

## APPLICATIONS OF LINEAR EQUATIONS PART I (INTEGER WORD PROBLEMS)

When solving word problems, it is necessary to first translate each word statement into an equivalent mathematical equation.

EXAMPLE 1: Four more than three times a number is seven more than twice the number. Find the number.

First we let  $x$  represent the unknown number. Then we translate the word statement into an equivalent mathematical equation.

"Four more than three times a number is seven more than twice the number"

$$3x + 4 = 2x + 7$$

Now we solve the equation

$$3x + 4 = 2x + 7$$

$$\underline{-4 \qquad -4}$$

$$3x = 2x + 3$$

$$\underline{-2x \quad -2x}$$

$$x = 3$$

example 2: A baseball team won four more games than they lost. If they played 22 games, how many did they win? How many did they lose?

What can be said about the wins and the losses?

$$\left( \begin{array}{c} \# \text{ of} \\ \text{wins} \end{array} \right) + \left( \begin{array}{c} \# \text{ of} \\ \text{losses} \end{array} \right) = \begin{array}{c} \text{total games} \\ \text{played} \end{array}$$

First we let  $x$  represent the number of losses.

Then the number of wins would be "four more" than the number of losses. So we can write  $x+4$  to represent the number of wins.

Using the formula above, we can write the mathematical equation.

$$(x+4) + (x) = 22$$

And now we solve:

$$x+4+x=22$$

$$2x+4=22$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$2x = 18$$

$$\frac{2x}{2} = \frac{18}{2}$$

$$x = \underline{\quad}$$

↪

↳ Since  $x$  represents the number of losses, the baseball team lost \_\_\_\_\_ games and they won \_\_\_\_\_ games.

consecutive numbers

example 3:

2 and 3 are consecutive numbers since 3 is one more than 2.

-3 and -2 are consecutive numbers since -2 is one more than -3.

0 and 1 are consecutive numbers since 1 is one more than 0.

$x$  and  $x+1$  are consecutive numbers since  $x+1$  is one more than  $x$ .

consecutive even numbers

example 4:

2 and 4 are consecutive even numbers since 4 is two more than 2.

-8 and -6 are consecutive even numbers since -6 is two more than -8.

0 and 2 are consecutive even numbers since 2 is two more than 0

↪

x and \_\_\_\_\_ are consecutive even numbers since \_\_\_\_\_ is two more than x

↪

consecutive odd numbers

example 5:

3 and 5 are consecutive odd numbers since 5 is two more than 3.

-7 and -5 are consecutive odd numbers since -5 is two more than -7.

↪

x and \_\_\_\_\_ are consecutive odd numbers since \_\_\_\_\_ is two more than x.

↪

example 6: The sum of two consecutive numbers is 15. Find the numbers.

First we translate the word statement into an equivalent mathematical equation.

$$(x) + (x+1) = 15$$

Now we solve the equation

$$x + x + 1 = 15$$

$$2x + 1 = 15$$

$$\underline{-1 \quad -1}$$

$$2x = 14$$

$$\underline{\quad \quad \quad 2 \quad \quad \quad 2}$$

↳

$$x = \underline{\quad}$$

↳

so the two numbers are          and         .

example 7: The sum of three consecutive even integers is 18. Find the numbers.

$$x + x+2 + x+4 = 18$$

$$3x + 6 = 18$$

$$\underline{-6 \quad -6}$$

$$3x = 12$$

$$\frac{3x}{3} = \frac{12}{3}$$

∴

$$x = \underline{\quad}$$

∴

so the three numbers are         ,          and

## APPLICATIONS OF LINEAR EQUATIONS PART I

### Practice Problems

1. The sum of three consecutive numbers is 30. Find the numbers.

2. The sum of two consecutive odd numbers is  $-8$ . Find the numbers.