

Find the Dimensions and Area of Triangles

Brenda Meery

Jen Kershaw

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AUTHORS

Brenda Meery

Jen Kershaw

7.6 Find the Dimensions and Area of Triangles

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[Figure 1]

Jessie saw this **median** as she rode to school. The **height** of each **triangle** in the median is 7 feet and the base is 5 feet. Jessie wondered about the **area** of each triangle. If there are seven triangles in a row, what is the total area of all seven triangles?

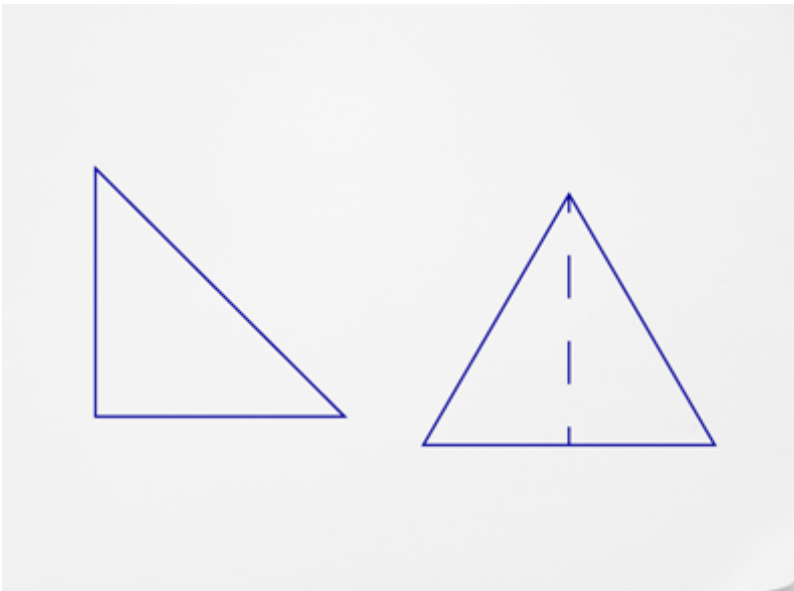
In this concept, you will learn to find the **dimensions** and area of triangles.

Area of a Triangle

Area is the amount of two-dimensional **space** a figure covers. To find the area of a triangle, you multiply the dimensions, or sides, of the figure. In a triangle, those dimensions are its height, h , and its base, b . The area formula for triangles is:

$$A = \frac{1}{2}bh$$

The **base** is the area at the bottom of the triangle **opposite** the **vertex** or top **point**. When finding the area of triangles, remember that the **height** of a triangle is always **perpendicular** to the base. The height is not necessarily a side of the triangle; this happens only in **right triangles**, because the two sides joined by a **right angle** are perpendicular.

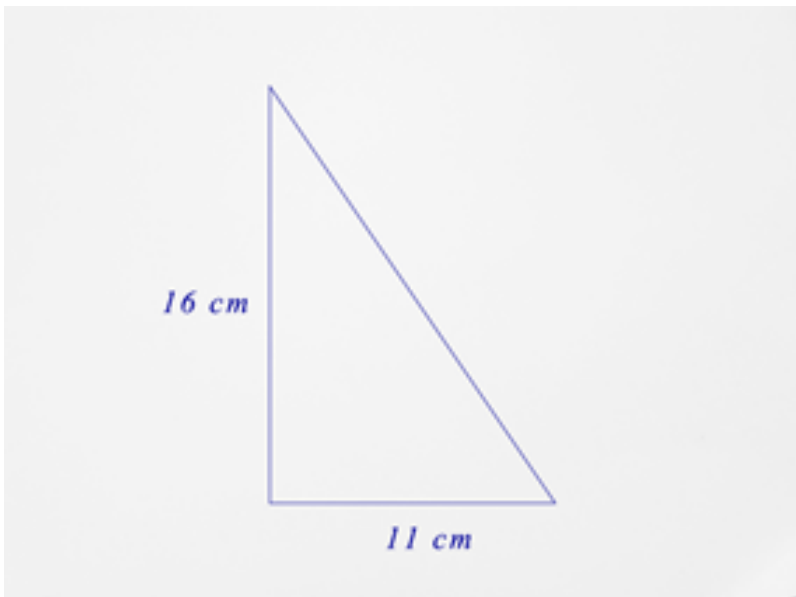


[Figure 2]

You can see in the right triangle above that the left side is also the height of the triangle. It is perpendicular to the base. The equilateral triangle has a dotted line to show you the measurement for the height of the triangle.

Let's look at an example.

Find the area of the triangle below.



[Figure 3]

First, substitute 11 for b (the base) and 16 for h (the height) into the formula for area.

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(11)(16)$$

Next, solve for A .

$$A = \frac{1}{2}(11)(16)$$

$$A = 88$$

The answer is 88.

The area of the triangle is 88 cm^2 .

You can also use this same formula to figure out a missing dimension of the triangle. This is possible if you are given the area and one dimension to start with. Then you can use the formula, substitute the values, and solve for the missing dimension.

Let's take a look at an example.

A triangle has an area of 44 m^2 . The base of the triangle is 8 m . What is its height?

