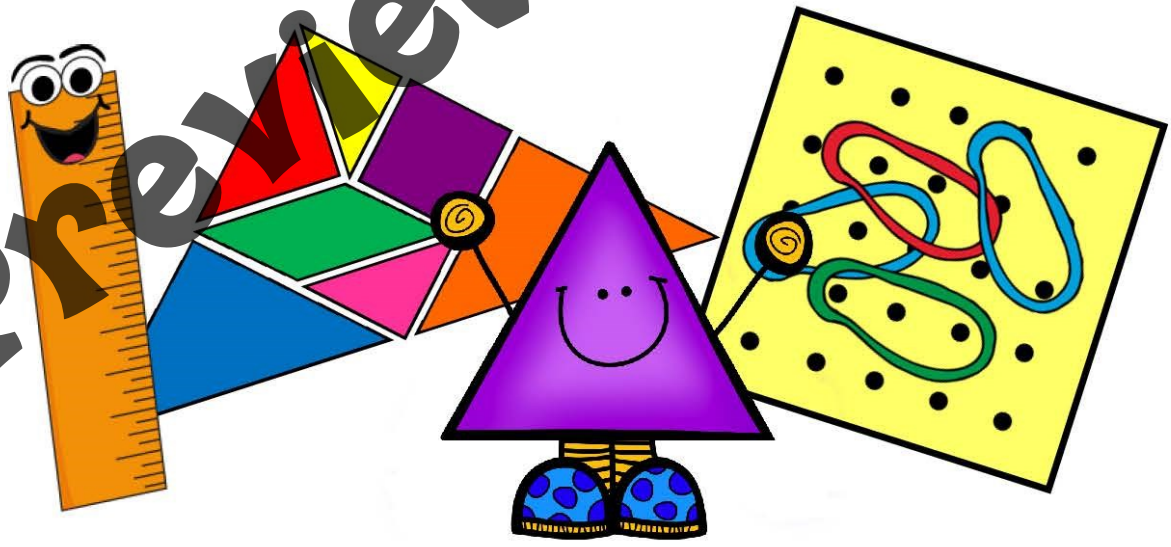
Grades 2 - 5

Exploring Perimeter

Hands-on Lessons and Printables to Develop Perimeter Concepts



Common Core Aligned
Math 3.MD.B.4,
3.MD.D.8, 4.MD.A.3

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Acknowledgements

The best projects are the result of collaboration, and I'd like to express my appreciation to the teachers below who reviewed ***Exploring Perimeter*** and/or used some of the activities with their students. Thanks to Stacy Kasse, Maia Dobson, Marie Roberts, Jo Ann Mumford, Kathleen Wilderman, Mary Robertson, Ann Bullard, Kristie Horst, and Kelli Newman!

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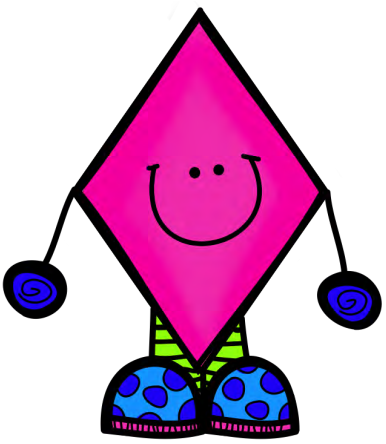

Exploring Perimeter

Contents and Intro

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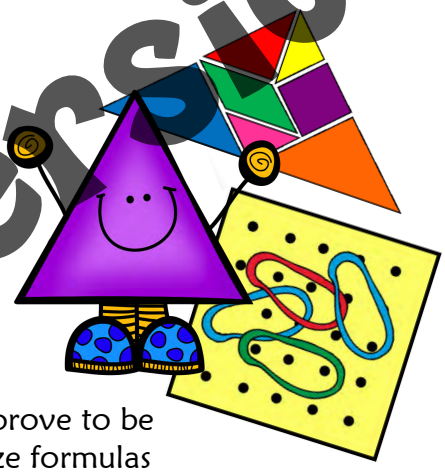
Printer Alert!

When you print this ebook, set the page size properties to **"Actual"** and not "Fit to Page." If your printer shrinks the pages, the measurement activities will not yield accurate results.



