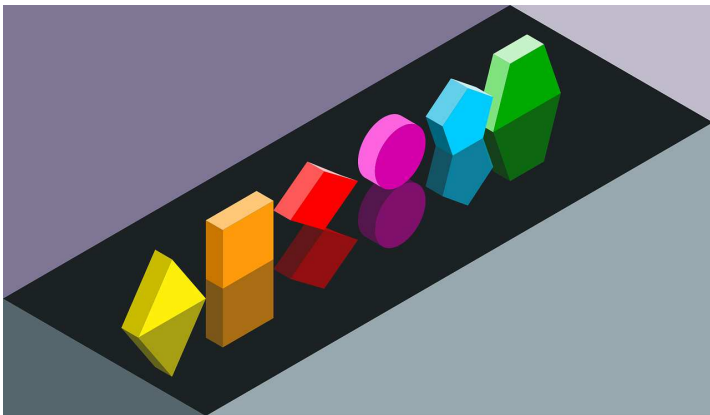


How to Do Word Problems



Geometric Perimeters

In this topic, we are given a geometric shape as well as its perimeter.

We are also given some relationship amongst all sides of the geometric shape which we use when setting up the equation for the perimeter. It is very helpful to draw the geometric shape and label all its sides accordingly based on information provided.

Most problems in this topic involves triangle and rectangle.

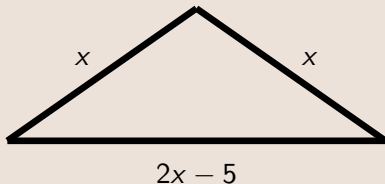
Geometric Shape	Sides	Perimeter
Triangle	a, b, c	$P = a + b + c$
Rectangle	L, W	$P = 2L + 2W$

Example:

Two sides of a triangle are equal. The third side is 5 inches shorter than the sum of the equal sides. Find the measure of all three sides if its perimeter is 23 inches.

Solution:

Let x be the measure of each one of the equal sides, therefore the third side has to be $2x - 5$.



Solution(continued):

$P = 23$	(Given Information)
$a + b + c = 23$	(Perimeter Formula)
$x + 2x - 5 + x = 23$	(Making Substitution)
$4x - 5 = 23$	(Simplify)
$4x - 5 + 5 = 23 + 5$	(Addition Property)
$4x + 0 = 28$	(Inverse & Simplify)
$4x = 28$	(Identity Property)
$x = 7$	(Division Property)

So the two equal sides are 7 inches each, and for the third side we evaluate $2x - 5$ for $x = 7$, that is $2(7) - 5 = 9$ inches.

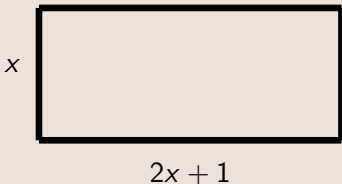
The three sides of the triangle are 7, 7, and 9 inches.

Example:

The perimeter of a rectangular garden is 74 feet. The length of this garden is 1 foot longer than twice its width. Find its dimensions.

Solution:

Let x be the measure of the width of this rectangle, therefore its length has to be $2x + 1$.



Solution(continued):

$P = 74$	(Given Information)
$2L + 2W = 74$	(Perimeter Formula)
$2(2x + 1) + 2x = 74$	(Making Substitution)
$4x + 2 + 2x = 74$	(Distributive Property)
$6x + 2 = 74$	(Simplify)
$6x + 2 - 2 = 74 - 2$	(Subtraction Property)
$6x + 0 = 72$	(Inverse & Simplify)
$6x = 72$	(Identity Property)
$x = 12$	(Division Property)

So the width is 12 feet, and for the length we evaluate $2x + 1$ for $x = 12$, that is $2(12) + 1 = 25$ feet.

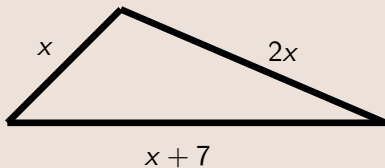
The dimensions are 12 ft. by 25 ft.

