

Find Perimeter and Area



Dear Family,

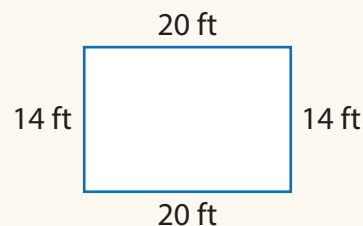
This week your child is learning about perimeter and area.

Some real-world situations that involve perimeter and area are installing a fence around a yard and determining how much flooring is needed for a room.

To find the perimeter of a rectangle, find the total length of all the sides. One way to do this is by adding together the lengths of all the sides.

For example, to find the length of fencing that is needed to enclose a rectangular yard like the one shown, add the 4 side lengths.

$$\begin{aligned}\text{Perimeter} &= \text{length} + \text{length} + \text{width} + \text{width} \\ &= 20 \text{ feet} + 20 \text{ feet} + 14 \text{ feet} + 14 \text{ feet} \\ &= 68 \text{ feet}\end{aligned}$$



Another way to find the perimeter of a rectangle is to use a **formula**.

P stands for perimeter, ℓ stands for length, and w stands for width.

$$\begin{array}{lcl} P = 2\ell + 2w & \text{or} & P = 2(\ell + w) \\ = 2(20) + 2(14) & & = 2(20 + 14) \\ = 40 + 28 & & = 2 \times 34 \\ = 68 & & = 68 \end{array}$$

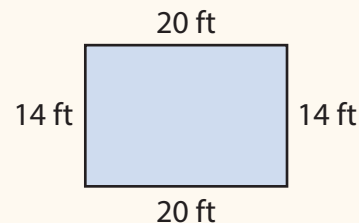
You need 68 feet of fencing to enclose the yard.

To find the area of a rectangle, use the area formula.

$$\text{Area} = \text{length} \times \text{width} \quad A = \ell \times w$$

The area of the rectangle at the right is:

$$20 \text{ feet} \times 14 \text{ feet} = 280 \text{ square feet}$$



If you were covering the rectangular yard with pavers, you would need enough pavers to cover 280 square feet.

Invite your child to share what he or she knows about perimeter and area by doing the following activity together.



