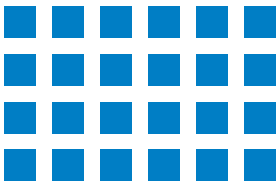
Chapter 6

Name _____

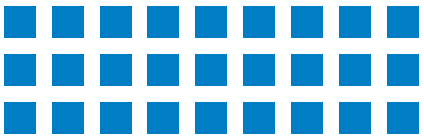
Apply Multiplication to Perimeter and Area

Show What You Know

Missing Factors Find the missing factor.

1. 

_____ × 6 = 24

2. 

3 × _____ = 27

Add Whole Numbers Find the sum.

3. 17 + 153 + 67 = _____

4. 8 + 78 + 455 = _____

5. 211 + 52 + 129 + 48 = _____

6. 42 + 9 + 336 + 782 = _____

Multiply Whole Numbers Find the product.

7. 78 × 6

8. 29 × 7

9. 42 × 5

10. 57 × 9

MATH in the Real World

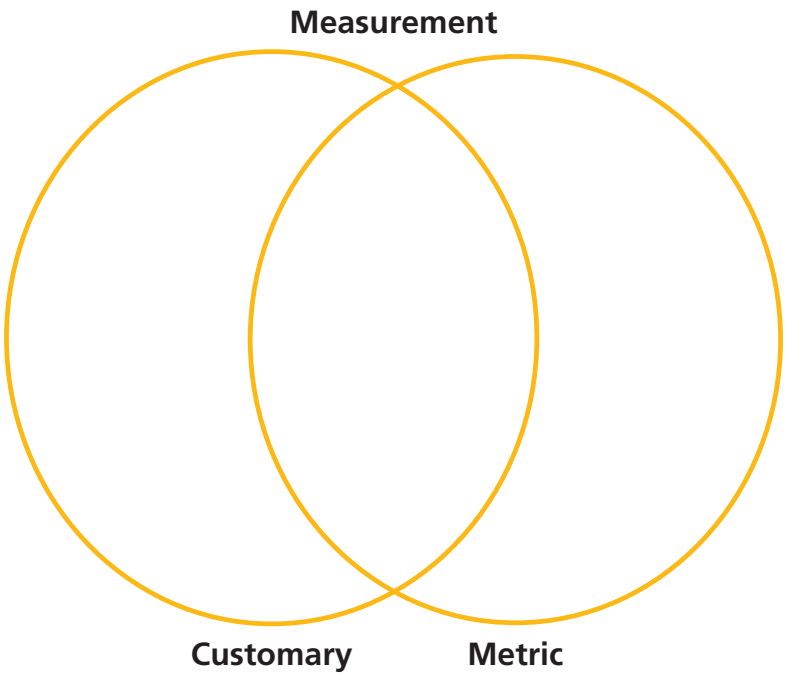
Native Americans once lived near Cartersville, Georgia, in an area that is now a state park. They constructed burial mounds that often contained artifacts, such as beads, feathers, and copper ear ornaments. One of the park's mounds is 63 feet in height. If the top of the mound is rectangular in shape with a perimeter of 322 yards, what could be the side lengths of the rectangle?

Vocabulary Builder

Go Online For more help

Visualize It

Sort words with a ✓ using the Venn diagram.



Connect to Vocabulary

Review Words
- ✓ centimeter
- ✓ foot
- ✓ inch
- ✓ kilometer
- ✓ meter
- ✓ mile
- ✓ yard

Preview Words
- ✓ area
- base
- ✓ formula
- ✓ height
- ✓ perimeter
- square unit

Understand Vocabulary

Write the word or term that answers the riddle.

1. I am the measure, in square units, of the inside region of a closed two-dimensional figure.

   _____

2. I am the sum of the side lengths of a polygon.

   _____

3. I am a unit of area that measures 1 unit by 1 unit.

   _____

4. I am a set of symbols that expresses a mathematical rule.

   _____

Name _____

Apply the Perimeter Formula

I Can use a formula to find the perimeter of a rectangle.

Florida's B.E.S.T.

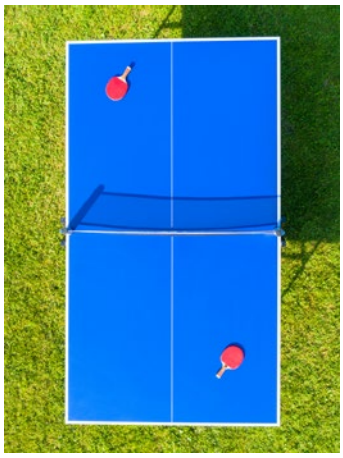
- **Geometric Reasoning** 4.GR.2.1
- **Mathematical Thinking & Reasoning** MTR 1.1, MTR 2.1, MTR4.1, MTR 6.1

UNLOCK the Problem Real World

Kendrick is putting padding along the edges of his ping-pong table. The length of the table is 9 feet. The width of the table is 5 feet. How many feet of padding does Kendrick need?

Perimeter is the distance around a shape.

To find how many feet of padding Kendrick needs, find the perimeter of the table.



Use addition.

Perimeter of a Rectangle = length + width + length + width

9 + 5 + 9 + 5 = _____

The perimeter is _____ feet.

Use multiplication.

Perimeter = (2 × length) + (2 × width)

Perimeter = (2 × 9) + (2 × 5)

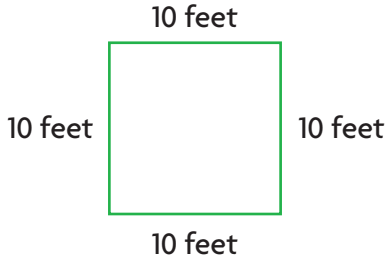
= 18 + 10

= _____

So, Kendrick needs _____ feet of padding.

You can also use multiplication to find the perimeter of a square.

Perimeter = 4 × one side



Perimeter = 4 × 10

= _____

So, the perimeter is _____ feet.

Math Talk **MTR 4.1** Engage in discussions on mathematical thinking.

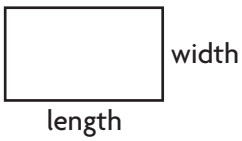
Why are there two different ways to calculate the perimeter of a rectangle?

Use a Formula

A **formula** is a mathematical rule. You can use a formula to find perimeter.

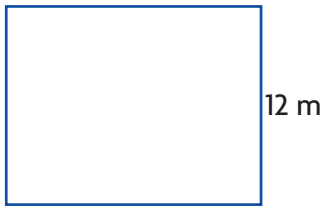
$P = (2 \times l) + (2 \times w)$

↑ perimeter ↑ length ↑ width



Example

Find the perimeter of the rectangle.



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

$= (2 \times$ _____ $) + (2 \times$ _____ $)$ Think: Write the measures you know.

$=$ _____ $+$ _____ Think: Do what is in parentheses first.

$=$ _____

The perimeter of the rectangle is _____.

Try This!

Write a formula for the perimeter of a square.

Use the letter _____ for perimeter.

Use the letter _____ for the length of a side.

Formula: _____

1. Justify the formula you wrote for the perimeter of a square.

_____

_____

_____

_____

2. Jolie says that you can use the multiplication formula for perimeter of a rectangle to find the perimeter of a square. Is she right? Explain.

_____

_____

_____

_____

Name _____

Formulas for Perimeter

Rectangle:
$P = (2 \times l) + (2 \times w)$ or
$P = 2 \times (l + w)$

Square:
$P = 4 \times s$

Share and Show

Math Board

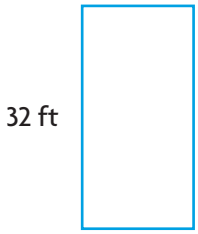
1. Find the perimeter of the rectangle.

