17.2 Find Perimeter

Essential Question How can you measure perimeter?

the 5 Es ENGAGE

GO DIGITAL Lesson Opener

Making Connections

Invite students to tell you what they know about triangles.

What is a triangle? (A triangle is a plane figure with three straight sides and three angles.) **Where do you see triangles in everyday life?** (Possible Answer: In art work, on your math textbook.)

Using the Digital Lesson

You may wish to remind students about the properties of triangles. Draw a few triangles and indicate the sides and angles in the triangle.

Learning Task

What is the problem the students are trying to solve? Connect the story to the problem.

- **What is the problem you are trying to solve?** (Find the perimeter of the triangle.)
- **What tool are you going to use?** (A ruler.)
- **What are you going to measure with the ruler?** (The perimeter of the triangle.)
- Have students think about how they found the perimeter using grid paper in the past.

Literacy and Mathematics

Choose one or more of the following activities.

- Have students explain how they might find the perimeter without using grid paper. Have students explain their reasoning to a partner.
- Have students discuss how they have used rulers in the past. Have students explain how they used rulers to measure various objects.

Texas Essential Knowledge and Skills

TEKS Geometry and Measurement—3.7.B
Determine the perimeter of a polygon or a missing length when given perimeter and remaining side lengths in problems

MATHEMATICAL PROCESSES
3.1.C Select tools, technology, and techniques
3.1.E Create and use representations

Are You Ready?

Access Prior Knowledge

Use the *Are You Ready?* 17.2 in the *Assessment Guide* to assess students' understanding of the prerequisite skills for this lesson.

Materials

Inch ruler

Vocabulary

GO DIGITAL Multimedia eGlossary at *thinkcentral.com*

GO DIGITAL Resources

For the student

- **Interactive Student Edition** *provides students with an interactive learning environment!*
- Math on the Spot Video Tutor
- *i*Tools Virtual Manipulatives
- Soar to Success Math Online Intervention

For the teacher

- **Digital Management Center** *organizes program resources by TEKS!*
- eTeacher Edition
- Online Assessment System

Unlock the Problem

Review with students that perimeter is the distance around a figure.

Activity

Introduce the activity by having students use a customary benchmark for length.

- **What part of your hand is about 1 inch long?**
  Possible answer: the distance from the tip of my thumb to the first knuckle is about 1 inch.
- **What is the length of a sheet of notebook paper?**
  The length is about 12 inches, or about 1 foot long.

In Step 1, have students estimate the perimeter without using their rulers.

In Step 2, students measure each side of the notebook to the nearest inch.

Students will measure to the nearest inch instead of the nearest half inch so that they do not have to add fractional parts.

In Step 3, remind students they need to add the lengths of the sides to find the perimeter.

Math Talk Mathematical Processes

Use Math Talk to check students' understanding of using an estimate to check for reasonableness.

Try This!

If the sides of the figures are measured correctly, each length will be a whole number of inches or centimeters.

ELL English Language Learners

Leveled Activities	ELPS
Beginning: Activity 20	1.A.1, 3.G.2, 4.C.3
Intermediate: Activity 54	3.B.3, 3.D.2, 4.F.2
Advanced: Activity 57	2.C.4, 3.D.2, 3.E
Advanced High: Activity 18	4.C.4, 4.E, 4.F.7

GO DIGITAL Go to *thinkcentral.com* for the **ELL Activity Guide** containing these leveled activities.

Name _____

17.2 Find Perimeter

TEKS Geometry and Measurement—3.7.B
MATHEMATICAL PROCESSES 3.1.C, 3.1.E

Essential Question How can you measure perimeter?

You can estimate and measure perimeter in standard units, such as inches and centimeters.

Unlock the Problem Real World

Find the perimeter of the cover of a notebook.

Activity **Materials** ■ inch ruler Possible answers are given.

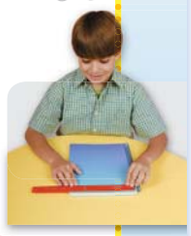
STEP 1 Estimate the perimeter of a notebook in inches. Record your estimate. 40 inches

STEP 2 Use an inch ruler to measure the length of each side of the notebook to the nearest inch.