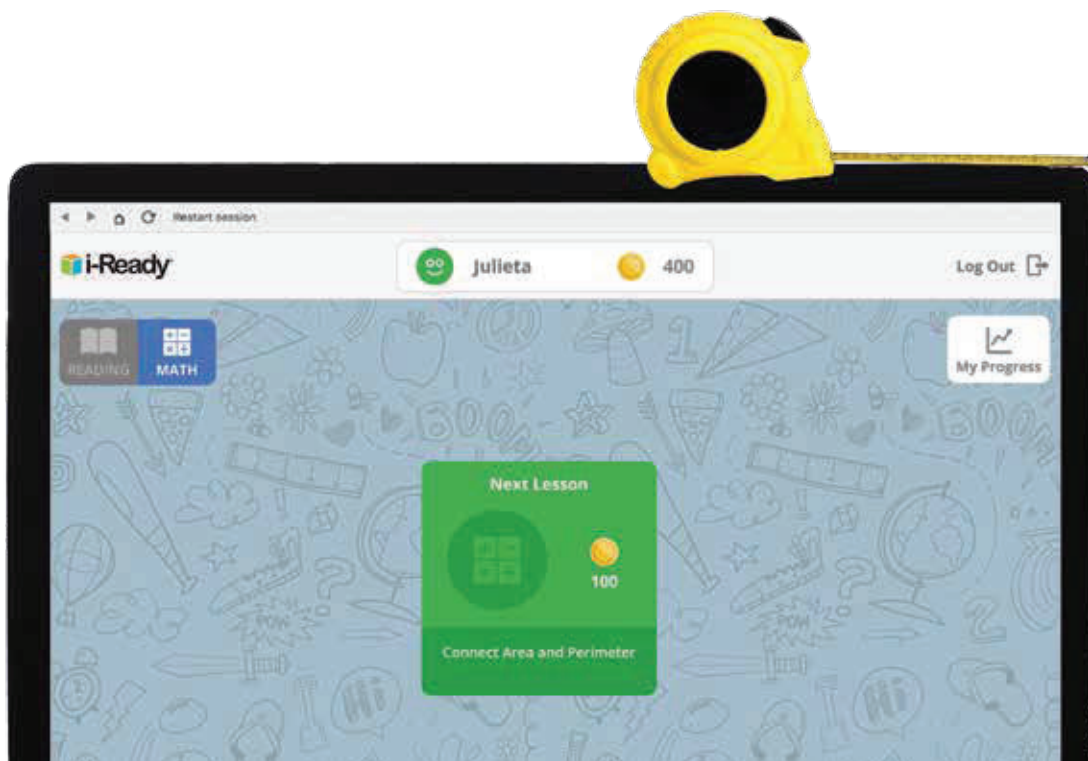
ACTIVITY FINDING PERIMETER AND AREA

Do this activity with your child to find perimeter and area.

Materials ruler or yardstick

- Look around your home for items that are shaped like a rectangle.
For example: a TV or computer screen, a table top, a rug, the floor of a room
- Help your child measure each side of the rectangular item. Have your child write the measurements. Be sure to use the same units of measurement, such as inches or feet, for each side.
- Have your child use the measurements to find the perimeter of the item.
- Now measure a different rectangular-shaped item and find its perimeter. Is the perimeter greater or less than the perimeter of the first item you measured?
- Next, find area. Suppose you want to cover a rectangular window with a shade. Choose a window and measure each side. Have your child find the area and tell how many square inches or square feet of shade are needed to cover the window.
- Find the area of other rectangular items in your home, such as different-sized windows or floors.

Look for other real-world opportunities to find perimeter and area with your child.



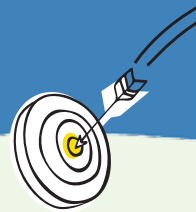
Explore Finding Perimeter

You have learned that you can find the perimeter of a rectangle by adding the lengths of the sides. Use what you know to try to solve the problem below.

Learning Target

- Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

SMP 1, 2, 3, 4, 5, 6, 7



Marissa uses 64 feet of fence to make a border around a rectangular flower garden. The length of the garden is 20 feet. What is the width of the garden?

TRY IT



Math Toolkit

- rulers
- grid paper
- perimeter and area tool
- multiplication models

DISCUSS IT

Ask your partner: How did you get started?

Tell your partner: I started by ...



CONNECT IT

1 LOOK BACK

Explain how you can find the width of the garden.

2 LOOK AHEAD

You can find the perimeter, or distance around a shape, in different ways.

- a. Complete the addition equation to find the perimeter of the rectangle.

$$\text{Perimeter} = \dots + \dots + \dots + \dots$$

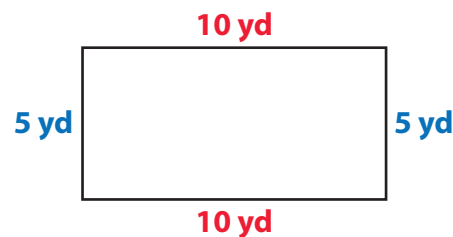
The perimeter is yards.

- b. The perimeter **formula** at the right uses multiplication and addition to find perimeter. Use the formula to find the perimeter of the rectangle.

The perimeter is yards.

- c. You can also find perimeter with the formula shown at the right. Use this formula to find the perimeter of the rectangle.

The perimeter is yards.



$$\begin{aligned} P &= (2 \times \ell) + (2 \times w) \\ &= (2 \times \dots) + (2 \times \dots) \\ &\quad \text{length} \qquad \qquad \text{width} \\ &= \dots + \dots \end{aligned}$$

$$\begin{aligned} P &= 2 \times (\ell + w) \\ &= 2 \times (\dots + \dots) \\ &\quad \text{length} \qquad \qquad \text{width} \\ &= 2 \times \dots \end{aligned}$$

3 REFLECT

A formula for the perimeter of a square with a side length of s is $P = 4s$. Explain why this formula works.

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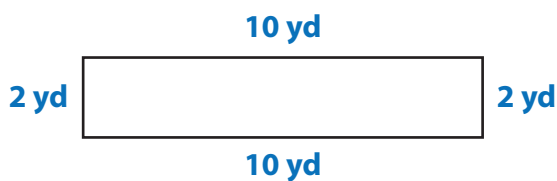
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Prepare for Finding Perimeter

- 1 Think about what you know about measurement. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

| Word | In My Own Words | Example |
|------------------|-----------------|---------|
| length | | |
| width | | |
| perimeter | | |

- 2 Complete the addition equation to find the perimeter of the rectangle.



