You have learned that you can find the perimeter of a rectangle by adding the lengths of the sides. Take a look at this problem.

Marissa has 64 feet of fencing. She is using the fencing to border a rectangular flower garden. Marissa wants the length to be 20 feet. If she uses all of the fencing, what will be the width of the rectangular area?

Explore It

Use the math you already know to solve the problem.

- To solve the problem, do you use perimeter or area? Explain how you know.
- How do you find the perimeter of a rectangle? ____________________________
- What is the total length of all of the fencing? ____________________________
- What side lengths are given? What is the total length of these sides? ____________________________
- What is the total length of fencing left to make the other two sides? Explain how to find this length. ____________________________
- Explain how you can find the length of the other two sides of the rectangle. ____________________________
Rectangles have length and width.

To find the perimeter of a rectangle, you can add the sides in any order.

Perimeter = length + length + width + width

Since the opposite sides of a rectangle are the same length, you can rewrite the equation as:

Perimeter = 2 \times \text{length} + 2 \times \text{width}

Use \( P \) to stand for perimeter, \( l \) to stand for length, and \( w \) to stand for width:

\[ P = 2l + 2w \]

The equation above is called the perimeter formula. You can use the perimeter formula to solve problems when the perimeter is unknown, or when the length or width is unknown. Here is how to solve the problem from the previous page, where the perimeter and length are known.

\[ 64 = (2 \times 20) + (2 \times w) \]
\[ 64 = 40 + (2 \times w) \]

Subtract \( 64 - 40 = 24 \). With 24 feet of fencing left, the width of the rectangle must be 12 feet.

Later in the lesson, you will solve similar problems using the area formula.

**Reflect**

1. The perimeter of a rectangular poster is 14 feet and the length is 4 feet. Describe how to use the perimeter formula to find the width. ________________________________

   ________________________________

   ________________________________

   ________________________________
Read the problem below. Then explore different ways to solve perimeter problems.

Keegan is building a rectangular play area in his backyard for his dog. The length of the rectangle is 30 feet and the width is 24 feet. What is the total length of fencing that Keegan needs to buy to make the play area?

**Picture It**

You can use models to help solve perimeter problems.

Draw a picture to represent the fence.

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

![Diagram of a rectangle with dimensions 30 ft x 24 ft, showing colored sides to highlight the lengths.]

Add the lengths to find the amount of fence Keegan needs to buy.

\[ 30 \text{ ft} + 30 \text{ ft} + 24 \text{ ft} + 24 \text{ ft} \]

**Model It**

You can also use words to help solve perimeter problems.

In this rectangle, the length is 30 feet and the width is 24 feet.

There are two sides that have a length of 30 feet and two sides that have a length of 24 feet.

\[
\text{Amount of fence} = \text{length} + \text{length} + \text{width} + \text{width} \\
= 30 \text{ feet} + 30 \text{ feet} + 24 \text{ feet} + 24 \text{ feet}
\]
Part 2: Guided Instruction

Connect It

Now you will solve the problem from the previous page using a formula.

2. What formula can you use to find the amount of fence Keegan needs? Why?

3. Use the formula to find the amount of fence Keegan needs for the dog's play area.

4. Keegan uses the formula $P = 2(l + w)$ to find the amount of fence he needs. Does Keegan’s formula work? Why or why not?

5. Which formula do you think is easiest? Why?

6. Explain how you know when to use the formula for the perimeter of a rectangle.

Try It

Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

7. Bianca is making a garden. She wants to make a rectangle that is 15 feet by 10 feet. How much fencing does she need to buy to make her garden?

8. Michael glues 1-foot pipe cleaners around the edges of a rectangular poster. He uses a total of 14 pipe cleaners with 4 pipe cleaners each on the longer sides of the poster. How many pipe cleaners does he use for each of the shorter sides of the poster?
Read the problem below. Then explore different ways to solve area problems.

Kevin is making a rectangular mural using colored tiles. He buys enough tiles to cover an area of 112 square feet. Kevin wants the width of the mural to be 8 feet. If he uses all of the tiles, what is the length of 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: $8 \times ? = 112$.

**Solve It**

You can use words to help understand the problem.

Area of the mural = length $\times$ width

The area of the mural is 112 square feet.

It can be covered by 8 rows of units that are each 1 square foot.

