LESSON
13.2 Area of Triangles

COMMON CORE 6.G.1
Find the area of right triangles, other triangles, . . . by composing into rectangles . . .
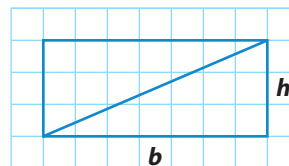
? ESSENTIAL QUESTION

How do you find the area of a triangle?

EXPLORE ACTIVITY 1 COMMON CORE **6.G.1**

Area of a Right Triangle

A Draw a large rectangle on grid paper.

What is the formula for the area of a rectangle? $A =$ _____

B Draw one diagonal of your rectangle.

The diagonal divides the rectangle into _____.

Each one represents _____ of the rectangle.

Use this information and the formula for area of a rectangle to

write a formula for the area of a right triangle. $A =$ _____

Reflect

1. **Communicate Mathematical Ideas** In the formula for the area of a right triangle, what do b and h represent?

_____

_____


EXPLORE ACTIVITY 2 COMMON CORE **6.G.1**

Area of a Triangle

A Draw a large triangle on grid paper. Do not draw a right triangle.

B Cut out your triangle. Then trace around it to make a copy of your triangle. Cut out the copy.

C Cut one of your triangles into two pieces by cutting through one angle directly across to the opposite side. Now you have three triangles — one large triangle and two smaller right triangles.
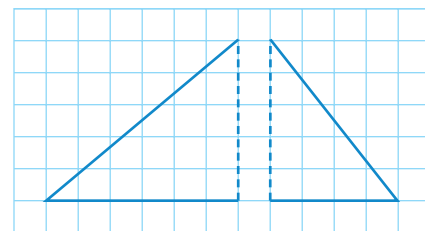
When added together, the areas of the two smaller triangles

equal the _____ of the large triangle.

D Arrange the three triangles into a rectangle.

What fraction of the rectangle does the large

triangle represent? _____

The area of the rectangle is $A = bh$. What is the area

of the large triangle? $A = $ _____

How does this formula compare to the formula for the area
of a right triangle that you found in Explore Activity 1?

_____
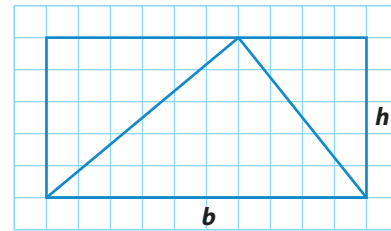
Reflect

2. Communicate Mathematical Ideas What type of angle is formed by
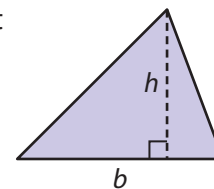the base and height of a triangle?

_____

Finding the Area of a Triangle
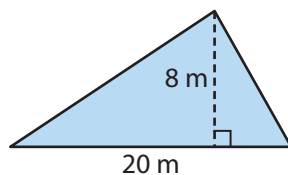
Area of a Triangle

The area A of a triangle is half the product
of its base b and its height h.

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

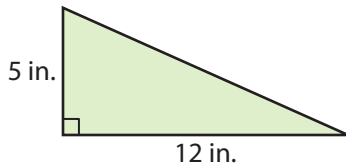## EXAMPLE 1

COMMON CORE 6.G.1

Find the area of each triangle.

A

8 m

20 m

$b = 20$ meters $h = 8$ meters

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

$\quad = \frac{1}{2}(20 \text{ meters})(8 \text{ meters})$ Substitute.

$\quad = 80$ square meters   Multiply.

Find the area of each triangle.

B

5 in.

12 in.

$b = 12$ inches $\quad h = 5$ inches

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

$\quad = \frac{1}{2} (12 \text{ inches}) (5 \text{ inches})$ Substitute.

$\quad = 30$ square inches Multiply.

YOUR TURN

Find the area of the triangle.

