Find Unknown Measures

Essential Question How can you find an unknown measure of a rectangle given its area or perimeter?

Unlock the Problem Real World

Tanisha is painting a mural that is in the shape of a rectangle. The mural covers an area of 54 square feet. The base of the mural measures 9 feet. What is its height?
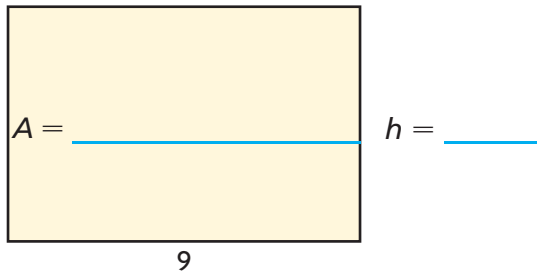
Use a formula for area.

• What do you need to find?

_____

• What information do you know?

_____

Example 1 Find an unknown measure given the area.

MODEL

Think: Label the measures you know. Use n for the unknown.

$A =$ _____ $h =$ _____

9

$b =$ _____

So, the height of the mural is _____ feet.

RECORD

Use the model to write an equation and solve.

_____ = _____ . _____   Write the formula for area.

_____ = _____ . _____   Use the model to write an equation.

54 = 9 × _____   What times 9 equals 54?

The value of n is _____.

Think: n is the height of the mural.

Math Talk

MATHEMATICAL PRACTICES ②

Reason Abstractly How can you use division to find an unknown factor?

1. What if the mural were in the shape of a square with an area of 81 square feet? What would the height of the mural be? Explain.

_____

_____

2. Explain how you can find an unknown side length of any square, when given only the area of the square.

_____

_____

_____

🔑 Example 2 Find an unknown measure given the perimeter.

Gary is building an outdoor pen in the shape of a rectangle for his dog. He will use 24 meters of fencing. The pen will be 3 meters wide. How long will the pen be?

Use a formula for perimeter.

MODEL	**RECORD**

Think: Label the measures you know. Use n for the unknown.

$w = $ _____

$l = $ _____

$P = $ _____

Use the model to write an equation and solve.

$P \quad = \quad (2 \quad \times \quad l) \quad + \quad (2 \quad \times \quad w)$

_____ $= ($ _____ _____ $) + ($ _____ _____ $)$

_____ $= ($ _____ _____ $) + $ _____

Think: $(2 \times n)$ is an unknown addend.

$24 = $ _____ $ + 6$ **Think:** What is $24 - 6$?

The value of $(2 \times n)$ is 18.

To find the value of n, find the unknown factor.

$2 \times$ _____ $= 18$

The value of n is _____.

Think: n is the length of the pen.

So, the pen will be _____ long.

> ⚠️ **ERROR Alert**
>
> Check that you are using the correct formula. Are you given the area or the perimeter?

Try This! The perimeter of a square is 24 feet. Find the side length.

Draw a model.	**Write an equation.**
	$P = 4 \times s$

738

Name _____

1. Find the unknown measure. The area of the rectangle is 36 square feet.

   $A = b \times h$

   _____ $= b \times$ _____

   3 ft ▭ ?
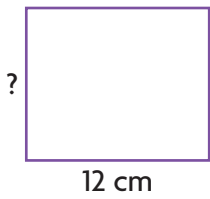
   The base of the rectangle is _____.
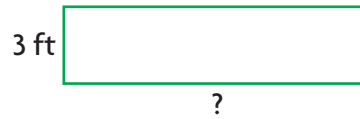
Find the unknown measure of the rectangle.
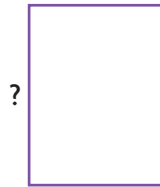
2. ▭ ? 12 cm

   Perimeter = 44 centimeters
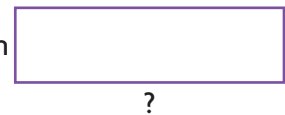
   width = _____

3. 9 in. ▭ ?

   Area = 108 square inches

   height = _____

4. 5 m ▭ ?

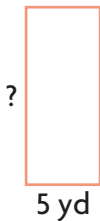   Area = 90 square meters

   base = _____

Math Talk

MATHEMATICAL PRACTICES 2

Represent a Problem Explain how using the area formula helps you find the base of a rectangle when you know its area and height.
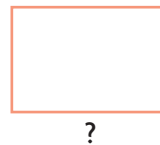
On Your Own

5. ▭ ? 5 yd

   Perimeter = 34 yards

   length = _____

6. ▭ 8 ft ?

