Lesson 7-2
Solve Triangle Area Problems

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I can...
find the areas of triangles.

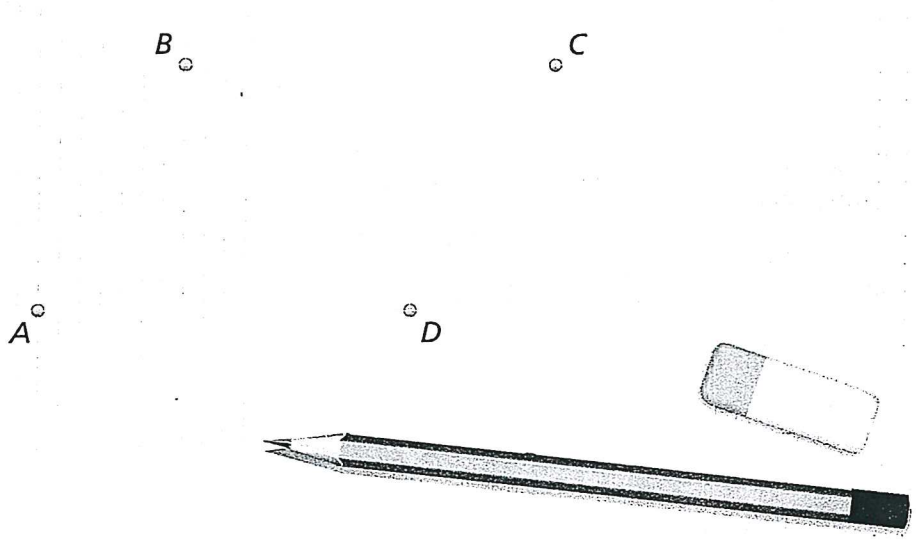
MAFS.6.G.1.1 Find the area of right triangles, other triangles,... by composing into rectangles... apply these techniques in the context of solving real-world and mathematical problems. Also 6.EE.1.2c

MAFS.K12.MP.2.1, MP.3.1, MP.6.1, MP.7.1, MP.8.1

Solve & Discuss It!

ACTIVITY

Connect point *A* to *B*, *B* to *C*, *C* to *D*, and *D* to *A*. Then draw a diagonal line connecting opposite vertices in the figure and find the area of each triangle formed.



Use Structure What relationships do you see between the area of the parallelogram and the areas of the triangles?

Focus on math practices

Generalize What is a rule for finding the area of any triangle?

Essential Question How can you find the area of a triangle?

VISUAL LEARNING ASSESS

EXAMPLE 1 Find the Area of a Triangle

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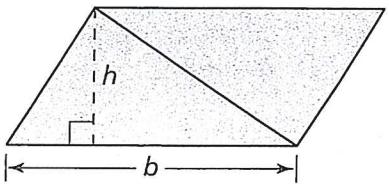
A parallelogram can be decomposed into two identical triangles. How can you use the formula for the area of a parallelogram to find the area of a triangle?

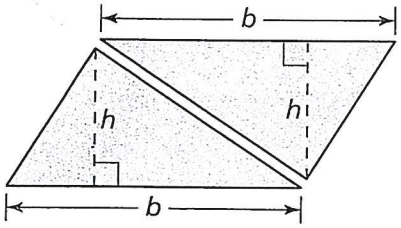
Reasoning How are the areas of parallelograms and triangles related?



Area of a Parallelogram

$A = bh$

A parallelogram can be decomposed into two identical triangles when divided diagonally.

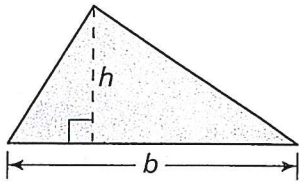


Identical triangles have the same base and height, so they also have the same area.

The area of one triangle is half the area of the related parallelogram.

Area of a Parallelogram $A = bh$

Area of a Triangle $A = \frac{1}{2}bh$



The formula for the area of a triangle is $A = \frac{1}{2}bh$.

Try It!

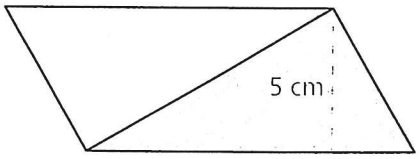
Use the formula $A = \frac{1}{2}bh$ to find the area of the triangle.

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

$A = \frac{1}{2} \times \quad \times$

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

$A =$



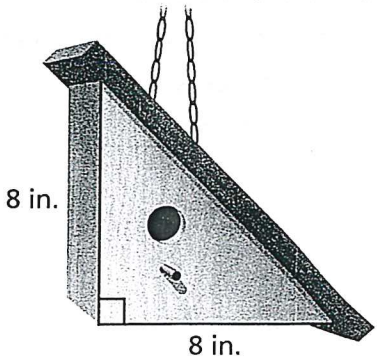
The area of the triangle is $\quad$ cm^2.

Convince Me! Two identical triangles form a parallelogram with a base of 8 inches and a height of 6 inches. What is the area of each triangle? Explain.