$P = 2 \times (\_\_\_\_ + \_\_\_\_)$

$= 2 \times (\_\_\_\_ + \_\_\_\_)$

$= 2 \times (\_\_\_\_)$

$= \_\_\_\_$



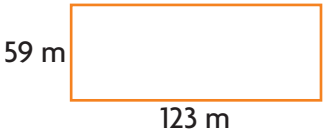
The perimeter is _____ feet.

Find the perimeter of the rectangle or square.

2.

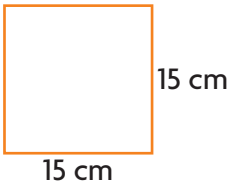
_____ yards

3.



_____ meters

4.



_____ centimeters

Math Talk

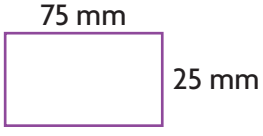
MTR 6.1 Assess the reasonableness of solutions.

When could you use the formula for perimeter of a square to estimate the perimeter of a rectangle?

On Your Own

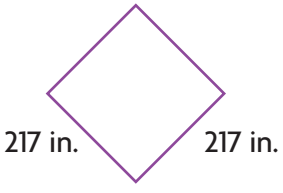
Find the perimeter of the rectangle or square.

5.



_____ millimeters

6.



_____ inches

7.

_____ meters

8. Abed wants to put a rail around his rectangular patio. The patio is 15 yards long and 12 yards wide. How many yards of railing does he need?

_____

9. MTR What is the side length of a square with a perimeter of 284 meters?

_____

Problem Solving • Applications

10. For safety, Lucien is putting up a fence that follows the edge of his rectangular pool. The pool is 36 feet long. The width is one-half the length. How much fencing does Lucien need?

a. Draw a picture of the pool, and label the given measurements on your drawing.

b. What do you need to find?

_____

c. What formula will you use?

_____

d. Show the steps you use to solve the problem.

e. Complete.

The length of the pool is _____ feet.

The width is one-half the length,

or _____ ÷ 2 = _____ feet.

So, the perimeter is _____ × (_____ + _____) = _____ feet.

f. Lucien needs _____ of fencing.

11. Stellen is putting ribbon around a poster that is four times as long as it is wide. The length of the poster is 44 inches. How much ribbon does he need for the poster?

_____

12. Hana is building a planter that is 30 inches wide. The length is five times the width. What is the perimeter of the planter? Show your work. Explain.

Name _____

Apply the Perimeter Formula

Go Online
Interactive Examples

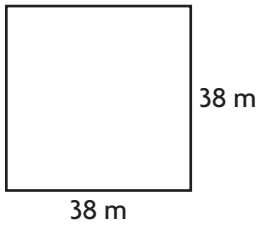
Find the perimeter of the rectangle or square.

1.

$2 \times (20 + 6) = 52$

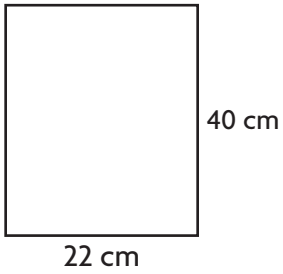
52 inches

2.



_____ meters

3.



_____ centimeters

Problem Solving Real World

4. Tre is making a banner shaped like a square. Each side measures 24 inches. He wants to add a border along all sides. He has 75 inches of border. Does he have enough border? **Explain.**

_____

5. The width of the play area at a park is 80 feet. The length is three times as long as its width. What is the perimeter of the play area?

_____

6. WRITE Math Imagine you want to put a border around the top of a rectangular room. What would you need to do to make sure you buy enough of the border?

_____

_____

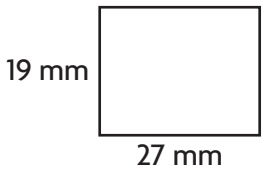
_____

_____

Lesson Check

7. What is the perimeter of a square platform with sides 22 feet long?

8. What is the perimeter of the rectangle below?



Spiral Review

9. Multiply.

356 × 79

10. Order the numbers from least to greatest.

326,740 362,704 326,040 262,407

11. Multiply.

5 × 3,000

12. Joseph has 54 colored pencils. He puts the same number of pencils in 8 different cups. What does the remainder tell you?

Name _____

Apply the Area Formula

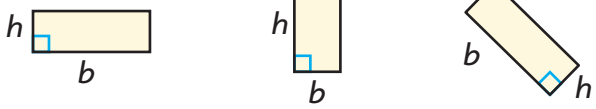
I Can use a formula to find the area of a rectangle.

Florida's B.E.S.T.

- **Geometric Reasoning** 4.GR.2.1
- **Mathematical Thinking & Reasoning** MTR 1.1, MTR 2.1, MTR 3.1, MTR 4.1

UNLOCK the Problem Real World

The **base, *b*,** of a two-dimensional figure can be any side. The **height, *h*,** is the measure of a perpendicular line segment from the base to the top of the figure.

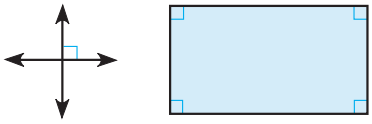


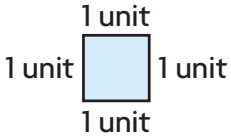
Area is the measure of the number of unit squares needed to cover a flat surface without gaps or overlaps. A **square unit** is a square that is 1 unit long and 1 unit wide. To find the area of a figure, count the number of unit squares inside the figure.

How are the base, height, and area of a rectangle related?

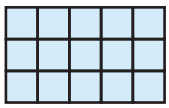
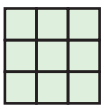
Remember

Perpendicular lines and perpendicular line segments form right angles.





Complete the table to find the area.

Figure	Base	Height	Area
	5 units		
			
			

1. What relationship do you see among the base, height, and area?

_____

_____

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

How do you decide which side of a rectangle to use as the base?

2. Write a formula for the area of a rectangle. Use the letter *A* for area. Use the letter *b* for base. Use the letter *h* for height.

Formula: _____

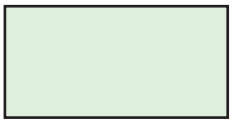
Go Online For more help

Use a Formula

You can use a formula to find the area.

$A = b \times h$

↑ area ↑ base ↑ height



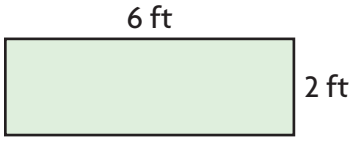
Math Idea

You can think of the base and height of a rectangle as length (l) and width (w), since the length and width are perpendicular. You can write the formula for the area (A) of a rectangle as $A = l \times w$.

Examples

Use a formula to find the area of a rectangle and a square.

A



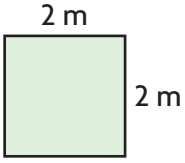
$A = b \times h$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$

The area is _____.

B



$A = b \times h$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$

The area is _____.

Try This!

Write a formula for the area of a square.

Use the letter _____ for area.

Use the letter _____ for the length of a side.

Formula: _____

Share and Show

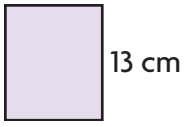
Math Board

1. Find the area of the rectangle.

$A = b \times \_\_\_\_$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$



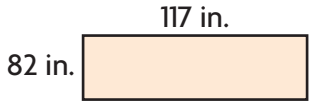
Name _____

Formulas for Area

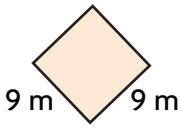
Rectangle:	Square:
$A = b \times h$	$A = s \times s$

Find the area of the rectangle or square.

