

Name \_\_\_\_\_

### Find Unknown Measures

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



Measurement and Data—  
4.MD.A.3

**MATHEMATICAL PRACTICES**  
MP2, MP4, MP7



### Unlock the Problem



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.

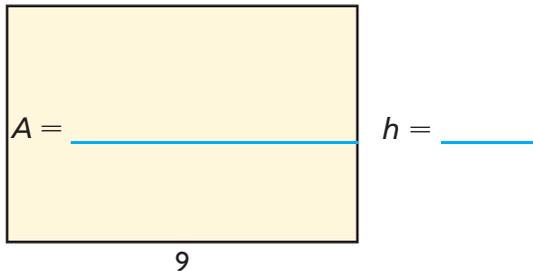
- What do you need to find?  
\_\_\_\_\_
- What information do you know?  
\_\_\_\_\_



### Example 1 Find an unknown measure given the area.

**MODEL**

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



$b =$  \_\_\_\_\_

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.



**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**

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



$w =$  \_\_\_\_\_

$l =$  \_\_\_\_\_

$P =$  \_\_\_\_\_

**RECORD**

Use the model to write an equation and solve.

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

$$\underline{\hspace{2cm}} = (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}})$$

$$\underline{\hspace{2cm}} = (\underline{\hspace{1cm}} \times \underline{\hspace{1cm}}) + \underline{\hspace{1cm}}$$

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

$$24 = \underline{\hspace{2cm}} + 6 \quad \text{Think: What is } 24 - 6?$$

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

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

$$2 \times \underline{\hspace{1cm}} = 18$$

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.

$$P = 4 \times s$$

Name \_\_\_\_\_

## Share and Show

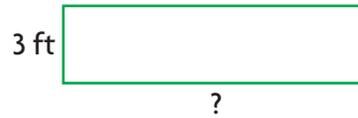


1. Find the unknown measure. The area of the rectangle is 36 square feet.

$$A = b \times h$$

$$\underline{\hspace{2cm}} = b \times \underline{\hspace{2cm}}$$

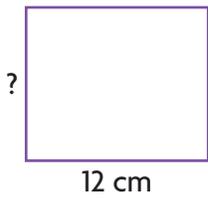
The base of the rectangle is \_\_\_\_\_.



**Find the unknown measure of the rectangle.**



2.

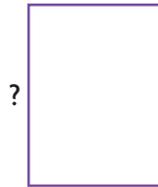


Perimeter = 44 centimeters

width = \_\_\_\_\_

3.

9 in.



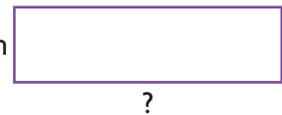
Area = 108 square inches

height = \_\_\_\_\_



4.

5 m



Area = 90 square meters

base = \_\_\_\_\_

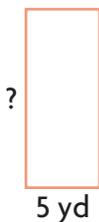
**Math Talk**

### 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

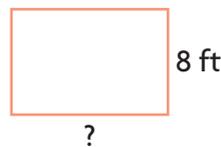
5.



Perimeter = 34 yards

length = \_\_\_\_\_

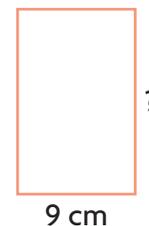
6.



Area = 96 square feet

base = \_\_\_\_\_

7.



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.

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# Problem Solving • Applications



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

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

$$\square = (2 \times l) + (2 \times \square)$$

$$\square = 2 \times l + \square$$

$$\square = 2 \times l$$

$$\square = l$$

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? \_\_\_\_\_

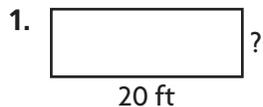
Name \_\_\_\_\_

### Find Unknown Measures



**COMMON CORE STANDARD—4.MD.A.3**  
Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

Find the unknown measure of the rectangle.



Perimeter = 54 feet

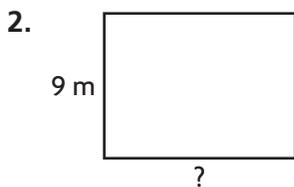
width = 7 feet

**Think:**  $P = (2 \times l) + (2 \times w)$

$$54 = (2 \times 20) + (2 \times w)$$

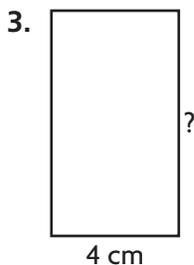
$$54 = 40 + (2 \times w)$$

Since  $54 = 40 + 14$ ,  $2 \times w = 14$ , and  $w = 7$ .



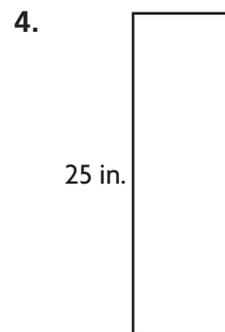
Perimeter = 42 meters

length = \_\_\_\_\_



Area = 28 square centimeters

height = \_\_\_\_\_



Area = 200 square inches

base = \_\_\_\_\_

### Problem Solving

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 (4.MD.A.3)

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 (4.NF.B.3d, 4.MD.A.2, 4.MD.A.3, 4.MD.C.5a, 4.MD.C.5b)

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?