Perimeter = length + width + length + width

Perimeter = + + +

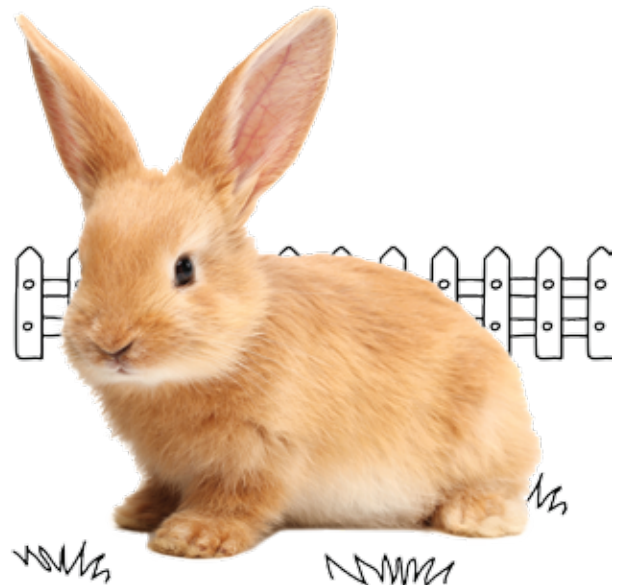
The perimeter is yards.

- 3 Solve the problem. Show your work.

Khan uses 78 feet of fence to make a rectangular pen for his pet rabbit. The length of the pen is 25 feet. What is the width of the rectangular pen?

Solution

- 4 Check your answer. Show your work.



Develop Finding Perimeter



Read and try to solve the problem below.

Keegan builds a fence to make a rectangular dog pen in his backyard. The pen is 30 feet long and 24 feet wide. How much fence does Keegan use to make the dog pen?

TRY IT



Math Toolkit

- rulers
- math reference sheet
- grid paper
- perimeter and area tool 
- multiplication models 



DISCUSS IT

Ask your partner: Why did you choose that strategy?

Tell your partner: I knew . . . so I . . .

Explore different ways to find the perimeter of a rectangle.

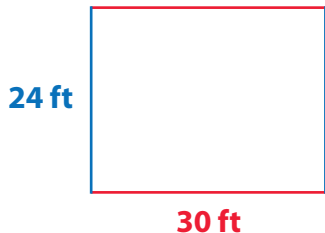
Keegan builds a fence to make a rectangular dog pen in his backyard. The pen is 30 feet long and 24 feet wide. How much fence does Keegan use to make the dog pen?

PICTURE IT

You can use pictures to help find the perimeter of a rectangle.

Draw a picture to represent the fence.

You can use color to highlight the sides that have the same length.

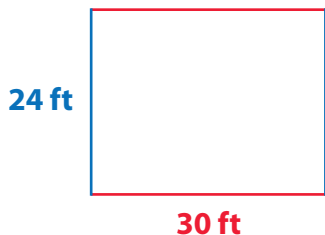


Add the lengths to find how much fence Keegan uses.

$$30 \text{ feet} + 24 \text{ feet} + 30 \text{ feet} + 24 \text{ feet}$$

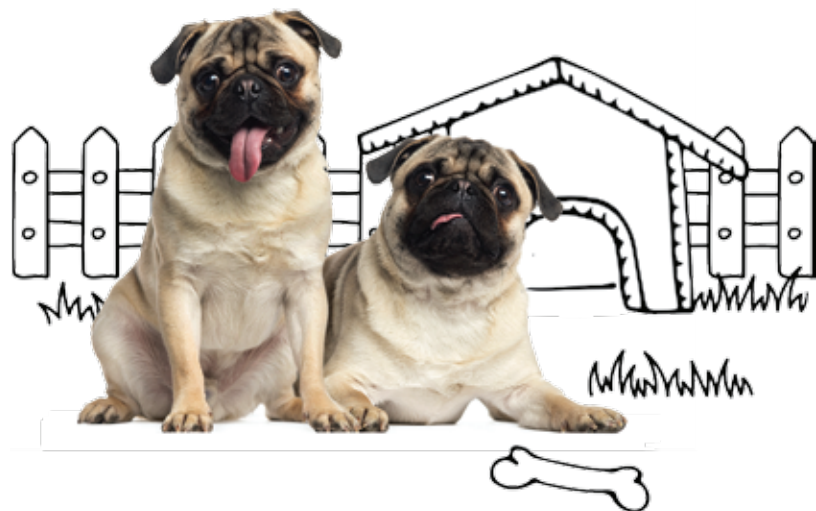
MODEL IT

You can also use a formula to help find the perimeter of a rectangle.