3.
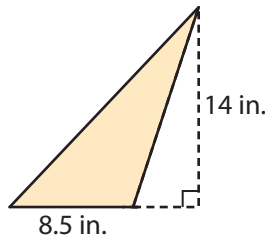
14 in.

8.5 in.

$A = \underline{\hspace{2cm}}$

Math Talk

Mathematical Practices

Why can you also write the formula for the area of a triangle as $A = \frac{bh}{2}$?

# Problem Solving Using Area of Triangles

You can use the formula for the area of a triangle to solve real-world problems.

EXAMPLE 2 Real World

COMMON CORE 6.G.1

Each triangular face of the Pyramid of Peace in Kazakhstan is made up of 25 smaller equilateral triangles. These triangles have measurements as shown in the diagram. What is the area of one of the smaller equilateral triangles?

10.4 m

12 m
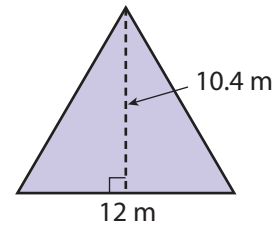
STEP 1 Identify the length of the base and the height of the triangle.

$b = 12$ m and $h = 10.4$ m

STEP 2 Use the formula to find the area of the triangle.

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

$\quad = \frac{1}{2} (12) (10.4)$ Multiply.

$\quad = 62.4$

The area of one small equilateral triangle is 62.4 m^2.

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Reflect

4. Persevere in Problem Solving What is the total area of one face of the pyramid? What is the total surface area of the faces of the pyramid, not counting the bottom? (Hint: the bottom of the pyramid is a square.)
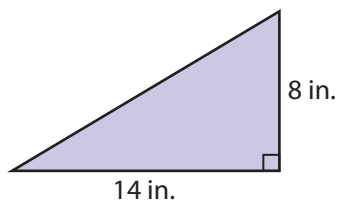
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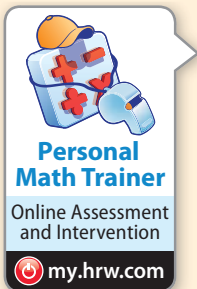
YOUR TURN

5. Amy needs to order a shade for a triangular-shaped window that has a base of 6 feet and a height of 4 feet. What is the area of the shade?

_____

Guided Practice

Find the area of each triangle. (Explore Activities 1 and 2, Example 1)

1.

8 in.

14 in.

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

$= \frac{1}{2} (\text{_____}) (\text{_____})$

$= \text{_____} \text{ in}^2$

2. A pennant in the shape of a triangle has a base of 12 inches and a height of 30 inches. What is the area of the pennant? (Example 2)

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

$= \frac{1}{2} (\text{_____}) (\text{_____})$

$= \text{_____} \text{ in}^2$

GO COYOTES!

? ESSENTIAL QUESTION CHECK-IN

3. How do you find the area of a triangle?

_____

_____

_____

13.2 Independent Practice

COMMON CORE 6.G.1

Find the area of each triangle.

4.

10 cm

15 cm

_____

5.

20 ft

24 ft

_____

6.

17 in.

12 in.

_____

7.