STEP 3 Record and add the lengths of the sides measured to the nearest inch.

9 + 12 + 9 + 12 = 42

So, the perimeter of the notebook cover measured to the nearest inch is 42 inches.



Math Talk Mathematical Processes
Explain how your estimate compares with your measurement.

Try This! **Find the perimeter.** Answers will vary. Possible answer: the estimate, 40 inches, is close to but less than the actual measurement, 42 inches.

Use an inch ruler to find the length of each side.

Add the lengths of the sides:

1 + 2 + 1 + 2 = 6

The perimeter is 6 inches.

Use a centimeter ruler to find the length of each side.

Add the lengths of the sides:

3 + 3 + 3 + 3 = 12

The perimeter is 12 centimeters.

Differentiated Instruction

ELL Language Support

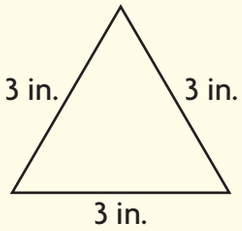
Interpersonal / Social
Partners / Small Group

ELPS 3.G.2, 4.F.1, 4.F.7

Strategy: Creative Grouping

Materials: inch ruler

- Partner advanced English learners or students who are fluent in English with beginning and intermediate English learners.
- Have them measure perimeter.
- Have students describe how to measure perimeter with an inch ruler.

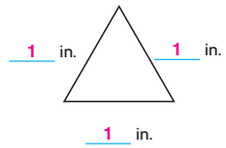


3 in. + 3 in. + 3 in. = 9 in.

Share and Show

MATH BOARD

1. Use an inch ruler to find the perimeter of the triangle.

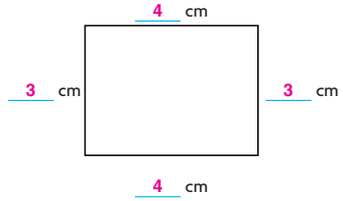


Think: How long is each side?

3 inches

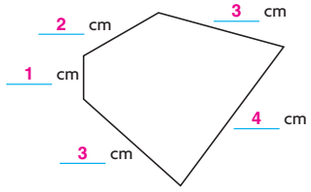
Use a centimeter ruler to find the perimeter.

2.



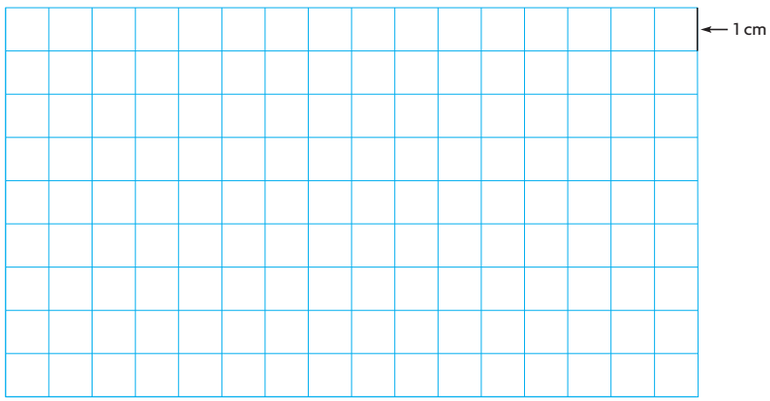
14 centimeters

3.



13 centimeters

4. Use the grid paper to draw a figure that has a perimeter of 24 centimeters. Label the length of each side. Check students' drawings.



Math Talk
Mathematical Processes
Explain how many numbers you add together to find the perimeter of a figure.

Possible explanation: the number of addends is equal to the number of sides a figure has.

Enrich

Visual
Individual

Materials: crayons, 1-Inch Grid Paper (see eTeacher Resources)

- Write the following perimeters on the board:
  perimeter = 12 inches
  perimeter = 15 inches
  perimeter = 8 inches
- Have students begin by drawing a rectangle with a perimeter of 12 inches. Then, have students draw other rectangles and figures with a perimeter of 12 inches.
- Challenge students to draw at least 3 different figures for each perimeter.