$$P = 2\ell + 2w$$

$$P = (2 \times 30) + (2 \times 24)$$



CONNECT IT

Now you will use the problem from the previous page to help you understand how to find the perimeter of a rectangle.

- 1 Use the formula in **Model It** to find how much fence Keegan uses to make the dog pen.
- 2 Keegan uses the formula $P = 2(\ell + w)$ to find how much fence he needs. Does Keegan's formula work? Why or why not?
- 3 Which formula do you think is easier? Why?
- 4 How are the methods for finding the perimeter of a rectangle in **Picture It** and **Model It** alike?

5 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for finding the perimeter of a rectangle? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 6 Bianca puts a fence around a rectangular garden. The garden is 15 feet long by 10 feet wide. How much fence does Bianca use? Show your work.

Solution

- 7 Michael glues craft sticks around the edges of a rectangular poster. He uses a total of 14 craft sticks. He uses 5 craft sticks on each long side of the poster. How many craft sticks does he use for each short side of the poster? Show your work.



Solution

- 8 A rectangle has a length of 17 inches and a width of 13 inches. What is the perimeter, in inches, of the rectangle? Show your work.

Solution

Practice Finding Perimeter

Study the Example showing how to find the perimeter of a rectangle.
Then solve problems 1–5.

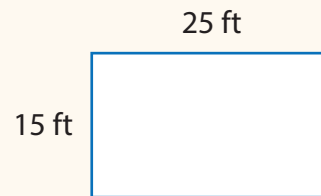
EXAMPLE

The community center has a rectangular kiddie pool. The length of the pool is 25 feet. The width is 15 feet. What is the perimeter of the kiddie pool?

Use a formula for the perimeter of a rectangle.

$$\begin{aligned} P &= 2\ell + 2w \\ &= (2 \times 25) + (2 \times 15) \\ &= 50 + 30 \\ &= 80 \end{aligned}$$

$$\begin{aligned} P &= 2(\ell + w) \\ &= 2(25 + 15) \\ &= 2(40) \\ &= 80 \end{aligned}$$



The perimeter of the kiddie pool is 80 feet.

- 1 A rectangular photo has a length of 10 inches and a width of 8 inches. Fill in the blanks to show two ways to find the perimeter of the photo.

$$P = \quad 2\ell \quad + \quad 2w$$

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

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

$$P = 2(\dots + \dots)$$

$$= \dots + \dots$$

$$= 2(\dots)$$

$$= \dots$$

$$= \dots$$

The perimeter is inches.

- 2 Jason's rectangular computer screen is 50 centimeters across and 36 centimeters high. What is its perimeter? Show your work.

$$P = \dots \text{ centimeters}$$

- 3 A rectangular garden has a width of 90 feet. The perimeter of the garden is 500 feet. What is the length of the garden?

$$500 = (2 \times \ell) + (\dots \times \dots)$$

$$500 = 2\ell + \dots$$

$$\dots = 2\ell$$

$$\dots \div 2 = \ell$$

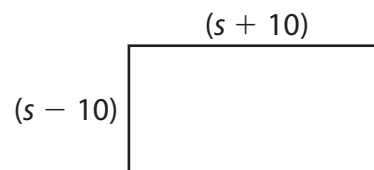
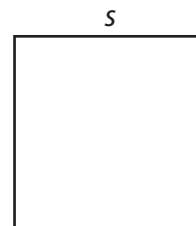
$$\dots = \ell$$

The length of the garden is \dots feet.

- 4 Amy has a ribbon that is 36 inches long. Tell whether she has enough ribbon to wrap around the perimeter of a picture frame for each frame with the given shape and size.

| | Yes | No |
|-----------------------------------|-----|-----|
| square, side lengths of 9 inches | (A) | (B) |
| rectangle, 18 inches by 10 inches | (C) | (D) |
| rectangle, 12 inches by 24 inches | (E) | (F) |
| square, side lengths of 6 inches | (G) | (H) |

- 5 The square and the rectangle at the right each have a perimeter of 200 centimeters. What are the side lengths of the square and rectangle? (*Hint*: First, find the side length of the square.) Show your work.