Example:

One side of a triangle is twice another side. The third side is 7 inches longer than the shorter side of the first two sides. Find the measure of all three sides if its perimeter is 27 inches.

Solution:

Let x be the measure of the shortest side, therefore the second side is $2x$ and the third side has to be $x + 7$.



Solution(continued):

$P = 27$	(Given Information)
$a + b + c = 27$	(Perimeter Formula)
$x + x + 7 + 2x = 27$	(Making Substitution)
$4x + 7 = 27$	(Simplify)
$4x + 7 - 7 = 27 - 7$	(Subtraction Property)
$4x + 0 = 20$	(Inverse & Simplify)
$4x = 20$	(Identity Property)
$x = 5$	(Division Property)

So one side is 5 inches, the second side is $2(5) = 10$ inches and for the third side we evaluate $x + 7$ for $x = 5$, that is $5 + 7 = 12$ inches.

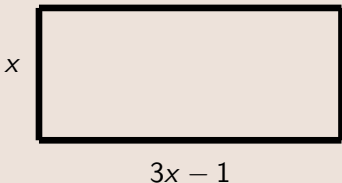
The three sides of the triangle are 5, 10, and 12 inches.

Example:

The perimeter of a rectangular pool is 54 feet. The length of the pool is 1 foot shorter than times its width. Find its dimensions.

Solution:

Let x be the measure of the width of this rectangle, therefore its length has to be $3x - 1$.



Solution(continued):

$P = 74$	(Given Information)
$2L + 2W = 74$	(Perimeter Formula)
$2(3x - 1) + 2x = 54$	(Making Substitution)
$6x - 2 + 2x = 54$	(Distributive Property)
$8x - 2 = 54$	(Simplify)
$8x - 2 + 2 = 54 + 2$	(Addition Property)
$8x + 0 = 56$	(Inverse & Simplify)
$8x = 56$	(Identity Property)
$x = 7$	(Division Property)

So the width is 7 feet, and for the length we evaluate $3x - 1$ for $x = 7$, that is $3(7) - 1 = 20$ feet.

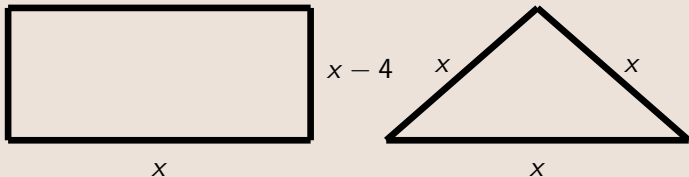
The dimensions are 7 ft. by 20 ft.

Example:

The perimeter of a rectangular shape is equal to the perimeter of triangular shape. All three sides of the triangle are equal and are equal to the length of the rectangle. The width of the rectangle is 4 meters shorter than its length. Find the dimensions of the rectangle and the measure of the sides of the triangle.

Solution:

Let x be the measure of the length of this rectangle as well as each of the triangle, therefore the width of the rectangle has to be $x - 4$.



Solution(continued):

$$P_{rectangle} = P_{triangle} \quad \text{(Given Information)}$$

$$2L + 2W = a + b + c \quad \text{(Perimeter Formula)}$$

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

$$2x + 2x - 8 = x + x + x \quad \text{(Distributive Property)}$$

$$4x - 8 = 3x \quad \text{(Simplify)}$$

$$4x - 8 + 8 = 3x + 8 \quad \text{(Addition Property)}$$

$$4x + 0 = 3x + 8 \quad \text{(Inverse & Simplify)}$$

$$4x = 3x + 8 \quad \text{(Identity Property)}$$

$$4x - 3x = 3x + 8 - 3x \quad \text{(Subtraction Property)}$$

$$x = 8 + 0 \quad \text{(Simplify & Inverse)}$$

Solution(continued):

$$x = 8 \quad (\text{Identity Property})$$

So the length of the rectangle is 8 meters, and for the width we evaluate $x - 4$ for $x = 8$, that is $8 - 4 = 4$ meters.

And the sides of the triangle are 8 meters each.

The dimensions of the rectangle are 8 meters by 4 meters.

The sides of the triangle are 8 meters each.