Developing Perimeter Concepts

Perimeter is one of the simplest geometry concepts to teach, but when combined with instruction on area it can prove to be extremely confusing. When students are taught to memorize formulas without having time to develop a deep understanding, they will almost certainly have difficulty distinguishing area from perimeter. This book provides numerous quick and easy hands-on activities to develop the concept of perimeter as linear measurement before you introduce area concepts.

Perimeter is simply the distance around an object. The concept holds true whether you measure that distance in toothpicks, jelly beans, inches, feet, centimeters, meters, or miles. In order to develop the concept fully, students need to count units around an object, measure objects to find perimeter, add or multiply the lengths of sides, and determine formulas for finding the perimeter of squares and rectangles. Finally, they need to apply the concept of perimeter to real world problems.

Common Core Connections

The activities in this Power Pack offer a sequential approach to teaching perimeter and are presented in their order of difficulty. From simple hands-on experiences with toothpicks to the development of formulas, you'll find a variety of activities to meet your needs. Use whatever is appropriate for your students. Even though the concept of perimeter only appears in the Common Core State Standards for third and fourth grades, perimeter may be introduced earlier as a part of a linear measurement unit.

Exploring Perimeter

Power Pack Suggestions

These concepts are also important in solving word problems at fifth grade and above. Therefore, some of the activities in this ebook aren't directly correlated with a specific Common Core Standard. Refer to the chart on the next page for the correlations that do exist in this Power Pack.

How to Use this Power Pack

Each activity is preceded by a teacher page that provides helpful information for planning. Check out the sample page below for information about each component. Don't feel you need to teach every lesson in this book; choose only the activities that meet your needs. Many of the lessons include variations of the same printable, one using inches and the other using centimeters, so review them carefully before including them in a lesson. Many activity pages are designed to be projected onto an interactive whiteboard, while others can be used as games for reviewing concepts. To save paper, laminate the activity pages and use them in math centers with dry erase markers. Be sure to engage students actively with cooperative learning and hands-on materials like geoboards and rulers. Most of all, enjoy these lessons and have fun as your students explore perimeter!

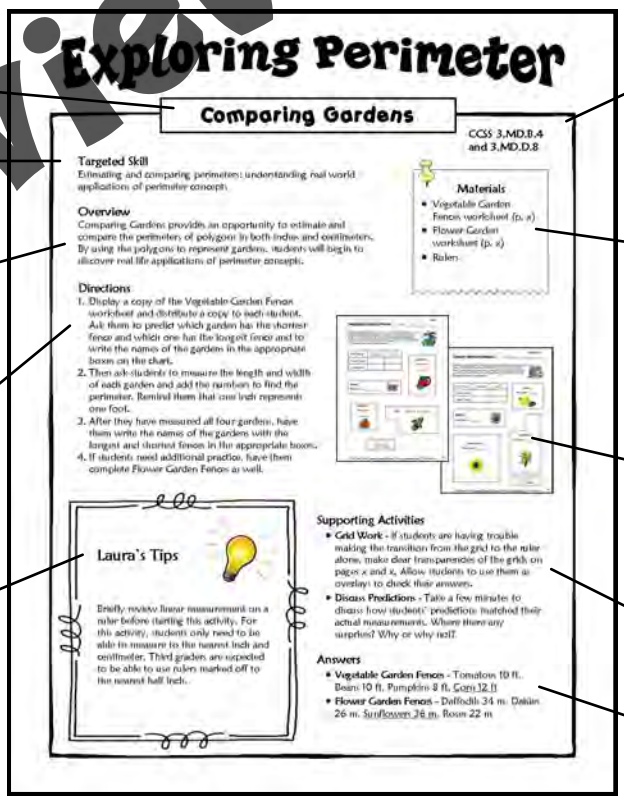
Activity Title

Targeted Skills
Objectives addressed by the activity.

Overview
General information about the lesson

Directions
Suggested procedure in step-by-step format

Laura's Tips
Management ideas, helpful hints, and suggestions



CCSS
Common Core State Standards (if applicable)