The number of square-foot units in each row is the length of the mural.
Connect It

Now you will solve the problem on the previous page using a formula.

9 Write an equation to represent the area of the mural.

10 Describe how you can find the length of the mural.

11 If Kevin uses all the tiles, what is the length of the mural?

12 Kevin notices another package of tiles that makes a mural with an area of 152 square feet. Write an equation that can help you find the length of this mural if it is also 8 feet wide.

13 Find the length of the mural Kevin can make with the package of tiles that covers an area of 152 square feet.

14 Suppose that you know the length and area of a rectangle. How would you find the width?

Try It

Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

15 Carla wants to create a garden in her backyard. She wants the width of the garden to be 9 meters and the area to be 162 square meters. What length should she make the garden?

16 Bill is building a deck. He wants the length of the deck to be 24 feet to match the length of the house. If he wants the area of the deck to be 288 square feet, what will be the width of the deck?
Study the model below. Then solve problems 17–19.

Jen drew a rectangle with a length of 12 inches and a width of 10 inches. Then she drew 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 the perimeter formula.

\[ P = 2(l + w) \]

length and width of first rectangle: \( l = 12 \text{ in.} \) and \( w = 10 \text{ in.} \)

length and width of second rectangle: \( l = 12 \times 2, \text{ or } 24, \text{ and } w = 10 \times 2, \text{ or } 20. \)

Perimeter of second rectangle = \( 2(24 + 20) \)
\[ P = 2 \times 44 \]
\[ P = 88 \]

Solution: The perimeter of the second rectangle is 88 inches.

17 A designer is adding a border around the edge of a rectangular swimming pool. He measures the pool and finds that the length of the pool is 52 meters and the width is 26 meters. What is the total length of the tile border?

Show your work.

Solution: ______________________________
18 Zachary is getting new carpet in his bedroom. The dimensions of his room are 9 feet by 13 feet. How much carpet does he need to cover the whole floor?

*Show your work.*

*Solution: ________________________________*

19 Tricia wants to create a path out of pebbles. She has 8 bags of pebbles and each bag covers an area of about 6 square feet. If she wants to make the path 2 feet wide, about how long can she make the path? Circle the letter of the correct answer.

A 3 feet  
B 22 feet  
C 24 feet  
D 48 feet

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

________________________________________

________________________________________

________________________________________

*Pair/Share*  
Does Tricia’s answer make sense?
Solve the problems.

1. A playground area in the park is rectangular and has a length of 40 feet. The width of the playground is half the length. What is the area of the playground?
   - **A** 120 square feet
   - **B** 800 square feet
   - **C** 1,600 square feet
   - **D** 3,200 square feet

2. Mike has a garden next to his garage. He wants to put a fence around the other three sides of the garden. Which expression does NOT represent the amount of fence Mike needs to buy?
   - **A** $6 + 21 + 6$
   - **B** $2w + l$
   - **C** $2w + 2l$
   - **D** $2 \times 6 + 21$

3. Maya is finding the perimeter of the rectangle. Which expression(s) can be used to find the perimeter? Circle the letter for all that apply.
   - **A** $(2 \times 16) + (2 \times 12)$
   - **B** $2 \times 16 + 12$
   - **C** $2(16 + 12)$
   - **D** $16 \times 12$
   - **E** $16 + 12 + 16 + 12$
4. A rectangle is 22 feet long and has a perimeter of 56 feet. What is the width of this rectangle? ____________

5. Ms. Leone plans to make a raised garden bed for her backyard. Her plan for the garden bed includes the following:
   - It will be in the shape of a rectangle.
   - The sides of the bed will use a total of 30 feet of cedar boards.
   - Each side will be longer than 1 foot.
   - The length and width will measure 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 the boards for each bed.

![Grid with key](image)

**Part B**

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

<table>
<thead>
<tr>
<th>Garden Bed 1:</th>
<th>Garden Bed 2:</th>
<th>Garden Bed 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length: _____</td>
<td>Length: _____</td>
<td>Length: _____</td>
</tr>
<tr>
<td>Width: _____</td>
<td>Width: _____</td>
<td>Width: _____</td>
</tr>
<tr>
<td>Area: _____</td>
<td>Area: _____</td>
<td>Area: _____</td>
</tr>
</tbody>
</table>

**Self Check**

Go back and see what you can check off on the Self Check on page 207.
Lesson 26  (Student Book pages 240–249)
Perimeter and Area

LESSON OBJECTIVES
• Use the formula for perimeter to solve problems.
• Use the formula for area to solve problems.