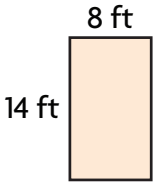
2.



3.



4.



Math Talk

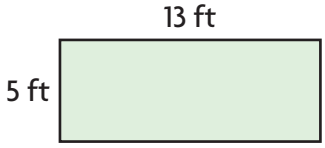
MTR 3.1 Complete tasks with mathematical fluency.

Explain how to find the area of a square if you only know the length of one side is 23 feet.

On Your Own

Find the area of the rectangle or square.

5.



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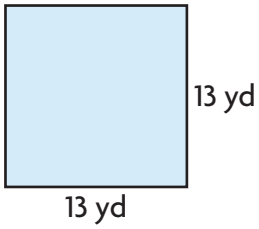
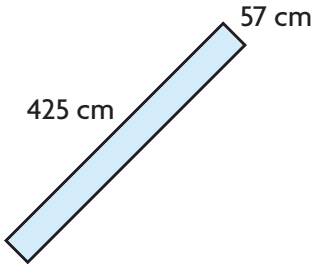


7.



Find the area of the rectangle.

8. base: 267 feet

height: 98 feet

9. base: 9 yards

height: 17 yards

10. base: 14 centimeters

height: 11 centimeters

11. Carter's rectangular yard is 15 meters by 18 meters. Ivan's rectangular yard is 20 meters by 9 meters. How much greater is the area of Carter's yard than Ivan's yard?

12. **MTR** Malia sewed a square baby quilt that measures 36 inches on each side. What is the area of the quilt?

Problem Solving · Applications

MATH on the Spot

13. Nancy and Luke are drawing plans for rectangular flower gardens. In Nancy's plan, the garden is 18 feet by 12 feet. In Luke's plan, the garden is 15 feet by 15 feet. Who drew the garden plan with the greater area? What is the area?

a. What do you need to find? _____

_____

b. What formula will you use? _____

c. What units will you use to write the answer? _____

d. Show the steps to solve the problem.

e. Complete the sentences.

The area of Nancy's garden is

_____.

The area of Luke's garden is

_____.

_____ garden has the greater area.

14. Hasan wants to buy fertilizer for his yard. The yard is 35 feet by 55 feet. The directions on the bag of fertilizer say that one bag will cover 1,250 square feet. How many bags of fertilizer should Hasan buy to be sure that he covers the entire yard?

_____

15. Tuan is an artist. He is painting on a large canvas that is 45 inches wide. The height of the canvas is 9 inches less than the width. What is the area of Tuan's canvas?

_____ square inches

Name _____

Apply the Area Formula

Go Online
Interactive Examples

Find the area of the rectangle or square.

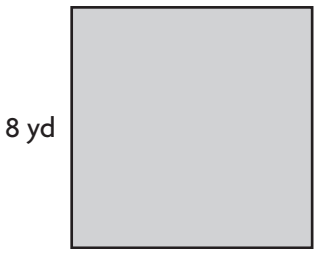
1.

$A = b \times h$

$= 12 \times 9$

108 square feet

2.



3.

Problem Solving Real World

4. Fatima is putting wallpaper on a wall that measures 8 feet by 12 feet. How much wallpaper does Fatima need to cover the wall?

5. Mehul is laying down sod in his yard to grow a new lawn. Each piece of sod is a 1-foot by 1-foot square. How many pieces of sod will Mehul need to cover his yard if his yard measures 30 feet by 14 feet?

6. WRITE Math Think about what you know about perimeter and area. Describe how to find the perimeter and area of your classroom.

Lesson Check

7. Ellie and Valentina drew floor models of their living rooms. Ellie's model represented 20 feet by 15 feet. Valentina's model represented 18 feet by 18 feet. Whose floor model represents the greater area? How much greater?

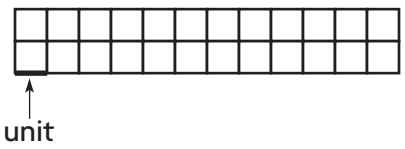
8. Makayla is laying down square carpet pieces in her photography studio. Each square carpet piece is 1 yard by 1 yard. If Makayla's photography studio is 7 yards long and 4 yards wide, how many pieces of square carpet will Makayla need?

Spiral Review

9. Typically, blood fully circulates through the human body 8 times each minute. How many times does blood circulate through the body in 1 hour?

10. Each of the 28 students in Romi's class raised at least $25 during the jump-a-thon. What is the least amount of money the class raised?

11. What is the perimeter of the shape below if each unit is 1 foot?



12. Talisha has 7 times as many clients as Diego. If Diego has 24 clients, how many clients does Talisha have?

Name _____

Same Perimeter, Different Areas

I Can use area to compare rectangles with the same perimeter.

Florida's B.E.S.T.

- **Geometric Reasoning** 4.GR.2.2
- **Mathematical Thinking & Reasoning** MTR 1.1, MTR 2.1, MTR 4.1

UNLOCK the Problem Real World

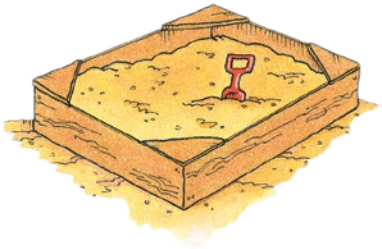
Yuri has 12 feet of boards to put around a rectangular sandbox. How long should he make each side so that the area of the sandbox is as large as possible?

- What is the greatest perimeter Yuri can make for his sandbox?

_____

Activity

Materials ■ square tiles



Use square tiles to make all the rectangles you can that have a perimeter of 12 units. Draw and label the sandboxes. Then find the area of each.

Sandbox 1

1 ft

5 ft

Sandbox 2

___ ft

___ ft

Sandbox 3

___ ft

___ ft

Find the perimeter and area of each rectangle.

	Perimeter	Area
Sandbox 1	5 + 1 + 5 + 1 = 12 feet	1 × 5 = ___ square feet
Sandbox 2	___ + ___ + ___ + ___ = ___ feet	___ × ___ = ___ square feet
Sandbox 3	___ + ___ + ___ + ___ = ___ feet	___ × ___ = ___ square feet

The area of Sandbox ____ is the greatest.

So, Yuri should build a sandbox that is

____ feet wide and ____ feet long.

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

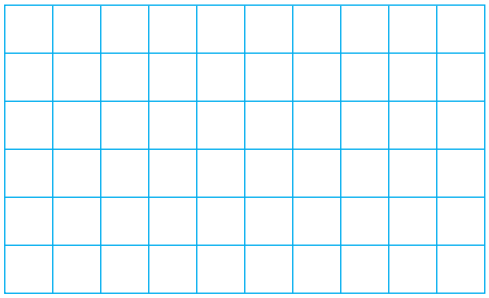
How are the sandboxes alike? How are the sandboxes different?

Examples Draw rectangles with the same perimeter and different areas.

A Draw a rectangle that has a perimeter of 20 units and an area of 24 square units.

The sides of the rectangle measure

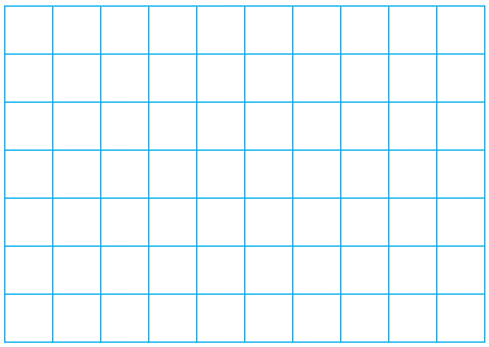
_____ units and _____ units.