18 ft

32 ft

_____
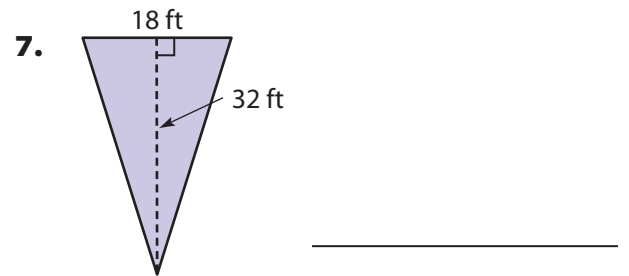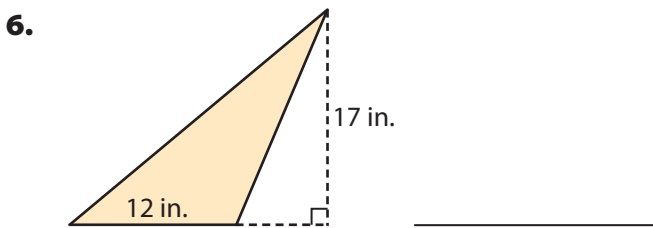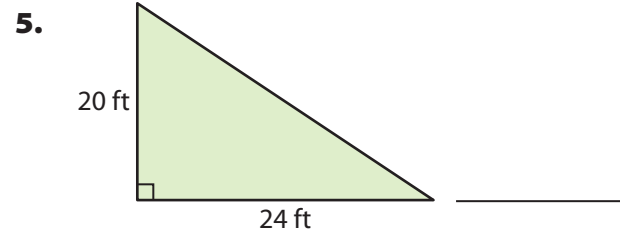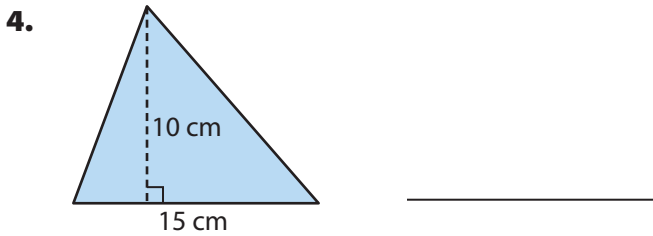
8. What is the area of a triangle that has a base of $15\frac{1}{4}$ in. and a height of 18 in.?

_____

9. A right triangle has legs that are 11 in. and 13 in. long. What is the area of the triangle?

_____

**10.** A triangular plot of land has the dimensions shown in the diagram. What is the area of the land?

_____

20 km

30 km

11. The front part of a tent has the dimensions shown in the diagram. What is the area of this part of the tent?

_____

5 ft

8 ft
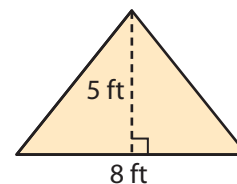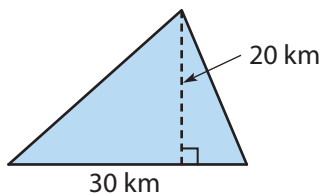
12. Multistep The sixth-grade art students are making a mosaic using tiles in the shape of right triangles. Each tile has leg measures of 3 centimeters and 5 centimeters. If there are 200 tiles in the mosaic, what is the area of the mosaic?

_____

13. Critique Reasoning Monica has a triangular piece of fabric. The height of the triangle is 15 inches and the triangle's base is 6 inches. Monica says that the area of the fabric is 90 in². What error did Monica make? Explain your answer.

_____

14. Multistep Wayne is going to paint the side of the house shown in the diagram. What is the area that will be painted? Explain how you found your answer.

_____

_____

_____

8 ft

12 ft

25 ft

Work Area
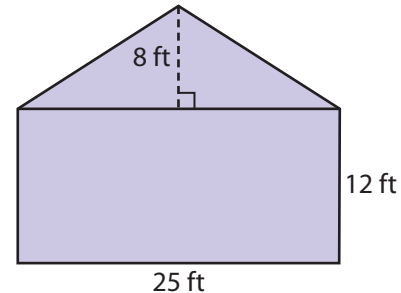
15. Communicate Mathematical Ideas Explain how the areas of a triangle and a parallelogram with the same base and height are related.

_____

_____

_____

_____

_____

16. Analyze Relationships A rectangle and a triangle have the same area. If their bases are the same lengths, how do their heights compare? Justify your answer.

_____

_____

_____

_____

_____

_____

_____

17. What If? A right triangle has an area of 18 square inches.

a. If the triangle is an isosceles triangle, what are the lengths of the legs of the triangle?

_____

b. If the triangle is not an isosceles triangle, what are all the possible lengths of the legs, if the lengths are whole numbers?

_____

_____