GO DIGITAL Go to *thinkcentral.com* for additional enrichment activities in the **Enrich Activity Guide**.

3 the 5 Es EXPLAIN

Share and Show

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

Math Talk
Mathematical Processes

Use Math Talk to focus on students' understanding of the relationship between the number of sides of a figure and the number of addends needed to find the perimeter of a figure.

Before the figures on this page are measured, you might choose to have students estimate each perimeter. After the figures have been measured, discuss how the estimates can be used to help decide the reasonableness of the exact answers.

Use the checked exercises for Quick Check. Students should show their answers for the Quick Check on the MathBoard.

RtI Quick Check

IF a student misses the checked exercises

THEN Differentiate Instruction with RtI Tier 1 Lesson 84

COMMON ERRORS

Error When a length is not given, the length is assumed.

Example Students assume all sides of a triangle are the same length and measure only one side.

Springboard to Learning Point out that unless students are told a triangle has three sides of equal length, they must measure each side to check that they are the same.

Problem Solving

H.O.T. Problems

For Problem 7, students need to analyze and solve a multistep problem. First, they find the perimeter of the square garden. Then, they multiply the perimeter by $5 to find the cost of the fence.

For Problem 8, some students may find it helpful to first sketch the rectangle and label one of its sides as 10 feet.

Go Deeper

Ask students to explain how multiplication *and* addition can be used to find the perimeter of a rectangle. Double the length and double the width (or multiply each measure by 2), and then find the sum of the products.

Math on the Spot Video Tutor

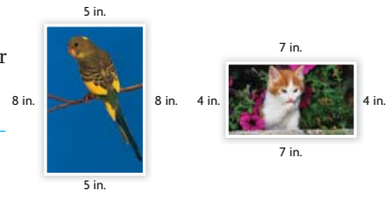
Through the ***Math on the Spot Video Tutor***, students will be guided through an interactive solving of this type of H.O.T. problem. Use this video to also help students solve the H.O.T. problem in the Interactive Student Edition. With these videos and the H.O.T. problems, students will build skills needed in the TEXAS assessment.

GO DIGITAL **Math on the Spot** videos are in the Interactive Student Edition and at *thinkcentral.com*.

Name _____

Problem Solving Real World

Use the photos for 5–6.



5. Which of the animal photos has a perimeter of 26 inches?

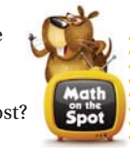
bird photo

6. **Multi-Step** **Analyze** How much greater is the perimeter of the bird photo than the perimeter of the cat photo?

4 inches

Write Math Show Your Work

7. H.O.T. **Multi-Step** Erin is putting a fence around her square garden. Each side of her garden is 3 meters long. The fence costs $5 for each meter. How much will the fence cost?



$60

8. H.O.T. Write Math Gary's garden is shaped like a rectangle with two pairs of sides of equal length, and it has a perimeter of 28 feet. **Explain** how to find the lengths of the other sides if one side measures 10 feet.

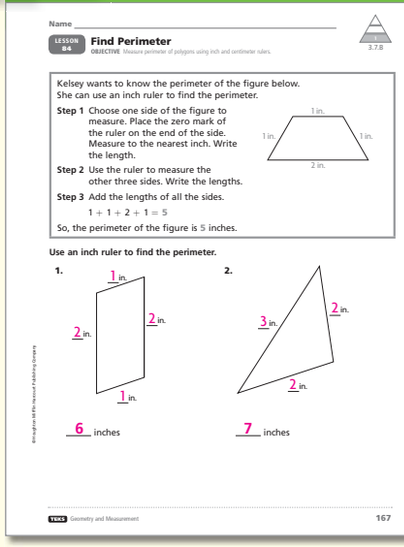
Possible explanation: I know that his garden has four sides with two pairs of sides of equal length; 10 + 10 = 20; 28 − 20 = 8; 8 ÷ 2 = 4; so, each of the other two sides is 4 feet; 10 + 4 + 10 + 4 = 28.

9. **Evaluate** Jill says that finding the perimeter of a figure with all sides of equal length is easier than finding the perimeter of other figures. Do you agree? **Explain**.