Square: side length \dots cm **Rectangle:** length \dots cm width \dots cm

Develop Finding Area



Read and try to solve the problem below.

Kevin makes a rectangular mural with colored tiles. He has enough tiles to cover 112 square feet. He uses all the tiles. The mural is 8 feet wide. How long is the mural?

TRY IT



Math Toolkit

- rulers
- math reference sheet
- grid paper
- perimeter and area tool 
- multiplication models 



DISCUSS IT

Ask your partner: Do you agree with me? Why or why not?

Tell your partner: I agree with you about ... because ...

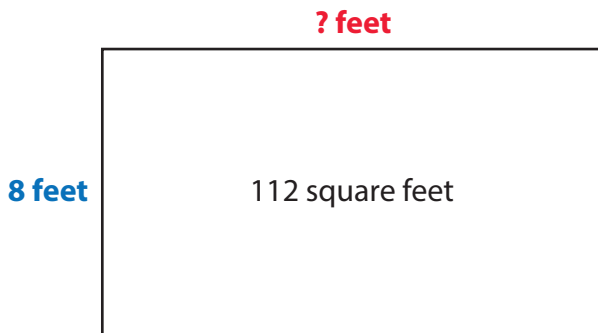
Explore different ways to understand solving area problems.

Kevin makes a rectangular mural with colored tiles. He has enough tiles to cover 112 square feet. He uses all the tiles. The mural is 8 feet wide. How long is the mural?

PICTURE IT

You can use a picture to help solve area problems.

Make a sketch of the mural.



Since you multiply the length and width of a rectangle to find the area, think: $8 \times ? = 112$.

MODEL IT

You can use the formula for the area of a rectangle to help understand the problem.

$$A = \ell \times w$$

area of the mural = **length** \times **width**

The area of the mural is 112 square feet.

It can be covered by 8 rows of square units that each have an area of 1 square foot.

The number of square units in each row is also the number of feet in the length of the mural.



CONNECT IT

Now you will use the problem from the previous page to help you understand how to solve area problems.

- 1 Write an equation to represent the area of the mural.
- 2 Describe how you can find the length of the mural.
- 3 What is the length of the mural?
- 4 Kevin notices another package of tiles. This package can make a rectangular mural with an area of 152 square feet. Suppose Kevin wants to use these tiles to make another mural that is 8 feet wide. Write an equation that can help you find the length of this mural.
- 5 Find the length of the rectangular mural Kevin can make with the package of tiles that covers an area of 152 square feet.
- 6 Suppose that you know the length and area of a rectangle. How would you find the width?

7 REFLECT

Look back at your **Try It**, strategies by classmates, and **Picture It** and **Model It**. Which models or strategies do you like best for solving area problems? Explain.

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APPLY IT

Use what you just learned to solve these problems.

- 8 Carla has a rectangular garden in her backyard. The width of the garden is 9 meters. The area of the garden is 360 square meters. What is the length of the garden? Show your work.

Solution

- 9 Bill builds a rectangular deck with a length of 15 feet and a width of 7 feet. What is the area of Bill's deck? Show your work.

Solution

- 10 A rectangle has an area of 65 square centimeters and a width of 5 centimeters. What is the length of the rectangle? Show your work.

Solution

Practice Finding Area

Study the Example showing how to solve a problem about the area of a rectangle. Then solve problems 1–6.

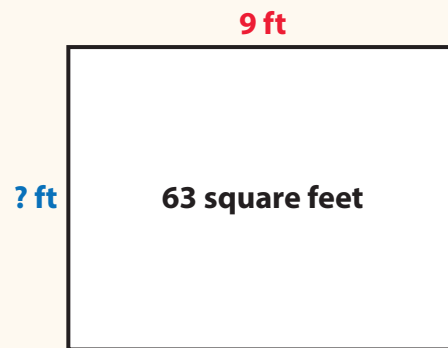
EXAMPLE

Michelle uses bricks to make a rectangular patio. She covers an area of 63 square feet with the bricks. The length of the patio is 9 feet. How wide is the patio?

