

Key

# using algebra to solve word problems

1

## DECLARE VARIABLES

Use "LET STATEMENTS" to define your variable.

2

## SET UP EQUATION & SOLVE

Translate into an equation using your let statements. Then solve

3

## DEFINE ANSWER

Show exactly what the problem is asking for.

### type 1: Finding Two Numbers

1. The larger of two numbers is four more than the smaller number. If the sum of the numbers is 74, find the numbers. Let  $x = \text{smaller \#}$

$x + 4 = \text{bigger \#}$

$$\begin{aligned} x + (x + 4) &= 74 \\ 2x + 4 &= 74 \\ -4 \quad -4 & \\ \hline 2x &= 70 \\ \frac{2x}{2} &= \frac{70}{2} \\ x &= 35 \end{aligned}$$

$$35 + 4 = 39$$

35, 39

2. The larger of two numbers is six less than twice the smaller number. If the sum of the numbers is 42, find the numbers. Let  $x = \text{smaller \#}$

$2x - 6 = \text{larger \#}$

$$\begin{aligned} x + 2x - 6 &= 42 \\ 3x - 6 &= 42 \\ 3x &= 48 \\ x &= 16 \end{aligned}$$

$$\begin{aligned} 2(16) - 6 \\ 32 - 6 \\ 26 \end{aligned}$$

16, 26

3. The larger of two numbers is seven less than three times the smaller number. If the sum of the numbers is 61, find the numbers. Let  $x = \text{smaller \#}$

$3x - 7 = \text{larger \#}$

$$\begin{aligned} x + 3x - 7 &= 61 \\ 4x - 7 &= 61 \\ 4x &= 68 \\ x &= 17 \end{aligned}$$

$$\begin{aligned} 3(17) - 7 \\ 51 - 7 \\ 44 \end{aligned}$$

17, 44

4. The larger of two numbers is one more than four times the smaller number. If the sum of the numbers is 106, find the numbers. Let  $x = \text{smaller \#}$

$4x + 1 = \text{larger \#}$

$$\begin{aligned} x + 4x + 1 &= 106 \\ 5x + 1 &= 106 \\ 5x &= 105 \\ x &= 21 \end{aligned}$$

$$\begin{aligned} 4(21) + 1 \\ 84 + 1 \\ 85 \end{aligned}$$

21, 85

## type 2: Perimeter of Rectangles

5. The length of a rectangle is six inches more than its width. If the perimeter of the rectangle is 24 inches, find its dimensions.  $w = \text{width}$   $l = \text{length}$   $l = (w + 6)$

$$P = 2l + 2w$$

$$24 = 2(w + 6) + 2w$$

$$24 = 2w + 12 + 2w$$

$$24 = 4w + 12$$

$$12 = 4w$$

$$w = 3$$

$$l = (w + 6)$$

$$l = 3 + 6$$

$$l = 9$$

$$w = 3 \text{ \& } l = 9$$

6. The length of a rectangle is five inches more than four times its width. If the perimeter of the rectangle is 90 inches, find its dimensions.  $w = \text{width}$   $l = \text{length}$

$$l = 4w + 5$$

$$90 = 2(4w + 5) + 2w$$

$$90 = 8w + 10 + 2w$$

$$90 = 10w + 10$$

$$80 = 10w$$

$$w = 8$$

$$l = 4(8) + 5$$

$$l = 32 + 5$$

$$l = 37$$

$$w = 8, l = 37$$

7. The length of a rectangle is three centimeters less than twice its width. If the perimeter of the rectangle is 18 centimeters, find its dimensions.  $w = \text{width}$   $l = \text{length}$

$$P = 2l + 2w$$

$$l = 2w - 3$$

$$18 = 2(2w - 3) + 2w$$

$$18 = 4w - 6 + 2w$$

$$18 = 6w - 6$$

$$24 = 6w$$

$$w = 4$$

$$l = 2(4) - 3$$

$$l = 8 - 3$$

$$l = 5$$

$$l = 5 \text{ } w = 4$$

8. The length of a rectangle is 7 inches more than its width. If the perimeter of the rectangle is 66 inches, find its dimensions.  $w = \text{width}$   $l = \text{length}$