Yes; possible explanation: because all of the sides have equal length, I can multiply the length of one side by the number of sides the figure has.

Differentiated Instruction

RtI Tier I Lesson 84



Name _____

LESSON 84 **Find Perimeter**

OBJECTIVE Measure perimeter of polygons using inch and centimeter rulers.

3.7.B

Kelsey wants to know the perimeter of the figure below. She can use an inch ruler to find the perimeter.

Step 1 Choose one side of the figure to measure. Place the zero mark of the ruler on the end of the side. Measure to the nearest inch. Write the length.

Step 2 Use the ruler to measure the other three sides. Write the lengths.

Step 3 Add the lengths of all the sides.

1 + 1 + 2 + 1 = 5

So, the perimeter of the figure is 5 inches.

1 in. 1 in. 1 in. 2 in.

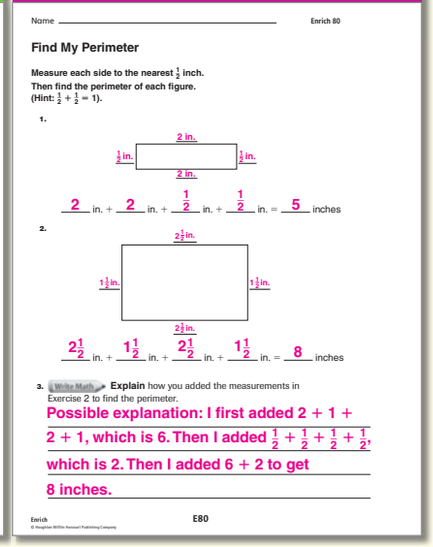
Use an inch ruler to find the perimeter.

1. 1 in. 2 in. 2 in. 1 in. — 6 inches

2. 3 in. 2 in. 2 in. — 7 inches

TEKS Geometry and Measurement 167

Enrich 80



Name _____ Enrich 80

Find My Perimeter

Measure each side to the nearest $\frac{1}{2}$ inch. Then find the perimeter of each figure. (Hint: $\frac{1}{2} + \frac{1}{2} = 1$).

1. 2 in. $\frac{1}{2}$ in. $\frac{1}{2}$ in. 2 in.

2 in. + 2 in. + $\frac{1}{2}$ in. + $\frac{1}{2}$ in. = 5 inches

2. $2\frac{1}{2}$ in. $1\frac{1}{2}$ in. $1\frac{1}{2}$ in. $2\frac{1}{2}$ in.

$2\frac{1}{2}$ in. + $1\frac{1}{2}$ in. + $2\frac{1}{2}$ in. + $1\frac{1}{2}$ in. = 8 inches

3. Write Math **Explain** how you added the measurements in Exercise 2 to find the perimeter.

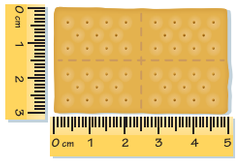
Possible explanation: I first added 2 + 1 + 2 + 1, which is 6. Then I added $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$, which is 2. Then I added 6 + 2 to get 8 inches.

Enrich E80

Daily Assessment Task

Fill in the bubble completely to show your answer.

10. Sally is putting frosting around the edges of the roof of a gingerbread house. What is the perimeter of the roof?



Ⓐ 18 cm
● 16 cm
Ⓒ 8 cm
Ⓓ 20 cm

11. Kyle is adding a border to his triangular flag. What is the perimeter of the flag?

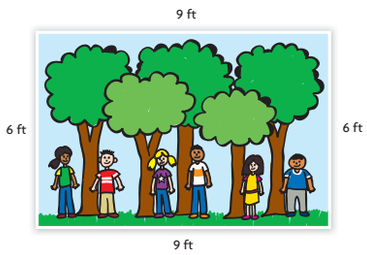
Ⓐ 2 inches
Ⓑ 6 inches
● 3 inches
Ⓓ 1 inch

12. Multi-Step Pete glues a rope around his rectangular rodeo sign. His sign has side lengths of 2 feet and 3 feet. The rope costs $4 for each foot. How much does Pete pay for rope?