PREREQUISITE SKILLS
In order to be proficient with the concepts/skills in this lesson, students should:
• Recognize area and perimeter as attributes of plane figures.
• Find the area of a rectangle with whole-number side lengths by tiling.
• Solve real-world and mathematical problems using multiplication to find the area of rectangles with whole-number side lengths.
• Explain the difference between area and perimeter.
• Find the perimeter of a shape with given units or with an unknown side length.
• Solve real-world problems using perimeter.

VOCABULARY
There is no new vocabulary.

THE LEARNING PROGRESSION
In Grade 3, students began developing an understanding of both area and perimeter using visual models. They learned to cover plane figures with unit squares without gaps or overlaps to determine area in square units. They also related area to multiplication. When working with perimeter, students recognized perimeter as an attribute of plane figures and found perimeter given the side lengths or found an unknown side length. Additionally, students learned to distinguish between perimeter and area by working with rectangles that had the same perimeter but different areas or the same area but different perimeters.

In Grade 4, students are expected to build on their understandings based on models to develop an understanding of the area and perimeter formulas. They should be able to apply the formulas and communicate why the formulas work. Later they will apply these concepts to the surface area of solid figures, and extend the concepts to include finding the volume of solid figures.

CCLS Focus

4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

ADDITIONAL STANDARDS: 4.NBT.B.5 (See page A44 for full text.)
STANDARDS FOR MATHEMATICAL PRACTICE: SMP 1, 2, 4, 5, 6, 7 (See page A11 for full text.)
Students read a word problem and answer a series of questions designed to help them find the width of a rectangle using information about the perimeter and the length.

**STEP BY STEP**

- Tell students that this page models how to find the width of a rectangle when they know the perimeter and the length of one side.

**SMP Tip:** Students apply their prior knowledge of finding the perimeter of figures when the side lengths are known to finding missing side lengths when the perimeter is known. Students need to be able to interpret perimeter and understand its meaning in contextual situations. Students must be able to identify the quantities that represent the length and width of rectangles in real-world problem situations and apply the quantities to the formula for perimeter. (SMP 1)

- Have students read the problem at the top of the page.
- Work through Explore It as a class.
- After students are given the chance to answer the first question, lead a class discussion about the difference between perimeter and area.
- Invite a volunteer to come to the board and draw a picture representing the rectangular garden space. Together as a class, work to label the dimensions of the garden space as the questions in Explore It are answered.
- Point out that if a side is unknown, you may not know before doing the math whether it is longer or shorter than the known side. Make sure students understand that even though the longest side of a rectangle is usually considered the length, when using the perimeter (and area) formulas, it does not matter which values they substitute for length and width.

---

**Explore It**

Use the math you already know to solve the problem.

- To solve the problem, do you use perimeter or area? Explain how you know.
- Use perimeter since the fence goes around the outside edges of the rectangle. It is not about the space that is covered by the rectangle.
- How do you find the perimeter of a rectangle? **Add the lengths of the sides.**
- What is the total length of all of the fencing? **24 feet**
- What side lengths are given? What is the total length of these sides? **The lengths of two sides are 20 feet each, for a total of 40 feet.**
- What is the total length of fencing left to make the other two sides? **There is 24 feet of fencing to cover 2 sides: 24 ÷ 2 = 12. The other two sides will each be 12 feet long.**
- Explain how you can find the length of the other two sides of the rectangle.

---

**Mathematical Discourse**

- **What are some of the different ways you can find the distance around a closed figure (perimeter)?**
  
  Student responses should indicate that they understand perimeter is the total distance around the outside of a figure. Different ways that they can find the perimeter should include measuring the sides with a ruler and adding the lengths. If the sides are all the same, you can measure one side and multiply. If you have a tape measure you might be able to wrap it around the whole figure to measure the entire perimeter at once.
AT A GLANCE

Students use a formula to find the perimeter of a rectangle.

STEP BY STEP

• Read Find Out More as a class.
• Review using the Commutative Property to show that the sides of a rectangle can be added in any order to find perimeter. It may help to use straws or strips of paper to model the addition.
• Point out to students that the formula uses “2l” and “2w” to mean “2 times the length” and “2 times the width.” Encourage students to practice reading formulas aloud using the correct terminology for each variable.
• Point out to students that the correct order of operations when using the perimeter formula $P = 2l + 2w$ is to multiply both quantities before adding the products.