B Draw a rectangle that has a perimeter of 20 units and an area of 25 square units.

The sides of the rectangle measure

_____ units and _____ units.



Math Talk

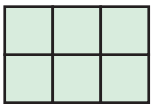
MTR 4.1 Engage in discussions on mathematical thinking.

Explain how the perimeters of Example *A* and Example *B* are related. Explain how the areas are related.

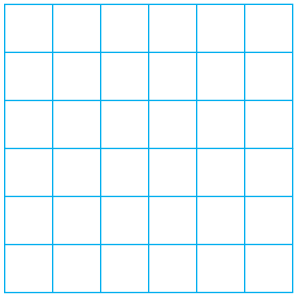
Share and Show Math Board

1. The perimeter of the rectangle at the right is

_____ units. The area is _____ square units.



2. Draw a rectangle that has the same perimeter as the rectangle in Problem 1 but with a different area.



3. The area of the rectangle in Problem 2 is

_____ square units.

4. Which rectangle has the greater area?

_____

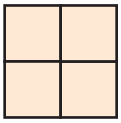
5. If you were given a rectangle with a certain perimeter, how would you draw it so that it has the greatest area?

_____

Name _____

Find the perimeter and the area. Tell which rectangle has a greater area.

6.



A

B

A: Perimeter = _____; Area = _____

B: Perimeter = _____; Area = _____

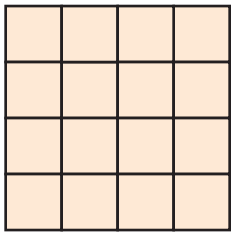
Rectangle _____ has a greater area.

On Your Own

Find the perimeter and the area. Tell which rectangle has a greater area.

7.

A



B

A: Perimeter = _____;

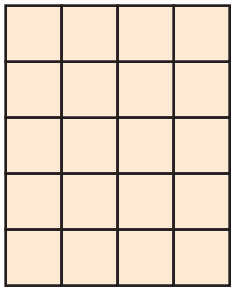
Area = _____

B: Perimeter = _____;

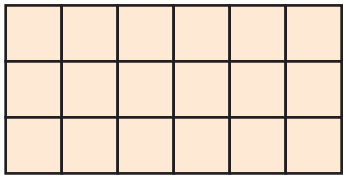
Area = _____

Rectangle ___ has a greater area.

8.



A



B

A: Perimeter = _____;

Area = _____

B: Perimeter = _____;

Area = _____

Rectangle ___ has a greater area.

9. MTR Moussa's flower garden is 4 feet wide and 8 feet long. If the answer is 32 square feet, what is the question?

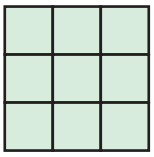
_____

Problem Solving · Applications

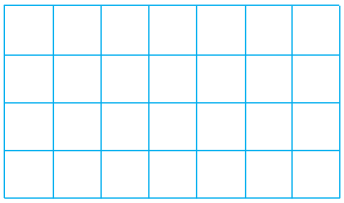
MATH on the Spot

10. Draw a rectangle with the same perimeter as Rectangle *C*, but with a smaller area. What is the area?

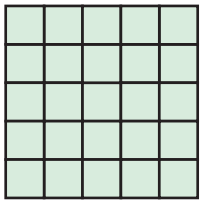
Area = _____



C



11. Which figure has a perimeter of 20 units and an area of 16 square units?



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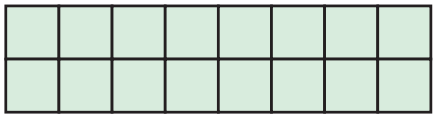

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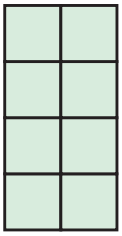

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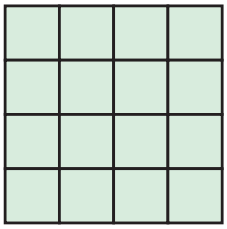


Ⓓ

Connect to Reading

Cause and Effect

Sometimes one action has an effect on another action. The *cause* is the reason something happens. The *effect* is the result.

12. Heechul wanted to print a digital photo that is 3 inches wide and 5 inches long. What if Heechul accidentally printed a photo that is 4 inches wide and 6 inches long?

Heechul can make a table to understand cause and effect.

Cause	Effect
The wrong size photo was printed.	Each side of the photo is a greater length.

Use the information and the strategy to solve the problems.

a. What effect did the mistake have on the perimeter of the photo?

_____

_____

b. What effect did the mistake have on the area of the photo?

_____

_____

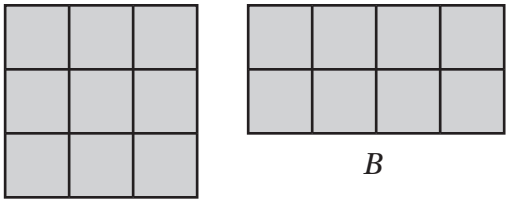
Name _____

Same Perimeter, Different Areas

Go Online
Interactive Examples

Find the perimeter and the area.
Tell which rectangle has a greater area.

1.



A *B*

A: Perimeter = 12 units;

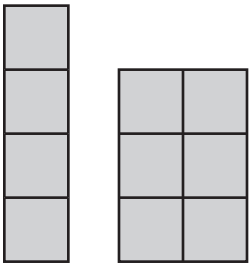
Area = 9 square units

B: Perimeter = _____;

Area = _____

Rectangle _____ has a greater area.

2.



A *B*

A: Perimeter = _____;

Area = _____

B: Perimeter = _____;

Area = _____

Rectangle _____ has a greater area.

Problem Solving Real World

3. Tara's and Genesis's bedrooms are shaped like rectangles. Tara's bedroom is 9 feet long and 8 feet wide. Genesis's bedroom is 7 feet long and 10 feet wide. Whose bedroom has the greater area? Explain.

_____

_____

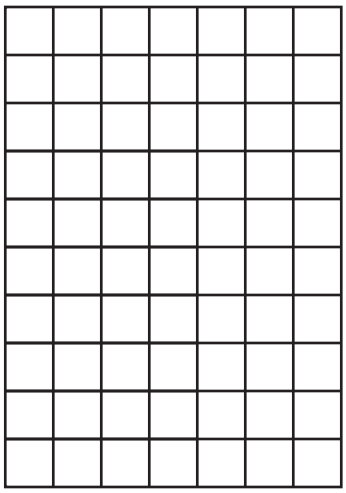
4. WRITE Math Draw three examples of rectangles that have the same perimeter, but different areas. Note which of the areas is greatest and which is the least.

_____

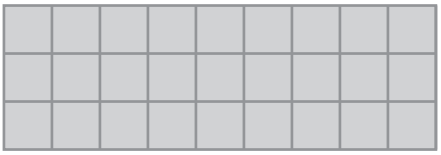
_____

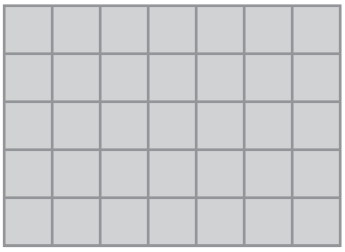
Lesson Check

5. Draw a rectangle that has a perimeter of 12 units and an area of 8 square units.



6. Find the perimeter and the area. Tell which rectangle has the greater area.

A 

B 

A: Perimeter = _____ units

Area = _____ square units

B: Perimeter = _____ units

Area = _____ square units

Rectangle _____ has a greater area.