Materials
Items needed for the activity including printables

Thumbnails
Small graphics of the activity pages

Extensions or Additional Info
Additional strategies and modifications

Answers
Activity Answers

Exploring Perimeter

Common Core Connections

Activity	Targeted Skills	CCSS
Toothpick Perimeters	Exploring the linear nature of perimeter; counting perimeter units	n/a
Geoboard Perimeters	Exploring the linear nature of perimeter; counting perimeter units	n/a
Perimeter Count Around	Counting perimeter units on a grid	n/a
Measuring on a Grid	Measuring with a ruler to find perimeter	3.MD.B.4
Perimeter Power Game	Measuring or counting to find perimeter	3.MD.B.4
Comparing Gardens	Measuring to find perimeter; calculating and comparing perimeters	3.MD.B.4, 3.MD.D.8
Perimeter Partners	Measuring to find perimeter of real objects	3.MD.B.4
Tangram Perimeters	Calculating perimeters of polygons and artwork created with polygons	3.MD.B.4
Calculating Perimeters	Calculating perimeters of polygons with given dimensions	3.MD.D.8
Missing Side Perimeters	Determining the lengths of unlabeled sides in order to calculate perimeter	3.MD.D.8
Mystery Perimeters	Determining the lengths of unlabeled sides in order to calculate perimeter	3.MD.D.8
Finding Formulas	Developing the formula for finding the perimeters of squares and rectangles	3.MD.D.8, 4.MD.A.3
Perimeter Problems	Solving word problems that require application of perimeter concepts	3.MD.D.8, 4.MD.A.3

Exploring Perimeter

Toothpick Perimeters

Targeted Skill
Developing the concept of perimeter as a linear unit

Overview
If your students have never studied perimeter, these activities are a good place to start. Fencing Barnyards and Cow Pasture Perimeters both require students to place toothpicks around barnyards to visually show perimeter as linear units.

Materials
- Fencing Barnyards and Cow Pasture Perimeters (pages 7 and 8)
- Toothpicks or other linear manipulatives
- Glue (optional)

Directions
1. Distribute one **Fencing Barnyards** worksheet to each student or pair of students. Place a pile of toothpicks in the middle of each team.
2. Review the student directions and introduce the word "perimeter." Have students place toothpicks, end to end around the outside edges of the barnyards to find the perimeters. You may want them to glue the toothpicks in place.
3. Remind students to record the perimeters on the lines provided.
4. Repeat with **Cow Pasture Perimeters**.

Laura's Tips

The toothpicks used in this activity are 2 5/8 inches long. You'll need to test out your toothpicks with the activity in advance. If they are not exactly the right size, ask your students to "round off" to the nearest toothpick. Or you can substitute some other linear object such as pretzel sticks, straws, pipe cleaners, or Wikki sticks cut to the right length.

Extensions
- Have students create their own barnyards from construction paper. Increase the difficulty level by having them create barnyards with specific perimeters.
- Use a rug or sheet of bulletin board paper to create a large "barnyard" in your classroom. Have students place 12" rulers end-to-end to create a "fence" around the barnyard. Count the rulers to find the length of the perimeter in feet.

Answers
- Chicken Coop - 4
- Horse Pasture - 6
- Cow Pasture - 10

Fencing Barnyards

Name _____

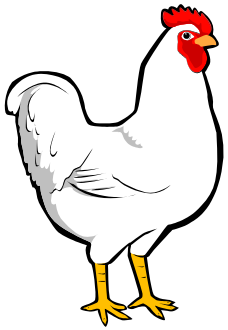
Help! Farmer Joe needs to fence in the barnyards shown below. Use toothpicks for fence rails and place them, end to end, around each barnyard. How many fence rails are needed to build a fence around each barnyard?

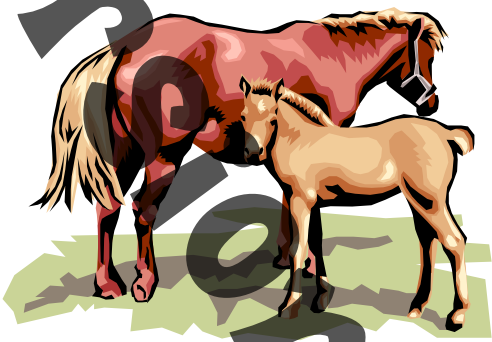
The distance around a shape is called its **perimeter**.

Record the perimeter of each barnyard below.

Chicken Coop Perimeter _____

Horse Pasture Perimeter _____





Cow Pasture Perimeter

Name _____

How many fence rails will Farmer Joe need to build a fence around his cow pasture? Use toothpicks to find the **perimeter** of the pasture. Place your toothpicks, end to end, around the outside of the barnyard and count to find the total distance.