Hands-On Activity

Use measuring tools to understand finding perimeter.

Materials: metric rulers, transparent sheets with centimeter grid paper printed on them, several pre-cut cardboard rectangles

• Provide each group of students with a set of pre-cut cardboard rectangles. Some rectangles should be larger than the ruler and/or grid transparency.
• Students will use the ruler and grid transparency to find the length and width of each rectangle and then record their findings.
• Students will use the formula to find the perimeter of each rectangle.
• Discuss with students which tool (ruler or grid transparency) was best for measuring the sides of each rectangle. Also discuss the strategies used for rectangles that were larger than the tool.

Real-World Connection

Brainstorm a list of activities for which knowing how to find perimeter of rectangles would be a useful skill. Discuss applications of perimeter for each activity.

Examples: creating frames or borders for photos or posters, hanging lights around a window, building a border around a garden, fencing a yard, and so forth.
AT A GLANCE
Students use models and word equations to find the perimeter of a rectangle.

STEP BY STEP
• Read the problem at the top of the page as a class.
• Read Picture It. Have a volunteer explain how they know to find the perimeter. [The unknown is the length of fence, which will go around the play area. Perimeter is the distance around a figure.]
• Have a volunteer explain the connection between the black and purple lines in the rectangle to the black and purple lines shown below the rectangle.
• Read Model It. Have a volunteer explain the relationship between the word equation shown and the picture shown in Picture It.
• Have a volunteer explain how to use different words to solve this problem. [amount of fence = 2 × length + 2 × width = 2 × 30 feet + 2 × 24 feet]

SMP Tip: Students are developing their understanding of perimeter and making sense of the concept in problem situations. Students should be encouraged to consider different options when solving problems, including the use of pictures or diagrams, and to ask themselves if the method they have selected makes sense for the situation. (SMP 1)

Concept Extension
Emphasize the property of rectangles that states opposites sides are of equal length. Connect this property to the formula for perimeter.
• Reinforce the property of opposite sides by having students highlight the length and width of several rectangles using two different colors.
• Review the concepts of doubles: two times a number is the same as adding the number to itself. Practicing finding doubles quickly and fluently will help students be efficient and confident.
• Have students explain the formula for perimeter in their own words. Students should use appropriate mathematical vocabulary to describe the formula and not just read the symbols.

Mathematical Discourse
• There are several ways to find the perimeter of a rectangle. What is the method you prefer? Are there situations when one method would be better than another?

Students should respond with their preferred method of finding perimeter and explain why they think it would be best to use. Have students compare methods and discuss when each should be used. For example, they may use a different method depending on whether the numbers are large or small, easy to work with mentally or not, and so forth.
AT A GLANCE

Students revisit the problem on page 242 and extend to more general use of formulas.

STEP BY STEP

• Read Connect It as a class. Be sure to point out that the questions refer to the problem on page 242.
• Be sure students understand that $2l$ means $2 \times l$, $2w$ means $2 \times w$, and use the more familiar $2 \times w$ notation at least as often as the $2w$.
• Make sure that students understand how to use the Distributive Property to write the formula for the perimeter of a rectangle as $P = 2(l + w)$. Ask students to explain why this formula gives the same answer as $P = 2l + 2w$.
• Have students explain their answer to problem 5. [Answers will vary, but students should give a reason as to why the formula they picked is easiest.]
• Make sure students understand when to use the formula for the perimeter of a rectangle. Words such as around, border, and outside often indicate this concept.

Hands-On Activity

Find perimeter of real-world objects.

**Materials:** rulers, student desks or tables

• Using a ruler, students will measure the length and width of their rectangular desk or table.
• Students will draw a diagram of their desk or table and label the length and width including the appropriate units of measure.
• Under the diagram they have drawn, students should write the calculation for perimeter two different ways and show that each method gives the same result.
• Have students compare the perimeter of their desk to several classmates’ measurements. If there are differences in the perimeter measurements, students should measure the other desk to determine if there is an actual size difference or if an error was made in a measurement.