Spiral Review

7. Xiao Mei covers a table with 8 rows of square unit tiles. There are 7 tiles in each row. What is the area that Xiao Mei covers in square units?

8. Von has a rectangular workroom with a perimeter of 26 feet. The length of the workroom is 6 feet. What is the width of Von's workroom?

Name _____

Same Area, Different Perimeters

Florida's B.E.S.T.
- **Geometric Reasoning** 4.GR.2.2
- **Mathematical Thinking & Reasoning** MTR 2.1, MTR 3.1, MTR 4.1

I Can use perimeter to compare rectangles with the same area.

UNLOCK the Problem Real World

Tam is making a rectangular pen to hold her rabbits. The area of the pen should be 16 square meters with side lengths that are whole numbers. What is the least amount of fencing she needs?

- What does the least amount of fencing represent?

_____

Activity Materials ■ square tiles

Use 16 square tiles to make rectangles. Make as many different rectangles as you can with 16 tiles. Record the rectangles on the grid, write the multiplication equation for the area shown by the rectangle, and find the perimeter of each rectangle.

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

How did you determine what rectangles to draw?

Area: _____ × _____ = 16 square meters Perimeter: _____ meters

Area: _____ × _____ = 16 square meters Perimeter: _____ meters

Area: _____ × _____ = 16 square meters Perimeter: _____ meters

To use the least amount of fencing, Tam should make a rectangular pen with side lengths of _____ meters and _____ meters.

So, _____ meters is the least amount of fencing Tam needs.

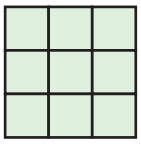
Try This!

Draw three rectangles that have an area of 18 square units on the grid. Find the perimeter of each rectangle. Shade the rectangle that has the greatest perimeter.

Share and Show

Math Board

1. The area of the rectangle at the right is _____ square units. The perimeter is _____ units.



2. Draw a rectangle that has the same area as the rectangle in Problem 1 but with a different perimeter.

3. The perimeter of the rectangle in Problem 2 is _____ units.

4. Which rectangle has the greater perimeter?

_____

5. If you were given a rectangle with a certain area, how would you draw it so that it had the greatest perimeter?

_____

Math Talk

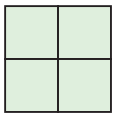
MTR 4.1 Engage in discussions on mathematical thinking.

Did you and your classmate draw the same rectangle for Exercise 2?

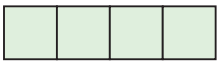
Name _____

Find the perimeter and the area. Tell which rectangle has a greater perimeter.

6.



A



B

A: Area = _____; Perimeter = _____

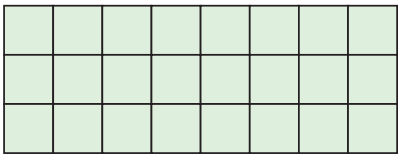
B: Area = _____; Perimeter = _____

Rectangle _____ has a greater perimeter.

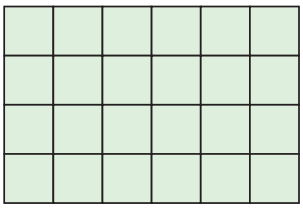
On Your Own

Find the area and perimeter. Tell which rectangle has a greater perimeter.

7.



A



B

A: Area = _____;

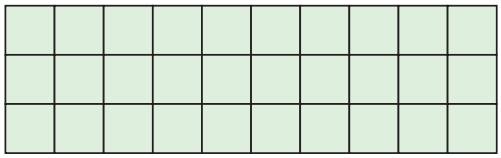
Perimeter = _____

B: Area = _____;

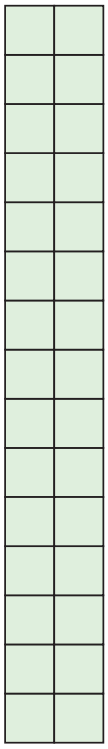
Perimeter = _____

Rectangle _____ has a greater perimeter.

8.



A



B

A: Area = _____;

Perimeter = _____

B: Area = _____;

Perimeter = _____

Rectangle _____ has a greater perimeter.

9. Dora says that of all the possible rectangles with the same area, the rectangle with the largest perimeter will have two side lengths that are 1 unit. Does her statement make sense? Explain.

MATH on the Spot

_____

Problem Solving · Applications Real World

10. Roberto has 12 tiles. Each tile is 1 square inch. He will arrange them into a rectangle and glue 1-inch stones around the edge. How can Roberto arrange the tiles so that he uses the least number of stones?

a. MTR How will you use what you know about area and perimeter to help you solve the problem?

_____

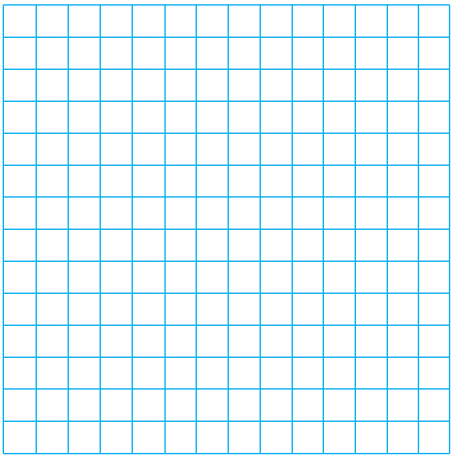
_____

_____

b. Draw possible rectangles to solve the problem, and label them *A*, *B*, and *C*.

_____

_____



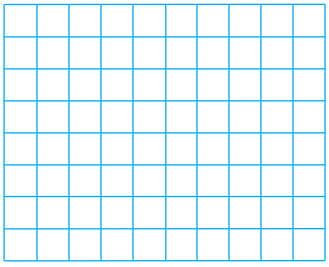
c. So, Roberto should arrange the tiles like Rectangle _____.

11. Draw 2 different rectangles with an area of 20 square units. What is the perimeter of each rectangle you drew?

Area = 20 square units

Perimeter = _____ units

Perimeter = _____ units



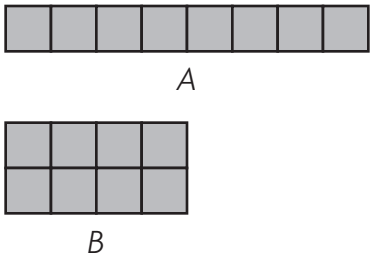
Name _____

Same Area, Different Perimeters

Go Online
Interactive Examples

Find the perimeter and the area. Tell which rectangle has a greater perimeter.

1.



A

B

A: Area = 8 square units;

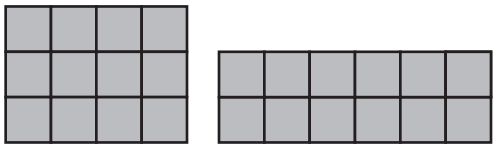
Perimeter = 18 units

B: Area = _____;

Perimeter = _____

Rectangle ____ has a greater perimeter.

2.



A B

A: Area = _____;

Perimeter = _____

B: Area = _____;

Perimeter = _____

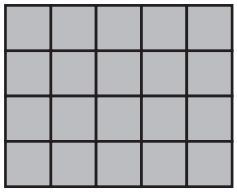
Rectangle ____ has a greater perimeter.

Problem Solving Real World

Use the tile designs for 3–4.

Beth's Tile Designs

A



B

3. Compare the areas of Design A and Design B.

_____

_____

4. Compare the perimeters. Which design has the greater perimeter?

_____

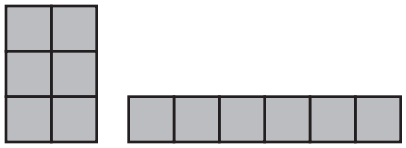
5. WRITE Math Draw two rectangles with different perimeters but the same area.

