

# Application of Linear Equations: Integer Word Problems

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

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## Example 1

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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

$$\begin{array}{r} 3x + 4 = 2x + 7 \\ \underline{-4 \qquad -4} \\ 3x \qquad = 2x + 3 \\ \underline{-2x \quad -2x} \end{array}$$

$$x = 3$$

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Example 2

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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?

$$\begin{pmatrix} \#of \\ Wins \end{pmatrix} + \begin{pmatrix} \#of \\ Losses \end{pmatrix} = \text{total games played}$$

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:

$$\begin{array}{r} x + 4 + x = 22 \\ 2x + 4 = 22 \\ \underline{-4 \quad -4} \\ 2x \quad = 18 \\ \underline{\quad \quad 2} \end{array}$$

$x = \underline{\hspace{2cm}}$
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Since **x** represents the number of losses, the baseball team lost \_\_\_\_\_ games and they won \_\_\_\_\_ games.

### Consecutive Numbers:

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#### Example 3

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**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 :

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#### Example 4

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**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:

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#### Example 5

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**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**.

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

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#### Example 6

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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

$$\begin{array}{r} x + x + 1 = 15 \\ 2x + 1 = 15 \\ \underline{-1 \quad -1} \\ 2x \quad = 14 \\ \underline{\quad \quad 2} \end{array}$$

$x = \underline{\quad}$

So the two numbers are \_\_\_\_\_ and \_\_\_\_\_.

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Example 7

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The sum of three consecutive even integers is **18**. Find the numbers.

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

Now we solve the equation

$$\begin{array}{r} 3x + 6 = 18 \\ \underline{-6 \quad -6} \\ 3x \quad = 12 \\ \underline{\quad \quad 3} \end{array}$$

$x = \underline{\quad}$
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So the three numbers are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

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Practice Problems

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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.