TRY IT SOLUTIONS

7  **Solution:** 50 feet; Substitute 15 for $l$ and 10 for $w$ in the formula for the perimeter of a rectangle:

$$P = (2 \times 15) + (2 \times 10) = 30 + 20 = 50.$$ 

8  **Solution:** 3 pipe cleaners; Substitute 14 for $P$ and 4 for $l$ in the rectangle perimeter formula:

$$14 = (2 \times 4) + (2 \times w) = (14 - 8) \div 2 = 3.$$ 

ERROR ALERT: Students who wrote 5 pipe cleaners did not multiply the length of the rectangle by 2 before subtracting it from 14.
AT A GLANCE

Students use pictures and words to solve an area problem.

STEP BY STEP

• Read the problem at the top of the page as a class.
• Read Picture It. Have a volunteer explain how to tile the picture to find the length of the mural. [Possible explanation: Make 10 columns of 8 equal squares first to make 80 tiles. Then make another 4 columns of 8 equal squares to make the remaining 32 squares. Count the columns.]
• Make sure students understand that while length may be measured in feet, area would be measured in square feet.
• Read Solve It. Have a volunteer explain how to find what length multiplied by a width of 8 feet will give an area of 112 square feet. [Division and multiplication are inverse operations, so we can divide 112 by 8.]
• Review methods of division as needed in Lesson 12.

Hands-On Activity

Use geoboards to find missing dimensions.

Materials: geoboards

• Have students work in pairs to create missing dimension problems for the partner to solve with a geoboard.
• Example 1: A rectangle has two sides that are 4 units long. It has an area of 24 square units. What is the length of one of the other two sides? [6 units]
• Example 2: A rectangle has a perimeter of 24 units. Two of the sides are 4 units long. What is the length of one of the other two sides? [8 units]
Lesson 26

Part 3: Guided Instruction

AT A GLANCE

Students revisit the problem on page 244 and further explore the area formula.

STEP BY STEP

• Read Connect It as a class. Be sure to point out that the questions refer to the problem on page 244.
• Ask students to explain why the equations $8 \times ? = 112$ and $112 \div 8 =$ ? could both be used to find the length. [Multiplication and division are opposite operations, and $112$ and $8$ are in the same fact family with $14$.]
• Have students explain their answer to problem 13. Invite a volunteer to draw on the board a sketch of the mural that shows the dimensions.
• Have students discuss their answers to problem 14. Emphasize that the procedure for finding the width when the length is known is the same as finding the length when the width is known.

SMP Tip: While learning to use the formula for the area of a rectangle, students are beginning to think more abstractly about the concept of area. Given a concrete problem or scenario, they should be able to represent the area symbolically and manipulate the symbols to solve the problem. (SMP 1)

TRY IT SOLUTIONS

15 Solution: 18 meters; Substitute 162 for $A$ and 9 for $w$ in the formula for the area of a rectangle: $162 = l \times 9$. Think, “What number do I multiply by 9 to get 162?” $162 = 18 \times 9$ or $162 \div 18 = ?$, so the length is 18 meters.

ERROR ALERT: Students who wrote 1,458 meters multiplied 162 by 9. Students who wrote 72 meters found the length of a rectangle with an area of 152 square feet, so they would divide the area by the length to find the width.

16 Solution: 12 feet; Substitute 288 for $A$ and 24 for $l$ in the formula for the area of a rectangle: $288 = w \times 24$. Think, “What number do I multiply by 24 to get 288?” $288 = 24 \times 12$, so the width is 12 meters.
AT A GLANCE

Students use formulas for the perimeter and area of rectangles to solve problems.

STEP BY STEP

- Ask students to solve the problems individually and label units in their calculations.
- When students have completed each problem, have them Pair/Share to discuss their solutions with a partner or in a group.

SOLUTIONS

**Ex** Solution: 88 inches; Using the formula \( P = 2(l + w) \) is shown as one way to solve the problem. Students could also draw a picture showing the doubled measurements and then add the side lengths.

17 **Solution:** 156 meters; Substitute 52 for \( l \) and 26 for \( w \) in the formula for the perimeter of a rectangle: 
\[ P = (2 \times 52) + (2 \times 26) = 104 + 52 = 156. \]  
(DOK 1)

18 **Solution:** 117 square feet; Use the formula for the area of a rectangle: \( A = l \times w = 13 \times 9 = 117. \)  
(DOK 1)

19 **Solution:** C; 8 bags of pebbles cover 6 square feet \( \times 8 = 48 \) square feet. \( 48 = l \times 2 \), so \( l = 24. \)  
Explain to students why the other two answer choices are not correct:  
B is incorrect because an incorrect computation was made.  
D is incorrect because it does not account for the 2-foot width of the path. (DOK 3)
Solve the problems.