_____

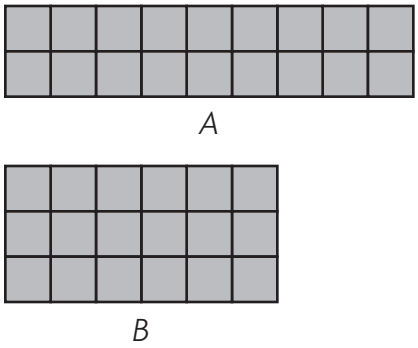
_____

Lesson Check

6. Farhan drew two rectangles. Which rectangle has the greater perimeter?



7. Theodora drew two rectangles. Which rectangle has the greater perimeter?



Spiral Review

8. Multiply $6{,}597 \times 4$.

9. What is 149,751 rounded to the nearest thousand?

10. Write a number in which the value of the digit 3 is one-tenth the value of the digit 3 in 123,597.

11. Divide $4{,}927 \div 8$. Write the remainder as a fraction.

Name _____

Find Unknown Measures

I Can find an unknown measure of a rectangle given its area or perimeter.

Florida's B.E.S.T.

- **Geometric Reasoning** 4.GR.2.1
- **Mathematical Thinking & Reasoning** MTR 2.1, MTR 3.1, MTR 4.1

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?

_____

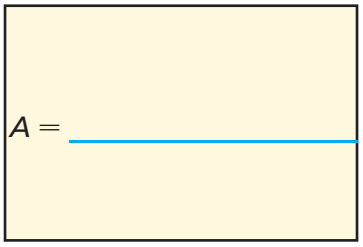
- What information do you know?

_____

Example 1 Find an unknown measure given the area.

MODEL

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



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

MTR 4.1 Engage in discussions on mathematical thinking.

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 × *l*) + (2 × *w*)

_____ = (_____ _____) + (_____ _____)

_____ = (_____ _____) + _____

Think: (2 × *n*) is an unknown addend.

24 = _____ + 6 **Think:** What is 24 − 6?

The value of (2 × *n*) is 18.

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

2 × _____ = 18

The value of *n* is _____.

Think: *n* is the length of the pen.

So, the pen will be _____ long.

Common Error

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 _____

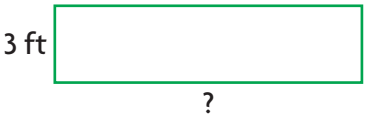
Share and Show Math Board

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

$A = b \times h$

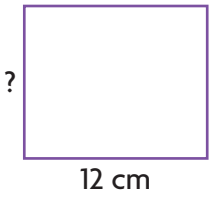
_____ $= b \times$ _____

The base of the rectangle is _____.



Find the unknown measure of the rectangle.

2.



Perimeter = 44 centimeters

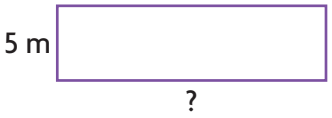
width = _____

3.

Area = 108 square inches

height = _____

4.



Area = 90 square meters

base = _____

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain how using the area formula helps you find the base of a rectangle when you know its area and height.

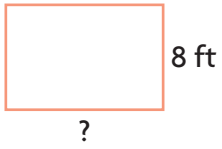
On Your Own

5.

Perimeter = 34 yards

length = _____

6.



Area = 96 square feet

base = _____

7.

Area = 126 square centimeters

height = _____

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

_____

_____

_____

_____

Problem Solving · Applications

9. MTR 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?

_____

10. 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

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

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

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

$\square = \square + 14$

Since $2 \times l = 50$, $l = \square$

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. 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? _____

MATH on the Spot

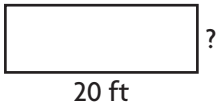
Name _____

Find Unknown Measures

Go Online
Interactive Examples

Find the unknown measure of the rectangle.

1.

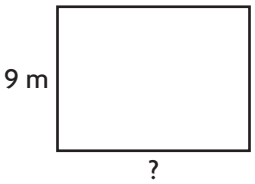


Perimeter = 54 feet

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 $w = 7$.

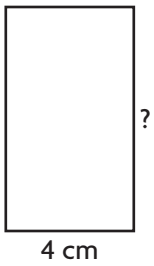
2.



Perimeter = 42 meters

length = _____

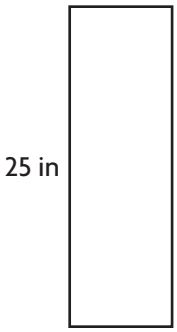
3.



Area = 28 square centimeters

height = _____

4.



Area = 200 square inches

base = _____

Problem Solving Real World

5. Ana 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

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

8. Nguyen 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

9. 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?

10. Order from least to greatest.
42,876; 45,021; 4,509

11. 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?

12. 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?

Name _____

Find the Area

I Can solve real-world problems involving the area of a rectangle.

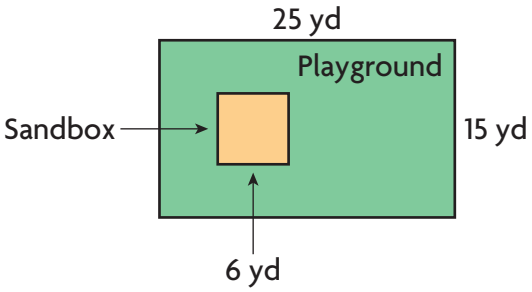
Florida's B.E.S.T.

- **Geometric Reasoning** 4.GR.2.1
- **Mathematical Thinking & Reasoning** MTR 1.1, MTR 2.1, MTR 4.1

UNLOCK the Problem Real World

A landscaper is laying grass for a rectangular playground. The grass will cover the whole playground except for a square sandbox. The diagram shows the playground and sandbox. How many square yards of grass will the landscaper use?

Use the graphic organizer below to solve the problem.



Read the Problem

What do I need to find?

I need to find how many _____ the landscaper will use.

What information do I need to use?

The grass will cover the _____.

The grass will not cover the _____.

The length and width of the playground are _____ and _____.

The side length of the square sandbox is _____.

How will I use the information?

I can solve simpler problems.

Find the area of the _____.

Find the area of the _____.

Then _____ the area of the _____ from the area of the _____.

Solve the Problem

First, find the area of the playground.

$A = b \times h$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$ square yards

Next, find the area of the sandbox.

$A = s \times s$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$ square yards

Last, subtract the area of the sandbox from the area of the playground.

$$\begin{array}{r} 375 \\ -\ 36 \\ \hline \quad\quad \end{array}$$

square yards

So, the landscaper will use _____ _____ of grass to cover the playground.

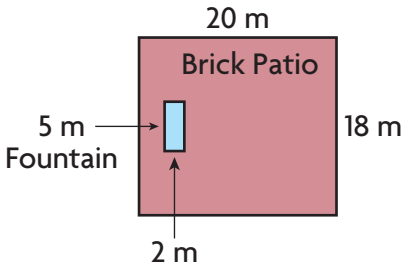
Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

How did the strategy help you solve the problem?

Try Another Problem

Zach is laying a rectangular brick patio for a new museum. Brick will cover the whole patio except for a rectangular fountain, as shown in the diagram. How many square meters of brick does Zach need?



