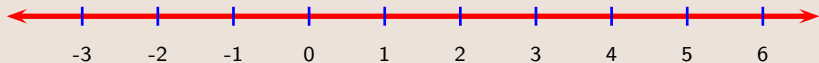


# How to Do Word Problems



## Study of Integers

In this chapter, we are going to closely look at the number line system and study integers.



An integer is simply a number like 0, 1, 2, 3, and 4, but unlike whole numbers, integers also include negative numbers like -1, -2, -3 and -4. An integer cannot be a decimal or a fraction.

Consecutive integers are simply integers that follow each other by an increment of 1, usually just one number after the other, like 1, 2, 3 and 4 or -12, -11, -10, and -9.

Consecutive even or odd integers are simply integers that follow each other by an increment of 2, like 0, 2, 4, 6, 8, 10 or -11, -9, -7, and -5.

Type	First	Second	Third
Consecutive Integers	$x$	$x + 1$	$x + 2$
Consecutive Even Integers <sup>1</sup>	$x$	$x + 2$	$x + 4$
Consecutive Odd Integers <sup>2</sup>	$x$	$x + 2$	$x + 4$

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<sup>1</sup>The first integer  $x$  must be an even integer.

<sup>2</sup>The first integer  $x$  must be an odd integer.

*Example:*

The sum of two consecutive integers is 231. Find both integers.

**Solution:**

Let  $x$  and  $x + 1$  be the two consecutive integers.

$$\boxed{\textit{First}} + \boxed{\textit{Second}} = 231 \quad (\text{Given Information})$$

$$\boxed{x} + \boxed{x + 1} = 231 \quad (\text{Making Substitution})$$

$$2x + 1 = 231 \quad (\text{Simplify})$$

$$2x + 1 - 1 = 231 - 1 \quad (\text{Subtraction Property})$$

$$2x + 0 = 230 \quad (\text{Inverse \& Simplify})$$

Solution(continued):

$$2x = 230 \quad (\text{Identity Property})$$

$$x = 115 \quad (\text{Division Property})$$

So the first integer is 115, and for the next consecutive integer, we simply evaluate  $x + 1$  for  $x = 115$ , that is  $115 + 1 = 116$  inches.

The two consecutive integers are 115 and 116.

*Example:*

Find two consecutive even integers such that twice the first one is 16 more than the second one.

## Solution:

Let  $x$  be the first even integer and  $x + 2$  be the second consecutive even integer.

$$2 \cdot \text{First} = \text{Second} + 16 \quad (\text{Given Information})$$

$$2 \cdot x = x + 2 + 16 \quad (\text{Making Substitution})$$

$$2x = x + 18 \quad (\text{Simplify})$$

$$2x - x = x + 18 - x \quad (\text{Subtraction Property})$$

$$x = 18 + 0 \quad (\text{Inverse \& Simplify})$$

$$x = 18 \quad (\text{Identity})$$

So the first even integer is 18, and for the next consecutive even integer, we simply evaluate  $x + 2$  for  $x = 18$ , that is  $18 + 2 = 20$  inches.

The two consecutive even integers are 18 and 20.

*Example:*

Find two consecutive odd integers such that the difference of three times first one and the second one is 100.

*Solution:*

Let  $x$  be the first odd integer and  $x + 2$  be the second consecutive odd integer.

$$3 \cdot \text{First} - \text{Second} = 101 \quad (\text{Given Information})$$

$$3 \cdot x - (x + 2) = 101 \quad (\text{Making Substitution})$$

$$3x - (x + 2) = 100 \quad (\text{Use } (\dots) \text{ after } -)$$

$$3x - x - 2 = 100 \quad (\text{Distributive Property})$$

$$2x - 2 = 100 \quad (\text{Simplify})$$

$$2x - 2 + 2 = 100 + 2 \quad (\text{Addition Property})$$

Solution(continued):

$$2x + 0 = 102 \quad (\text{Inverse \& Simplify})$$

$$2x = 102 \quad (\text{Identity})$$

$$x = 51 \quad (\text{Simplify})$$

So the first odd integer is 51, and for the next consecutive odd integer, we simply evaluate  $x + 2$  for  $x = 51$ , that is  $51 + 2 = 53$  inches.

The two consecutive odd integers are 51 and 53.

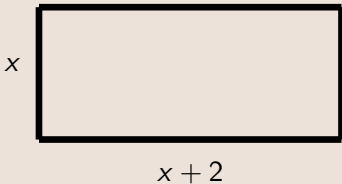


*Example:*

The length and the width a rectangular garden are two consecutive even integers. The perimeter of this garden is 298 feet. Find its dimensions.

**Solution:**

Let  $x$  be the measure of the width of this rectangle, therefore its length has to be  $x + 2$  since they are consecutive even integers.



Solution(continued):

$$P = 298 \quad \text{(Given Information)}$$

$$2L + 2W = 298 \quad \text{(Perimeter Formula)}$$

$$2(x + 2) + 2x = 298 \quad \text{(Making Substitution)}$$

$$2x + 4 + 2x = 298 \quad \text{(Distributive Property)}$$

$$4x + 4 = 298 \quad \text{(Simplify)}$$

$$4x + 4 - 4 = 298 - 4 \quad \text{(Subtraction Property)}$$

$$4x + 0 = 294 \quad \text{(Inverse & Simplify)}$$

$$4x = 294 \quad \text{(Identity Property)}$$

$$x = 74 \quad \text{(Division Property)}$$

So the width is 74 feet, and for the length we evaluate  $x + 2$  for  $x = 74$ , that is  $74 + 2 = 76$  feet.

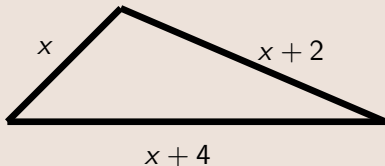
The dimensions of the garden are 74ft. by 76ft.

*Example:*

Three sides a triangle are three consecutive odd integers. Find the measure of all three sides if its perimeter is 135 inches.

**Solution:**

Let  $x$  be the measure of the shortest side, therefore the other two sides are  $x + 2$  and  $x + 4$  since they are three consecutive odd integers.



Solution(continued):

$$P = 135 \quad (\text{Given Information})$$

$$a + b + c = 135 \quad (\text{Perimeter Formula})$$

$$x + x + 4 + x + 2 = 135 \quad (\text{Making Substitution})$$

$$3x + 6 = 135 \quad (\text{Simplify})$$

$$3x + 6 - 6 = 135 - 6 \quad (\text{Subtraction Property})$$

$$3x + 0 = 129 \quad (\text{Inverse \& Simplify})$$

$$3x = 129 \quad (\text{Identity Property})$$

$$x = 43 \quad (\text{Division Property})$$

So the shortest side is 43 inches, the next side is  $43 + 2 = 45$  inches and the third side is  $43 + 4 = 47$  inches.

The three sides of the triangle are 43, 45, and 47 inches.