Use the formula for the area of a rectangle.

$$\begin{aligned} A &= \ell \times w \\ A &= 9 \times w \\ 63 &= 9 \times w \\ 63 \div 9 &= w \\ 7 &= w \end{aligned}$$

The patio is 7 feet wide.

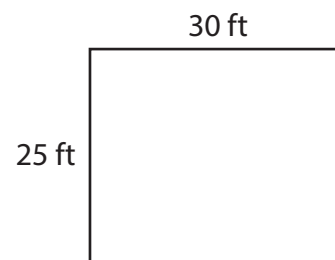


- 1 Juan puts new flooring in a rectangular room. The picture shows the length and width of the room. How many square feet of flooring does Juan use?

$$A = \dots \times \dots$$

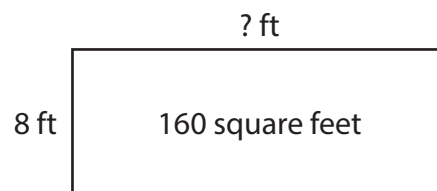
$$A = \dots$$

Juan uses square feet of flooring.



- 2 Look at the picture below. Alyssa wants to tile a rectangular room with an area of 160 square feet. The width of the room is 8 feet. What is the length of the room?

$$\begin{aligned} \dots &= \ell \times \dots \\ \dots \div \dots &= \ell \\ \dots &= \ell \end{aligned}$$



The length of the room is feet.



- 3 Jim paints the surface of a shelf. The rectangular surface has an area of 90 square inches. The width of the shelf is 6 inches. What is the length of the shelf? Show your work.

Solution

- 4 A rectangular exercise mat has an area of 48 square meters. Its length is 8 meters. What is the width of the mat? Show your work.

Solution

- 5 Look at problem 4. Suppose the width of the rectangular exercise mat is 2 meters longer. What is another name for the shape of this exercise mat? Explain how you know.

Solution

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- 6 Melissa has enough paint to cover an area of 250 square feet. She wants to paint two walls. The rectangular wall is 9 feet high and 20 feet wide. The square wall has a height of 9 feet. Does Melissa have enough paint to cover the area of both walls? Show your work.

Solution

Refine Finding Perimeter and Area

Complete the Example below. Then solve problems 1–8, using the Math Reference Sheet as necessary.

EXAMPLE

Jen draws a rectangle with a length of 12 inches and a width of 10 inches. Then she draws another rectangle by doubling the length and width of the first one. What is the perimeter of the second rectangle?

Look at how you could show your work using a formula for the perimeter of a rectangle.

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

length and width of first rectangle:

$$\ell = 12 \text{ inches and } w = 10 \text{ inches}$$

length and width of second rectangle:

$$\ell = 12 \times 2, \text{ or } 24, \text{ inches} \quad w = 10 \times 2, \text{ or } 20, \text{ inches}$$

$$\text{Perimeter of second rectangle} = 2(24 + 20)$$

$$P = 2 \times 44$$

Solution

The student uses a formula for the perimeter of a rectangle and labels the work to keep it organized.



PAIR/SHARE

How else could you solve the problem?

APPLY IT

- 1 A designer puts a tile border around the edge of a rectangular swimming pool. The length of the pool is 52 meters, and the width is 26 meters. How long is the tile border? Show your work.

Solution

Are you looking for the perimeter or the area of the pool?

PAIR/SHARE

How did you solve the problem? Why did you choose that method?

- 2 Zachary has new carpet on his bedroom floor. The dimensions of his rectangular room are 9 feet by 13 feet. How much carpet is used to cover the whole floor? Show your work.

Are you finding the perimeter or the area of the room?



Solution

- 3 Tricia wants to make a rectangular path using pebbles. She has 8 bags of pebbles. Each bag covers an area of 6 square feet. Tricia wants to make the path 2 feet wide. How long can she make the path?
- Ⓐ 3 feet
 - Ⓑ 22 feet
 - Ⓒ 24 feet
 - Ⓓ 48 feet

Laura chose Ⓐ as the correct answer. How did she get that answer?