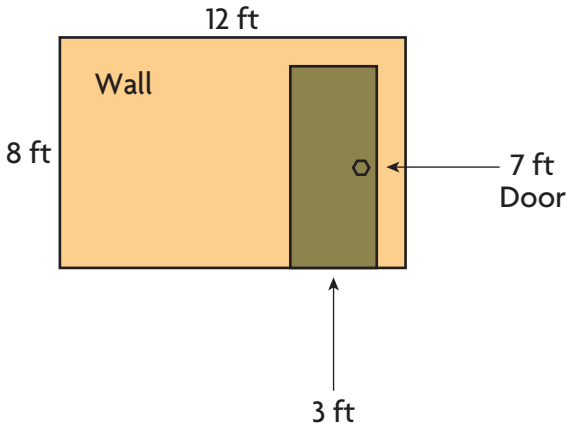
Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use this information?	

- How many square meters of brick does Zach need? Explain.

Name _____

Share and Show Math Board

1. Lila is wallpapering one wall of her bedroom, as shown in the diagram. She will cover the whole wall except for the doorway. How many square feet of wall does Lila need to cover?



First, find the area of the wall.

$A = b \times h$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$ square feet

Next, find the area of the door.

$A = b \times h$

$= \_\_\_\_ \times \_\_\_\_$

$= \_\_\_\_$ square feet

Last, subtract the area of the door from the area of the wall.

$\_\_\_\_ - \_\_\_\_ = \_\_\_\_$ square feet

So, Lila needs to cover _____ of wall.

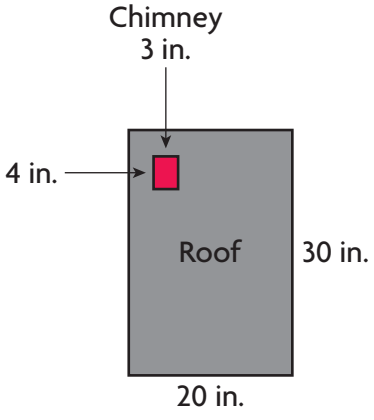
2. What if there was a square window on the wall with a side length of 2 feet? How much wall would Lila need to cover then? Explain.

_____

_____

_____

3. Ed is building a model of a house with a flat roof, as shown in the diagram. There is a chimney through the roof. Ed will cover the roof with square tiles. If the area of each tile is 1 square inch, how many tiles will he need? Explain.



_____

_____

_____

On Your Own

4. MTR Lia has a dog and a cat. Together, the pets weigh 28 pounds. The dog weighs 3 times as much as the cat. How much does each pet weigh?

_____

5. Mr. Foster is covering two rectangular pictures with glass. One is 6 inches by 4 inches and the other one is 5 inches by 5 inches. Does he need the same number of square inches of glass for each picture? Explain.

MATH on the Spot

_____

_____

6. Claire says the area of a square with a side length of 100 centimeters is greater than the area of a square with a side length of 1 meter. Is she correct? Explain.

_____

_____

_____

Show the Math

Demonstrate Your Thinking

7. A rectangular floor is 12 feet long and 11 feet wide. Janine places a rug that is 9 feet long and 7 feet wide and covers part of the floor in the room. Select the word(s) to complete the sentence.

To find the number of square feet of the floor that is NOT covered by the rug,

add subtract multiply	the	area of the rug length of the rug area of the floor		from by to	the area of the floor.

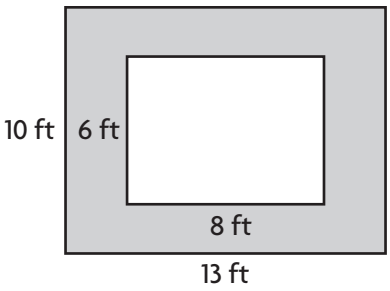
Name _____

Find the Area

Go Online
Interactive Examples

Solve each problem.

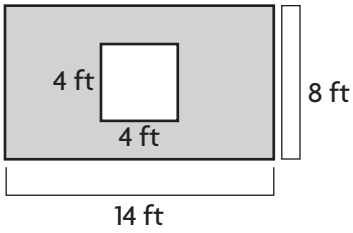
1. A room has a wooden floor. There is a rug in the center of the floor. The diagram shows the room and the rug. How many square feet of the wood floor still shows?



82 square feet

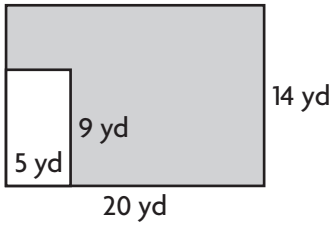
Area of the floor: $13 \times 10 = 130$ square feet
Area of the rug: $8 \times 6 = 48$ square feet
Subtract to find the area of the floor still showing: $130 - 48 = 82$ square feet

2. A rectangular wall has a square window, as shown in the diagram.



What is the area of the wall NOT including the window?

3. Bob wants to put down new sod in his backyard, except for the part set aside for his flower garden. The diagram shows Bob's backyard and the flower garden.



How much sod will Bob need?

4. A rectangular painting is 24 inches wide and 20 inches tall without the frame. With the frame, it is 28 inches wide and 24 inches tall. What is the area of the frame not covered by the painting?

5. WRITE Math Suppose you painted the walls of your classroom. Describe how to find the area of the walls that are painted.

Lesson Check

6. One wall in Zoe's bedroom is 5 feet wide and 8 feet tall. Zoe puts up a poster of her favorite athlete. The poster is 2 feet wide and 3 feet tall. How much of the wall is not covered by the poster?

7. A garage door is 15 feet wide and 6 feet high. It is painted white, except for a rectangular panel 1 foot high and 9 feet wide that is brown. How much of the garage door is white?

Spiral Review

8. Keregan made a box to hold her jewelry collection. She used 42 inches of wood to build the sides of the box. If the box was 9 inches wide, how long was the box?

9. Larry, Mary, and Terry each had a full glass of juice. Larry drank $\frac{3}{4}$ of his. Mary drank $\frac{3}{8}$ of hers. Terry drank $\frac{7}{10}$ of his. Who drank less than $\frac{1}{2}$ of their juice?

10. List all of the numbers between 20 and 30 that are prime.

11. Tomas and some friends went to a movie. The show started at 2:30 P.M. and ended at 4:15 P.M. How long did the movie last?

Name _____

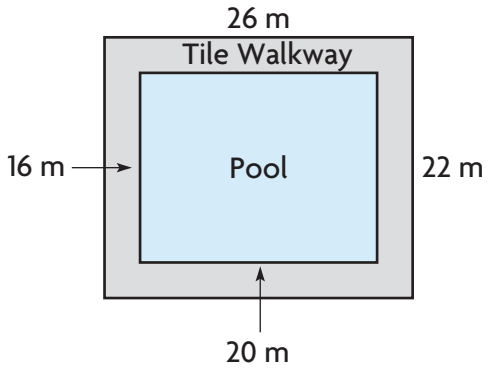
Chapter 6

Chapter Review

1. For problems 1a–1e, select Yes or No to indicate if a rectangle with the given dimensions would have a perimeter of 50 inches.

1a.	length: 25 inches	width: 2 inches	○ Yes	○ No
1b.	length: 20 inches	width: 5 inches	○ Yes	○ No
1c.	length: 17 inches	width: 8 inches	○ Yes	○ No
1d.	length: 15 inches	width: 5 inches	○ Yes	○ No
1e.	length: 15 inches	width: 10 inches	○ Yes	○ No

2. The swimming club's indoor pool is in a rectangular building. Marco is laying tile around the rectangular pool.



Part A

What is the area of the pool and the area of the pool and the walkway? Show your work.

Part B

How many square meters of tile will Marco need for the walkway? Explain how you found your answer.