$$P = 2l + 2w$$

$$l = w + 7$$

$$66 = 2(w + 7) + 2w$$

$$66 = 2w + 14 + 2w$$

$$66 = 4w + 14$$

$$52 = 4w$$

$$w = 13$$

$$l = 13 + 7$$

$$l = 20$$

$$l = 20 \text{ } w = 13$$

9. The length of a rectangle is five less than twice its width. If the perimeter of the rectangle is 56 inches, find its dimensions.  $w = \text{width}$   $l = \text{length}$

$$P = 2l + 2w$$

$$l = 2w - 5$$

$$56 = 2(2w - 5) + 2w$$

$$56 = 4w - 10 + 2w$$

$$56 = 6w - 10$$

$$66 = 6w$$

$$w = 11$$

$$l = 2(11) - 5$$

$$l = 22 - 5$$

$$l = 17$$

$$l = 17 \text{ } w = 11$$

### type 3: Finding Consecutive Numbers

- What does consecutive mean? in a row ; one after another
- Give examples of the following:

consecutive numbers	1, 2, 3, ...
consecutive <u>even</u> numbers	2, 4, 6
consecutive <u>odd</u> numbers	7, 9, 11

10. The sum of two consecutive numbers is 123. Find the numbers.

let  $x = 1^{st} \#$   
 let  $x+1 = 2^{nd} \#$

$$\begin{aligned} x + x + 1 &= 123 \\ 2x + 1 &= 123 \\ 2x &= 122 \\ x &= 61 \end{aligned}$$

$$61 + 1 = 62$$

61, 62

11. The sum of two consecutive numbers is 85, find the numbers.

let  $x = 1^{st} \#$   
 $x+1 = 2^{nd} \#$

$$\begin{aligned} x + x + 1 &= 85 \\ 2x + 1 &= 85 \\ 2x &= 84 \\ x &= 42 \end{aligned}$$

$$42 + 1 = 43$$

42, 43

12. Find two consecutive even numbers whose sum is 54.

let  $x = 1^{st} \#$   
 $x+2 = 2^{nd} \#$

$$\begin{aligned} x + x + 2 &= 54 \\ 2x + 2 &= 54 \\ 2x &= 52 \\ x &= 26 \end{aligned}$$

$$26 + 2 = 28$$

26, 28

13. The sum of two consecutive odd numbers is 128. Find the numbers.

let  $x = 1^{st} \#$   
 $x+2 = 2^{nd} \#$

$$\begin{aligned} x + x + 2 &= 128 \\ 2x + 2 &= 128 \\ 2x &= 126 \\ x &= 63 \end{aligned}$$

$$63 + 2 = 65$$

63, 65

14. The sum of three consecutive **even** numbers is 138. Find the numbers.

$$\begin{aligned} \text{Let } x &= 1^{\text{st}} \# \\ x+2 &= 2^{\text{nd}} \# \\ x+4 &= 3^{\text{rd}} \# \end{aligned}$$

$$x + x + 2 + x + 4 = 138$$

$$3x + 6 = 138$$

$$3x = 132$$

$$x = 44$$

44, 46, 48

15. The sum of three consecutive **odd** numbers is 57. What are the three numbers?

$$\begin{aligned} x &= 1^{\text{st}} \# \\ x+2 &= 2^{\text{nd}} \# \\ x+4 &= 3^{\text{rd}} \# \end{aligned}$$

$$x + x + 2 + x + 4 = 57$$

$$3x + 6 = 57$$

$$3x = 51$$

$$x = 17$$

17, 19, 21

## MR. WILKS' CHALLENGE!



In cross-country, the team score is determined by the place each individual runner finishes. (For example 1st place is one point, 16th place is 16 points, etc.) In their latest meet, Mr. Wilks' team scored 55 points. If there were five runners on the team and each runner finished one after another, what places did they each come in?

$$x + x + 1 + x + 2 + x + 3 + x + 4 = 55$$

$$5x + 10 = 55$$

$$5x = 45$$

$$x = 9$$

9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, 13<sup>th</sup>