First, substitute 8 for b (the base) and 44 for A (the area) into the formula for area.

$$A = \frac{1}{2}bh$$

$$44 = \frac{1}{2}(8)(h)$$

$$44 = 4h$$

Next, divide both sides by 4 to solve for h .

$$44 = 4h$$

$$\frac{44}{4} = \frac{4h}{4}$$

$$h = 11$$

The answer is 11.

The height of the triangle is 11 cm .

Examples

Example 1

Earlier, you were given a problem about the triangles.

Each of the seven triangles has a base length of 5 feet and a height of 7 feet.

First, substitute 5 for b (the base) and 7 for h (the height) into the formula for area.

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(5)(7)$$

Next, solve for A .

$$A = \frac{1}{2}(5)(7)$$

$$A = 17.5$$

Then, since there are 7 triangles, multiply this area by 7.

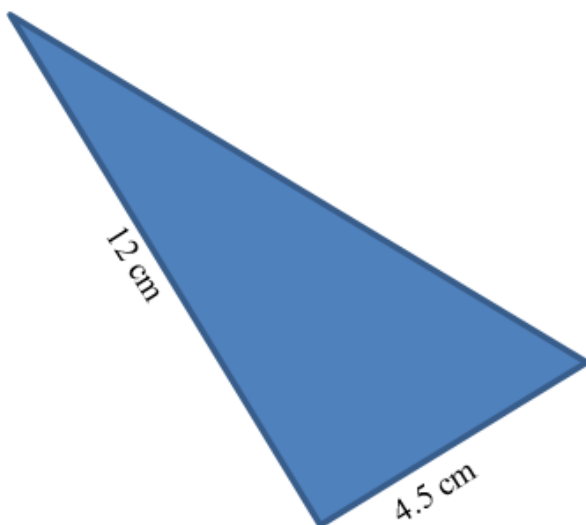
$$\text{Total Area} = (17.5)(7)$$

$$\text{Total Area} = 122.5$$

The answer is 122.5.

The total area of the media is 122.5 ft^2 .

Example 2



[Figure 4]

First, substitute 4.5 for b (the base) and 12 for h (the height) into the formula for area.

$$A = \frac{1}{2}bh$$
$$A = \frac{1}{2}(4.5)(12)$$

Next, solve for A .

$$A = \frac{1}{2}(4.5)(12)$$
$$A = 27$$

The answer is 27.

The area of the triangle is 27 cm^2 .

Example 3

Find the area of each triangle given the **base = 6 inches** and the **height = 4 inches**.

First, substitute 6 for b (the base) and 4 for h (the height) into the formula for area.

$$A = \frac{1}{2}bh$$
$$A = \frac{1}{2}(6)(4)$$

Next, solve for A .

$$A = \frac{1}{2}(6)(4)$$
$$A = 12$$

The answer is 12.

The area of the triangle is 12 in^2 .

Example 4

Find the area of each triangle given the **base = 3.5 feet** and the **height = 4 feet**.

First, substitute 3.5 for b (the base) and 4 for h (the height) into the formula for area.

$$A = \frac{1}{2}bh$$
$$A = \frac{1}{2}(3.5)(4)$$

Next, solve for A .

$$A = \frac{1}{2}(3.5)(4)$$
$$A = 7$$

The answer is 7.

The area of the triangle is 7 ft^2 .

Example 5

Find the area of each triangle given the **base** = 8 mm and the **height** = 9 mm .

First, substitute 8 for b (the base) and 9 for h (the height) into the formula for area.

$$A = \frac{1}{2}bh$$
$$A = \frac{1}{2}(8)(9)$$

Next, solve for A .

$$A = \frac{1}{2}(8)(9)$$
$$A = 36$$

The answer is 36.

The area of the triangle is 36 mm^2 .

Review

Find the area of each triangle described below. Round your answer to the nearest hundredths place if needed.

1. $b = 10 \text{ inches}$, $h = 5 \text{ inches}$
2. $b = 7 \text{ inches}$, $h = 5.5 \text{ inches}$
3. $b = 8 \text{ feet}$, **height** = 6 feet

4. $b = 9$ feet, height $= 7.5$ feet
5. $b = 12$ meters, $h = 9$ meters
6. $b = 15$ feet, $h = 12$ feet
7. $b = 12.5$ feet, $h = 3.5$ feet
8. $b = 15.25$ feet, $h = 8.5$ feet
9. $b = 25.75$ feet, $h = 13.5$ feet

Find the missing dimension for each triangle given the area and one other dimension.

10. $A = 4.5$ sq. in, $b = 4.5$ in, $h = ?$
11. $A = 21$ sq. ft, $b = 7$ ft, $h = ?$
12. $A = 60$ sq. in, $h = 10$ in, $b = ?$
13. $A = 97.5$ sq. ft, $h = 13$ ft, $b = ?$
14. $A = 187$ sq. ft, $b = 22$ ft, $h = ?$
15. $A = 405$ sq. ft, $b = 30$ ft, $h = ?$

Review (Answers)

To see the review answers, return to the [Table of Contents](#) and select 'Other Versions' or 'Resources'.

Resources

Example: Determine the area of the triangle.

The area A of a triangle is half the length of the base b times the height h :

$$A = \frac{1}{2} b h = \frac{bh}{2}$$

Area = $\frac{1}{2} \cdot \frac{12m}{1} \cdot \frac{6m}{1}$





The diagram shows a green triangle with a base labeled $b = 12\text{ m}$ and a height labeled $h = 6\text{ m}$.

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