

LESSON
10.2

Area of a Triangle

Goal: Find the area of a triangle.



Vocabulary

Base of a triangle:

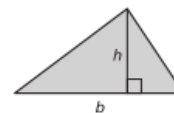
Height of a triangle:



Area of a Triangle

Words Area = $\frac{1}{2} \cdot \text{base} \cdot \text{height}$

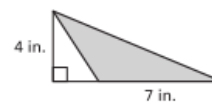
Algebra $A = \frac{1}{2}bh$



EXAMPLE 1 Finding the Area of a Triangle

As you see in Example 1, the height of an obtuse triangle can be drawn outside the figure.

Find the area of the triangle shown.



Solution

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

Write the formula for the area of a triangle.

$$= \frac{1}{2} \cdot 7 \cdot 4$$

Substitute **7** for b and **4** for h .

$$= 14$$

Simplify.

Answer: The area of the triangle is **14** square inches.

Your turn now Find the area of the triangle described.

1. base = 15 centimeters, height = 6 centimeters

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

$$= \frac{1}{2} \cdot 15 \cdot 6$$

$$= 3 \cdot 15 = 45 \text{ cm}^2$$

2. base = 8 feet, height = 13 feet

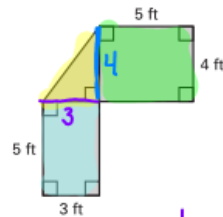
$$A = \frac{1}{2} \cdot 8 \cdot 13$$

$$= 4 \cdot 13$$

$$= 52 \text{ ft}^2$$

EXAMPLE 2 Finding the Area of Combined Figures

Checkout Counter The layout for a checkout counter at a store is shown. How much glass, in square feet, is needed for the countertop?



Solution

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

$$A = l \cdot w$$

1. Find the area of each shape.

Area of the triangle:

$$A = \frac{1}{2} \cdot 3 \cdot 4 = 6 \text{ ft}^2$$

Area of smaller rectangle:

$$A = 3 \cdot 5 = 15 \text{ ft}^2$$

Area of larger rectangle:

$$A = 5 \cdot 4 = 20 \text{ ft}^2$$

2. Add the areas to find the total area.

$$6 + 15 + 20 = 41$$

Answer: You will need 41 square feet of glass for the countertop.

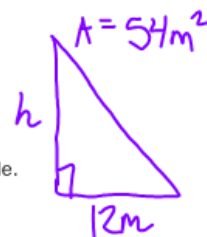
$$41 \text{ ft}^2$$

WATCH OUT!

Before finding the area of the triangle, label the lengths of the triangle's legs to make sure you use the correct dimensions.

EXAMPLE 3 Finding the Height of a Triangle

The area of a triangle is 54 square meters and the base is 12 meters.
What is the height of the triangle?



$A = \frac{1}{2} \cdot b \cdot h$ Write the formula for the area of a triangle.

$54 = \frac{1}{2} \cdot 12 \cdot h$ Substitute 54 for A and 12 for b .

$54 = 6 \cdot h$ Simplify.

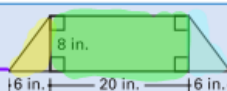
$6 = \cancel{6} \cdot h$ Write a related division equation.

$9 = h$ Simplify.

Answer: The height of the triangle is 9 meters.

Your turn now Solve the problems below.

3. Find the area of the figure at the right.



tri. 1
 $A = \frac{1}{2}bh$
 $= \frac{1}{2} \cdot 6 \cdot 8$
 $= 24 \text{ in}^2$

tri. 2
 24 in^2

rect.
 $A = l \cdot w$
 $= 20 \cdot 8$
 $= 160 \text{ in}^2$

24
 24
 $+ 160$
 208 in^2

4. The area of a triangle is 35 square millimeters and the height is 14 millimeters. Find the base.



$A = 35 \text{ mm}^2$

$A = \frac{1}{2}bh$
 $35 = \frac{1}{2} \cdot b \cdot 14$
 $35 = 7 \cdot b$

$\frac{35}{7} = \frac{7 \cdot b}{7}$
 $5 \text{ mm} = b$