Ⓐ $24
Ⓑ $20
Ⓒ $10
● $40

TEXAS Test Prep

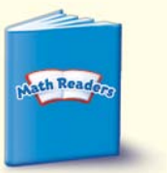
13. Austin's class is making a poster for Earth Day. What is the perimeter of the poster?



Ⓐ 24 feet
Ⓑ 21 feet
Ⓒ 15 feet
● 30 feet

Grab-and-Go!™ Ready-Made Independent Activities

Differentiated Centers Kit



Literature
James' Frames
Students read about using perimeter to find how much wood is needed to make picture frames.

Activities
Perimeter Parade
Students complete orange Activity Card 10 by finding the perimeter of pattern blocks.

Activities
Jump to 9
Students complete blue Activity Card 6 by measuring and then adding lengths.

5 the 5 Es EVALUATE

Daily Assessment Task RtI

Can students measure perimeter?

IF	THEN
NO	• Soar to Success Math Warm-Up 47.30
YES	• Enrich 80 • Homework and Practice Lesson 17.2

TEXAS Test Prep Coach

Test Prep Coach helps teachers to identify common errors that students can make.

In the Test Prep exercise, if students selected:

A They forgot to add one of the 6-ft sides.

B They forgot to add one of the 9-ft sides.

C They forgot to add one 9-ft side and one 6-ft side.

Essential Question

Write Math

How can you measure perimeter? Possible answer: I can estimate the perimeter of a shape by using benchmarks. I can use an inch or a centimeter ruler to find the length of each side. Then I add the lengths and compare the perimeter to the estimate to see if my answer is reasonable.

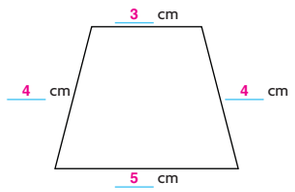
Homework and Practice

TEKS Geometry and Measurement—3.7.B
MATHEMATICAL PROCESSES 3.1.C, 3.1.E

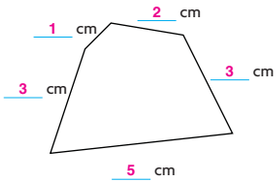
Name _____

17.2 Find Perimeter

Use a centimeter ruler to find the perimeter.

1. 

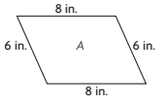
16 centimeters

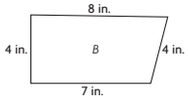
2. 

14 centimeters

Problem Solving Real World

Use the drawings for 3–4.





3. Carly drew quadrilaterals *A* and *B*. Which quadrilateral has a perimeter of 28 inches?

quadrilateral *A*

4. How much greater is the perimeter of quadrilateral *A* than the perimeter of quadrilateral *B*?

5 inches

Lesson Check

TEXAS Test Prep

Fill in the bubble completely to show your answer.

5. Benjamin builds a fence in the shape of a triangle. Each side of the fence is the same length. If the perimeter is 36 feet, how long is each side of the fence?

Ⓐ 6 feet
● 12 feet
Ⓒ 9 feet
Ⓓ 18 feet

6. Anton puts a rail around his patio. The patio is in the shape of a rectangle with side lengths of 7 feet and 9 feet. What is the perimeter of Anton's patio?

Ⓐ 16 feet
Ⓑ 63 feet
Ⓒ 22 feet
● 32 feet

7. Alexander makes this name plate from wood in art class. What is the perimeter of the name plate?

● 18 cm
Ⓑ 9 cm
Ⓒ 3 cm
Ⓓ 6 cm

8. **Multi-Step** Iris sews a border around a blanket. The blanket has side lengths that are 4 feet and 6 feet. The border material costs $2 for each foot. How much does Iris pay for the border?

Ⓐ $20
Ⓑ $12
● $40
Ⓓ $16

9. **Multi-Step** An artist paints two pictures. Each picture has side lengths of 2 feet and 4 feet. Framing costs $3 for each foot. How much will the artist pay to put a frame around both paintings?

Ⓐ $18
● $72
Ⓒ $36
Ⓓ $24

Homework and Practice

Use the Homework and Practice pages to provide students with more practice on the concepts and skills of this lesson.