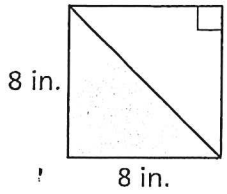
EXAMPLE 2 Find the Area of a Right Triangle

ACTIVITY ASSESS

The side of a birdhouse is in the shape of a right triangle. What is the area of the side of the birdhouse?



Draw a triangle and compose a square.



The two sides that form the right angle in a right triangle are its base and height.

Generalize You can use the formula $A = \frac{1}{2}bh$ to find the area of *any* triangle when you know the base and height.

Find the area of the triangle.

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

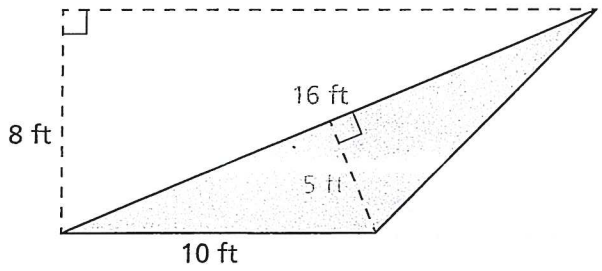
$A = \frac{1}{2} \times 8 \times 8 = 32$

The area of the side of the birdhouse is 32 in.^{2}.

EXAMPLE 3 Identify the Corresponding Base and Height to Find the Area

Kaylan drew the triangle shown below. What is the area of the triangle?

Any side of a triangle can be its base. The height is the perpendicular distance from the base to the height of the opposite vertex.



ONE WAY

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

$A = \frac{1}{2} \cdot 10 \cdot 8$

$A = 40$

Substitute a corresponding base of 10 ft and height of 8 ft.

The area is 40 ft^2.

ANOTHER WAY

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

$A = \frac{1}{2} \cdot 16 \cdot 5$

$A = 40$

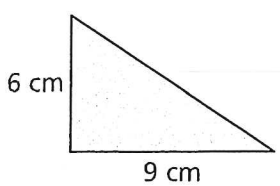
Substitute a corresponding base and height.

The area is 40 ft^2.

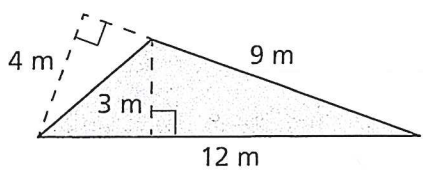
Try It!

Find the area of each triangle.

a.



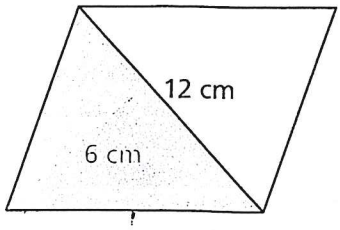
b.



KEY CONCEPT

You can use the formula $A = \frac{1}{2}bh$ to find the area of any triangle.

Acute Triangle

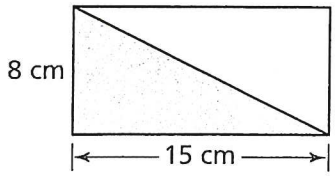


$A = \frac{1}{2}bh$

$A = \frac{1}{2} \times 12 \times 6$

$A = 36 \text{ cm}^2$

Right Triangle

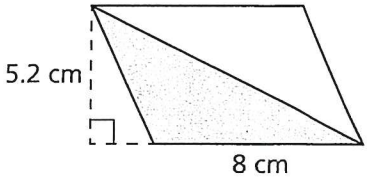


$A = \frac{1}{2}bh$

$A = \frac{1}{2} \times 15 \times 8$

$A = 60 \text{ cm}^2$

Obtuse Triangle



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

$A = \frac{1}{2} \times 8 \times 5.2$

$A = 20.8 \text{ cm}^2$

Do You Understand?

1. Essential Question How can you find the area of a triangle?

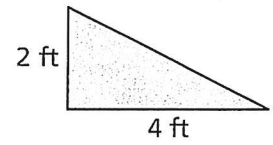
2. **Reasoning** If you cut a rectangle into 2 identical triangles, what type of triangles will they be?

3. **Construct Arguments** In Example 1, if the other diagonal were used to divide the parallelogram into two triangles, would the area of each of these triangles be half the area of the parallelogram? Explain.

Do You Know How?

In 4–6, find the area of each triangle.

4.



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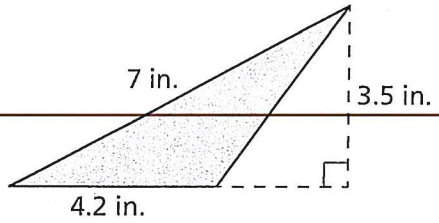

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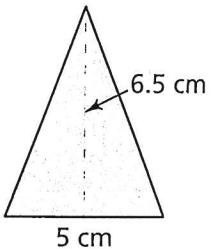

Name: _____

Practice & Problem Solving

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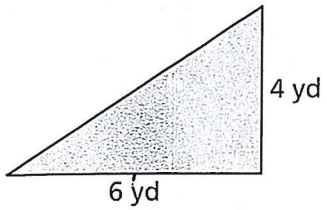
Leveled Practice **In 7–12, find the area of each triangle.**

7.