   Area = 96 square feet

   base = _____

7. ▭ ? 9 cm

   Area = 126 square centimeters

   height = _____

8. **GO DEEPER** A square has an area of 49 square inches. Explain how to find the perimeter of the square.

   _____

   _____

   _____

   _____

Problem Solving • Applications *Real World*

9. **MATHEMATICAL PRACTICE 7** **Identify Relationships** The area of a swimming pool is 120 square meters. The width of the pool is 8 meters. What is the length of the pool in centimeters?

_____

Personal Math Trainer

10. *THINK SMARTER +* An outdoor deck is 7 feet wide. The perimeter of the deck is 64 feet. What is the length of the deck? Use the numbers to write an equation and solve. A number may be used more than once.

| 7 | 9 | 5 | 14 | 25 | 50 | 64 |

$P = (2 \times l) + (2 \times w)$

$\boxed{} = (2 \times l) + (2 \times \boxed{})$

$\boxed{} = 2 \times l + \boxed{}$

$\boxed{} = 2 \times l$

$\boxed{} = l$

So, the length of the deck is _____ feet.

Connect to Science

Mountain Lions

Mountain lions are also known as cougars, panthers, or pumas. Their range once was from coast to coast in North America and from Argentina to Alaska. Hunting and habitat destruction now restricts their range to mostly mountainous, unpopulated areas.

Mountain lions are solitary animals. A male's territory often overlaps two females' territories but never overlaps another male's. The average size of a male's territory is 108 square miles, but it may be smaller or larger depending on how plentiful food is.

11. *THINK SMARTER* A male mountain lion has a rectangular territory with an area of 96 square miles. If his territory is 8 miles wide,

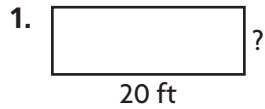what is the length of his territory? _____

Name _____

Find Unknown Measures

Find the unknown measure of the rectangle.
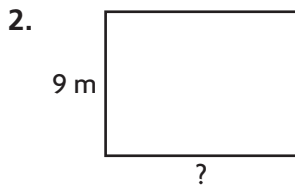
1.

20 ft · ?

Perimeter = 54 feet

width = __7 feet__

Think: $P = (2 \times l) + (2 \times w)$
$54 = (2 \times 20) + (2 \times w)$
$54 = 40 + (2 \times w)$
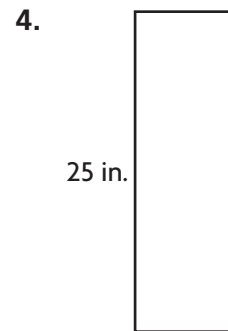Since $54 = 40 + 14$, $2 \times w = 14$, and $w = 7$.

2.

9 m

?

Perimeter = 42 meters

length = _____

3.

?

4 cm
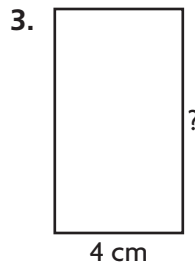
Area = 28 square centimeters

height = _____

4.

25 in.

Area = 200 square inches

base = _____

Problem Solving Real World

5. Susie is an organic vegetable grower.
The perimeter of her rectangular vegetable
garden is 72 yards. The width of the
vegetable garden is 9 yards. How long is the
vegetable garden?

_____

6. **WRITE** ▸ *Math* Write a problem that
involves finding the unknown measure of a
side of a rectangle. Include the solution.

_____

_____

_____

Lesson Check

1. The area of a rectangular photograph is 35 square inches. If the width of the photo is 5 inches, how tall is the photo?

2. Natalie used 112 inches of blue yarn as a border around her rectangular bulletin board. If the bulletin board is 36 inches wide, how long is it?

Spiral Review

3. A professional basketball court is in the shape of a rectangle. It is 50 feet wide and 94 feet long. A player runs one time around the edge of the court. How far does the player run?

4. On a compass, due east is a $\frac{1}{4}$ turn clockwise from due north. How many degrees are in a $\frac{1}{4}$ turn?

5. Hakeem's frog made three quick jumps. The first was 1 meter. The second jump was 85 centimeters. The third jump was 400 millimeters. What was the total length in centimeters of the frog's three jumps?

6. Karen colors in squares on a grid. She colored $\frac{1}{8}$ of the squares blue and $\frac{5}{8}$ of the squares red. What fraction of the squares are not colored in?

FOR MORE PRACTICE GO TO THE
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