $x$   
 $x+2$   
 $x+4$  } = #S

THEN:  $x + (x+2) + (x+4) = 30$

$$\begin{array}{r} 3x + 6 = 30 \\ \underline{-6} \quad \underline{-6} \\ 3x = 24 \\ \underline{\quad} \quad \underline{\quad} \\ x = 8 \end{array}$$

THE #S ARE 8, 10, & 12

\*\* NOTE: THIS IS THE SAME 'let' STATEMENT IF THE #S WERE CONSECUTIVE ODD!

$x = 8$   
 $x+2 = 10$   
 $x+4 = 12$

## C. Total/Sum Problems

5. The sum of two numbers is 117. Five times the smaller number is seven less than three times the larger. Find both numbers.

LET:  $x$  = SMALLER #  
 $117 - x$  = LARGER #

THEN:  $5x = 3(117 - x) - 7$

$$\begin{array}{r} 5x = 351 - 3x - 7 \\ 5x = 344 - 3x \\ + 3x \quad \quad \quad + 3x \\ \hline 8x = 344 \\ \underline{\quad} \quad \underline{\quad} \\ x = 43 \end{array} \quad \begin{array}{l} 117 - x \\ = 74 \end{array}$$

THE #S ARE 74 & 43

6. John and Lisa's ages total 62. John is 10 years older than Lisa. Find their ages.

LET:  $l$  = LISA'S AGE  
 $62 - l$  = JOHN'S AGE

THEN:  $62 - l = l + 10$

$$\begin{array}{r} 62 - l = l + 10 \\ \underline{-10} \quad \underline{-10} \\ 62 = 2l + 10 \\ \underline{-10} \quad \underline{-10} \\ 52 = 2l \\ \underline{\quad} \quad \underline{\quad} \\ 26 = l \end{array}$$

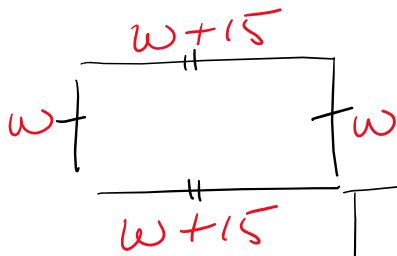
LISA IS 26 YEARS OLD  
 JOHN IS 36 YEARS OLD.

$26 = l$   
 $l + 10 = 36$

**D. Perimeter Problems** (HINT: Draw a diagram.)

$$P = 2l + 2w$$

7. The length of a rectangle is 15 cm longer than its width. The perimeter is 82. Find the length and width.



LET:  $w = \text{WIDTH}$   
 $w + 15 = \text{LENGTH}$

$$\begin{aligned} \text{THEN: } 4w + 30 &= 82 \\ -30 & \quad -30 \\ \hline 4w &= 52 \\ \frac{4w}{4} &= \frac{52}{4} \\ w &= 13 \\ w + 15 &= 28 \end{aligned}$$

THE WIDTH IS 13 cm  
 & THE LENGTH IS 28 cm.

**E. Challenging Problems** (HINT: Use a table to organize data.)

8. Luke is twice as old as Jaspreet. The sum of their ages 4 years ago was 52. Find their ages now.

LET  $j = \text{JASPREET'S AGE}$   
 $2j = \text{LUKE'S AGE}$

	NOW	4 YRS AGO
JAS	$j$	$j - 4$
LUKE	$2j$	$2j - 4$

$$\begin{aligned} \text{THEN: } (j - 4) + (2j - 4) &= 52 \\ 3j - 8 &= 52 \\ +8 & \quad +8 \\ \hline 3j &= 60 \\ \frac{3j}{3} &= \frac{60}{3} \\ j &= 20 \quad 2j = 40 \end{aligned}$$

JASPREET IS 20 & LUKE IS 40.

9. Apple pies cost \$12 and cherry pies cost \$8. A baker sold 28 pies with a total value of \$312. How many of each pie did they sell?

LET  $a = \# \text{ OF APPLE PIES}$   
 $28 - a = \# \text{ OF CHERRY PIES}$

	#	\$	TOTAL COST
APPLE	$a$	12	$12a$
CHERRY	$28 - a$	8	$8(28 - a)$

$$\begin{aligned} \text{THEN: } 12a + 8(28 - a) &= 312 \\ 12a + 224 - 8a &= 312 \\ 4a + 224 &= 312 \\ -224 & \quad -224 \\ \hline 4a &= 88 \\ \frac{4a}{4} &= \frac{88}{4} \\ a &= 22 \\ 28 - a &= 6 \end{aligned}$$

They sold 8 CHERRY  
 & 22 APPLE PIES.