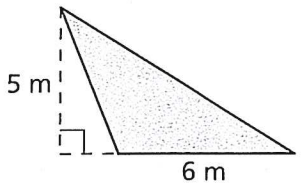


$A = \frac{1}{2}bh$

$= \frac{1}{2} \times \square \times 4$

$= \square$ yd^2

8.

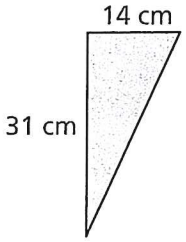


$A = \frac{1}{2}bh$

$= \frac{1}{2} \times \square \times$

$= \square$ m^2

9.

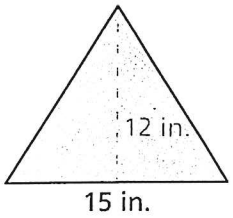


$A = \frac{1}{2}bh$

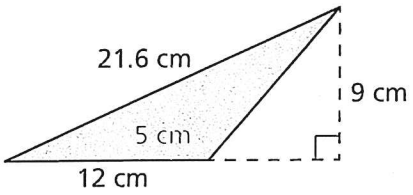
$= \frac{1}{2} \times \square \times$

$= \square$ cm^2

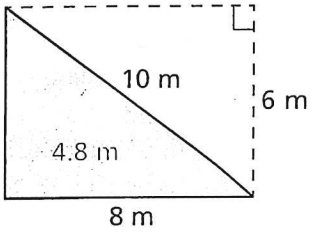
10.



11.



12.

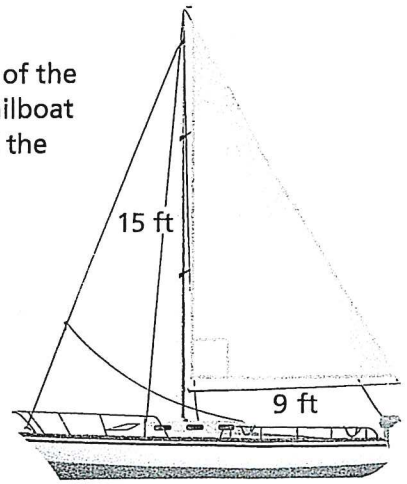


13. The vertices of a triangle are $A(0, 0)$, $B(3, 8)$, and $C(9, 0)$. What is the area of this triangle?

14. **Be Precise** The base of a triangle is 2 ft. The height of the triangle is 15 in. What is the area of the triangle in square inches?

15. **Reasoning** Ms. Lopez drew $\triangle ABC$, with a height of 6 inches and a base of 6 inches, and $\triangle RST$, with a height of 4 inches and a base of 8 inches. Which triangle has the greater area? Use an area formula to justify your answer.

16. The dimensions of the sail for Erica's sailboat are shown. Find the area of the sail.

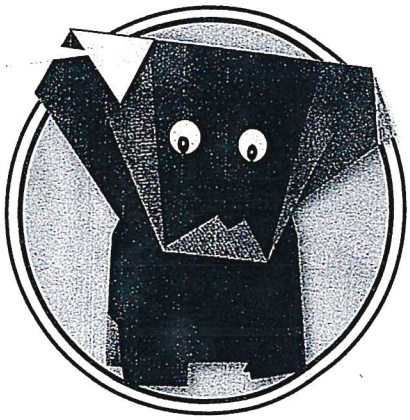


In 17 and 18, use the picture at the right.

17. **Be Precise** What is the area in square millimeters of the yellow triangle outlined on the origami figure at the right?

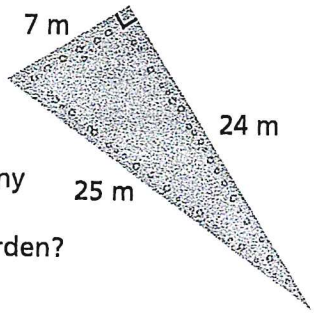
$b = 3$ cm

$h = 1.76$ cm



18. The nose of the origami dog is a right triangle with sides that are 2 cm, 3 cm, and 3.6 cm long. What is the area of this triangle?

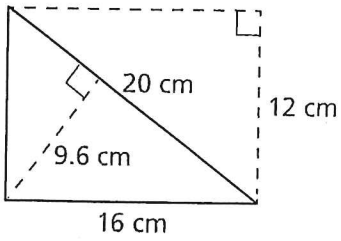
19. Michael is planting a garden in the shape of a right triangle. He wants 4 tickseed plants for each square meter of area. How many tickseed plants does Michael want in the garden?



20. **Higher Order Thinking** If you know the area and the height of a triangle, how can you find the base?

Assessment Practice

21. Select all expressions that represent the area of the given triangle. 6.G.1.1



- ☐ $A = \frac{1}{2}(12 \times 16)$
- ☐ $A = 12 \times 16$
- ☐ $A = 9.6 \times 20$
- ☐ $A = \frac{1}{2}(16 \times 9.6)$
- ☐ $A = \frac{1}{2}(20 \times 9.6)$