3. Match the dimensions of the rectangles in the top row with the correct area or perimeter in the bottom row.

length: 5 cm width: 9 cm	length: 6 cm width: 6 cm	length: 6 cm width: 5 cm	length: 9 cm width: 6 cm
area = 36 sq cm	perimeter = 22 cm	perimeter = 30 cm	area = 45 sq cm

4. Kyleigh put a large rectangular sticker on her notebook. The height of the sticker measures 18 centimeters. The base is half as long as the height. What area of the notebook does the sticker cover?

_____ square centimeters

5. A rectangular flower garden in Samantha's backyard has 100 feet around its edge. The width of the garden is 20 feet. What is the length of the garden? Use the numbers to write an equation and solve. A number may be used more than once.

10 20 50 30 40 60 100

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

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

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

$\square = \square + 40$

Since $2 \times l = 60$, $l = \square$

So, the length of the garden is $\square$ feet.

6. Mateo drew a rectangle and a square, each with a perimeter of 20 inches. Draw the rectangle and square Mateo could have drawn, and compare the areas. Which has the greater area?

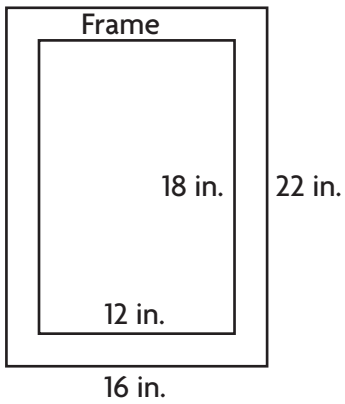
Name _____

7. Ami and Bert are drawing plans for rectangular vegetable gardens. In Ami's plan, the garden is 13 feet by 10 feet. In Bert's plan, the garden is 12 feet by 12 feet. For problems 7a–7d, select True or False for each statement.

7a.	The area of Ami's garden is 130 square feet.	○ True	○ False
7b.	The area of Bert's garden is 48 square feet.	○ True	○ False
7c.	Ami's garden has a greater area than Bert's garden.	○ True	○ False
7d.	The area of Bert's garden is 14 square feet greater than Ami's.	○ True	○ False

8. A farmer planted corn in a square field. One side of the field measures 32 yards. What is the area of the cornfield? Show your work.

9. Harvey bought a frame in which he put his family's picture.



What is the area of the frame not covered by the picture?

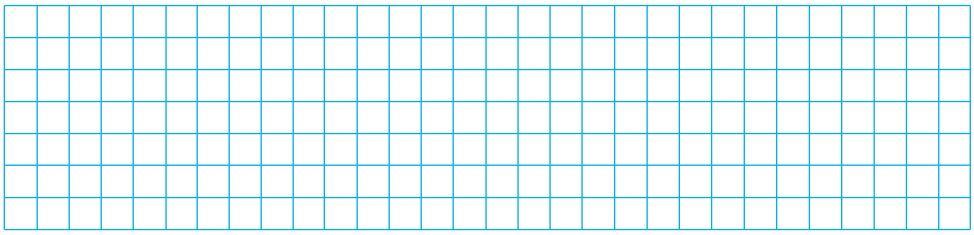
_____ square inches

10. Kelly has 236 feet of fence to use to enclose a rectangular space for her dog. She wants the width to be 23 feet. Draw a rectangle that could be the space for Kelly's dog. Label the length and the width.

11. Anthony wants to make two different rectangular flower beds, each with an area of 24 square feet. He will build a wooden frame around each flower bed. The flower beds will have side lengths that are whole numbers.

Part A

Each unit square on the grid below is 1 square foot. Draw two possible flower beds. Label each with a letter.



Part B

Which of the flower beds will take more wood to frame? Explain how you know.

12. Chad's bedroom floor is 12 feet long and 10 feet wide. He has an area rug on his floor that is 7 feet long and 5 feet wide. Which statements tell how to find the amount of the floor that is not covered by the rug? Mark all that apply.

- (A) Add 12×10 and 7×5.
- (B) Subtract 35 from 12×10.
- (C) Subtract 10×5 from 12×7.
- (D) Add $12 + 10 + 7 + 5$.
- (E) Subtract 7×5 from 12×10.
- (F) Subtract 12×10 from 7×5.

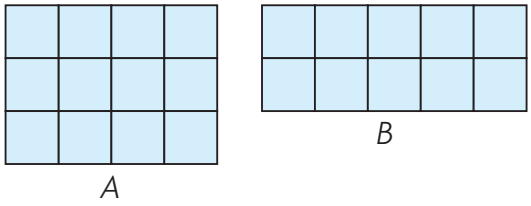
Name _____

13. A row of plaques covers 120 square feet of space along a wall. If the plaques are 3 feet tall, what length of the wall do they cover?

_____ feet

14. Tomas drew two rectangles on grid paper.

Circle the words that make the sentence true.



Rectangle *A* has an area that is

less than
the same as
greater than

the area of Rectangle *B* and a perimeter that is

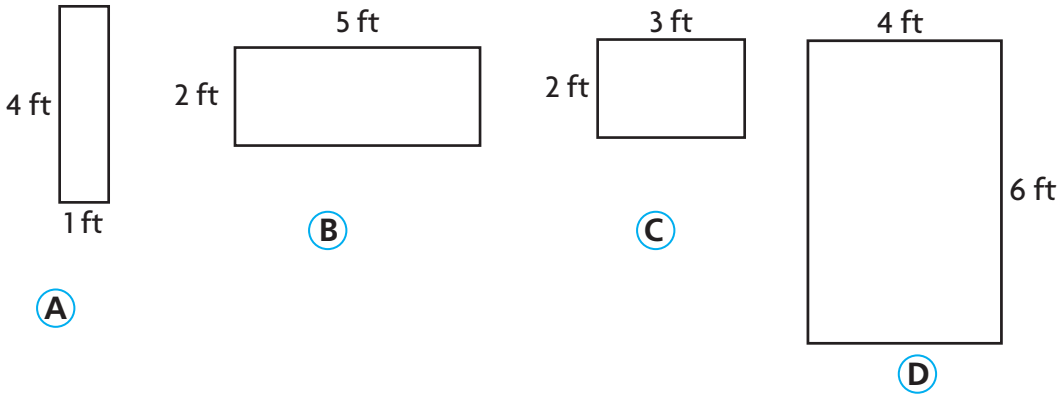
less than
the same as
greater than

the perimeter of Rectangle *B*.

15. Lorenzo built a rectangular brick patio. He is putting a stone border around the edge of the patio. The width of the patio is 12 feet. The length of the patio is 2 feet longer than the width.

How many feet of stone will Lorenzo need? Explain how you found your answer.

16. Which rectangles have a perimeter of 10 feet? Mark all that apply.



17. A folder is 11 inches long and 8 inches wide. Alyssa places a sticker that is 2 inches long and 1 inch wide on the folder. Choose the words that correctly complete the sentence.

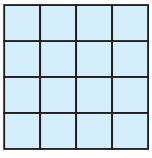
To find the number of square inches of the folder that is NOT covered by the sticker,

add subtract multiply	the	width of the sticker area of the sticker area of the folder		from by to	the	width of the sticker area of the sticker area of the folder	.

18. Which rectangle has a number of square units for its area equal to the number of units of its perimeter?

Ⓐ 

Ⓒ 

Ⓑ 

Ⓓ 

19. Mr. Butler posts his students' artwork on a bulletin board.

The width and length of the bulletin board are whole numbers. What could be the dimensions of the bulletin board Mr. Butler uses?

Area = 15 square feet