1 A playground area in the park is rectangular and has a length of 40 feet. The width of the playground is half the length. What is the area of the playground?
   A 120 square feet
   B 800 square feet
   C 1,600 square feet
   D 3,200 square feet

2 Mike has a garden next to his garage. He wants to put a fence around the other three sides of the garden. Which expression does NOT represent the amount of fence Mike needs to buy?
   A $6 + 21 + 6$
   B $2w + l$
   C $2w + 2l$
   D $2 \times 6 + 21$

3 Maya is finding the perimeter of the rectangle. Which expression(s) can be used to find the perimeter? Circle the letter for all that apply.
   A $(2 \times 16) + (2 \times 12)$
   B $2 \times 16 + 12$
   C $2(16 + 12)$
   D $16 \times 12$
   E $16 + 12 + 16 + 12$

4 A rectangle is 22 feet long and has a perimeter of 56 feet. What is the width of this rectangle? 6 feet

5 Ms. Leone plans to make a raised garden bed for her backyard. Her plan for the garden bed includes the following:
   • It will be in the shape of a rectangle.
   • The sides of the bed will use a total of 30 feet of cedar boards.
   • Each side will be longer than 1 foot.
   • The length and width will measure 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 the boards for each bed.

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: 16  
Width: 9  
Area: 144

Garden Bed 2:  
Length: 18  
Width: 8  
Area: 144

Garden Bed 3:  
Length: 12  
Width: 10  
Area: 120

Go back and see what you can check off on the Self Check on page 207.

Part 5: Common Core Practice
Lesson 26

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L26: Perimeter and Area
269
Assessment and Remediation

- Ask students to find the perimeter of a rectangle that is 13 feet long and 8 feet wide. [42 feet]
- For students who are still struggling, use the chart below to guide remediation.
- After providing remediation, check students’ understanding. Ask students to explain their thinking while finding the area of a rectangle that is 15 inches long and 6 inches wide. [90 square inches]
- If a student is still having difficulty, use Ready Instruction, Level 3, Lesson 30.

<table>
<thead>
<tr>
<th>If the error is . . .</th>
<th>Students may . . .</th>
<th>To remediate . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 feet</td>
<td>have added the length and width but did not multiply by 2.</td>
<td>Demonstrate by drawing a rectangle that the distance around the rectangle is 2 times the length plus 2 times the width. Every rectangle has 2 sets of side lengths that have the same measure.</td>
</tr>
<tr>
<td>26 feet</td>
<td>not have included the two sides that represent the width.</td>
<td>Remind students that they need to multiply the length and width by 2 and then add.</td>
</tr>
<tr>
<td>104 feet</td>
<td>have found the area of the rectangle.</td>
<td>Remind students to use the formula ( P = 2l + 2w ) for perimeter and ( A = l \times w ) for area.</td>
</tr>
</tbody>
</table>

Hands-On Activity

Use geoboards to understand finding perimeter and area

Materials: geoboards, rubber bands

- Have students build rectangles on the geoboard and then find the area and perimeter. For example, what is the perimeter and area of a rectangle with width of 4 and length of 6?
- Have students use the geoboard to find as many different combinations of length and width that will produce a given area of a rectangle. For example, if a rectangle has an area of 36 square units, what are all the possible combinations of length and width for the rectangle?
- Have students use the geoboard to find as many different combinations of length and width that will produce a given perimeter of a rectangle. For example, if a rectangle has a perimeter of 24 units, what are all the possible combinations of length and width for the rectangle?

Challenge Activity

Provide the following problem situation for students to solve.

A farmer has 100 feet of fencing to build an enclosed, rectangular pen for his animals.

- In order to get the largest possible area to keep his animals, what would be the length and width of animal pen he could make? [10 feet by 10 feet]
- What would be the dimensions of the largest rectangular pen he could make with 169 feet of fence? [13 feet by 13 feet]
- What generalizations can you make about getting the largest possible rectangular area with a given perimeter? [The largest rectangular area will be a square.]