PAIR/SHARE

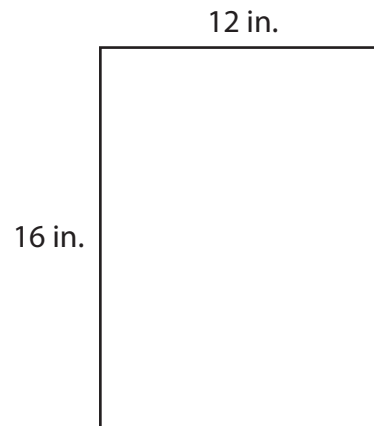
How do the units in the answer tell whether you found area or perimeter?

How much area can Tricia cover with all the bags of pebbles?

PAIR/SHARE

Does Laura's answer make sense?

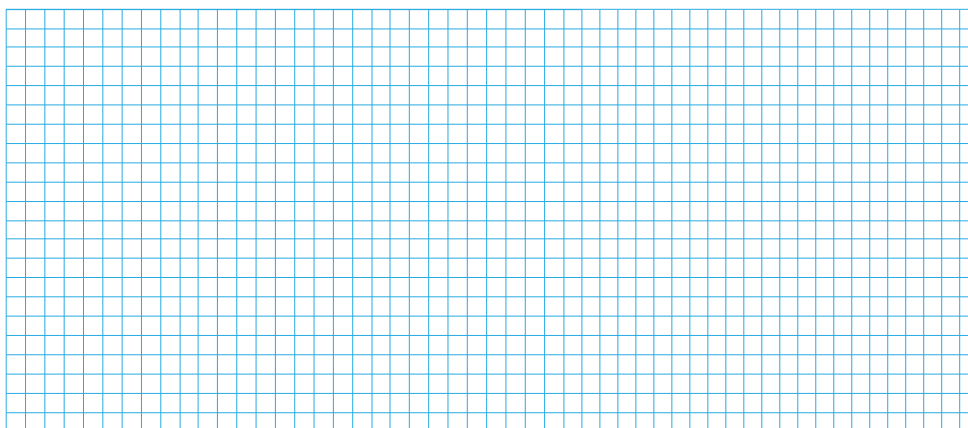
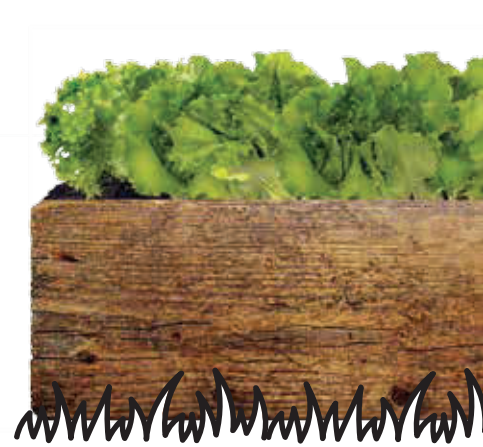
- 4 A playground in the park is rectangular and has a length of 18 yards. The width of the playground is half the length. What is the area of the playground?
- (A) 27 square yards
(B) 54 square yards
(C) 92 square yards
(D) 162 square yards
- 5 Maya is finding the perimeter of the rectangle at the right. Which expressions can be used to find the perimeter?
- (A) $(2 \times 16) + (2 \times 12)$
(B) $2 \times 16 + 12$
(C) $2(16 + 12)$
(D) 16×12
(E) $16 + 12 + 16 + 12$
- 6 A rectangle is 22 feet long and has a perimeter of 56 feet. What is the width of the rectangle? Show your work.

**Solution**

7 Ms. Leone’s plan for a raised garden bed includes the following:

- It is in the shape of a rectangle.
- The sides of the bed use a total of 30 feet of cedar boards.
- Each side is longer than 1 foot.
- The length and width have measurements in whole feet.

Part A Use the grid below to draw three different rectangles that can each represent Ms. Leone’s garden bed. Be sure to use all 30 feet of cedar boards for each bed.



| |
|-------------------|
| Key |
| □ = 1 square foot |

Part B Write the length and width of each garden bed you drew. Then find the area of each garden bed.

Garden Bed 1:

Length:

Width:

Area:

Garden Bed 2:

Length:

Width:

Area:

Garden Bed 3:

Length:

Width:

Area:

8 MATH JOURNAL

Draw a rectangle. Label its length and width. Explain how to find the perimeter and area of your rectangle. Use perimeter and area formulas in your explanation.



SELF CHECK Go back to the Unit 3 Opener and see what you can check off.