Cow Pasture Perimeter = _____

Exploring Perimeter

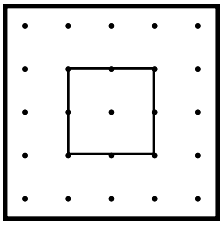
Geoboard Perimeters

Targeted Skill
Exploring the concept of perimeter as linear measurement

Overview
This activity is excellent for visual-spatial learners, as well as students who need hands-on experiences. Students are asked to stretch rubber bands around the pegs of a geoboard to create models of the polygon illustrations on the worksheet. Then they count the units around the shape and record the perimeter on the worksheet. You may also have students use a ruler and determine the actual measurement with a standard measurement system.

Materials
- Geoboard Perimeters activity page (page 10)
- Geoboards
- Rubber bands

Directions
1. Distribute geoboards and two or three rubber bands to each student. Allow them to have a few minutes to play and explore how to use the geoboard to create shapes.
2. Demonstrate how to create a shape on the geoboard and tell students that the distance around the shape is called its **perimeter**. Tell them that the distance between two pegs is one unit of measurement. Show them how to "pluck" the rubber band between each two pegs to count the perimeter.
3. Give each student or pair of students a copy of the **Geoboard Perimeters** worksheet. Show them how to create a model of the first shape using the rubber bands on their geoboards.
4. After creating the shape on their geoboards, have them count around to find the perimeter and record that number on the worksheet above the polygon.
5. Check their responses for the first polygon and then allow them to finish at their own pace.
6. If you want to create more **Geoboard Perimeter** activities, use the printable on page 61.



Laura's Tips

Many students will have trouble recreating the polygon illustrations on their geoboards. It may help to have them visualize a coordinate grid and label the X and Y axes with numbers. Then have them notice the points where the rubber band is looped around a peg, such as point (2,3). You can also pair them with a partner and have them help each other with this task.

Extensions
- **Measurement** - Have students measure the distance around each polygon with a ruler instead of counting units. Centimeters are usually easier to use than inches because they eliminate the need for fractional units.
- **Create Your Own** - Allow students to create their own shapes on their geoboards. Then have them transfer their models to paper.
- **Virtual Geoboards** - Use the free virtual geoboard from www.mathplayground.com to demonstrate and explore perimeter.

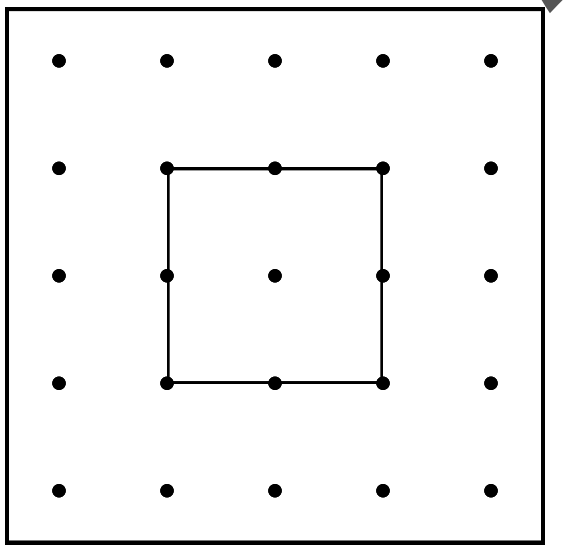
Answers
#1 - 8, #2 - 12, #3 - 10, #4 - 14,
#5 - 12, #6 - 12

Geoboard Perimeters

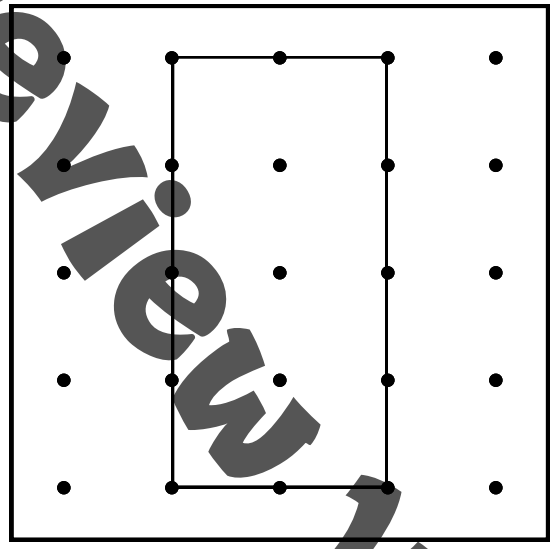
Name _____

Directions: Create each geometric figure on your geoboard and find its perimeter. Write the perimeter above the figure.

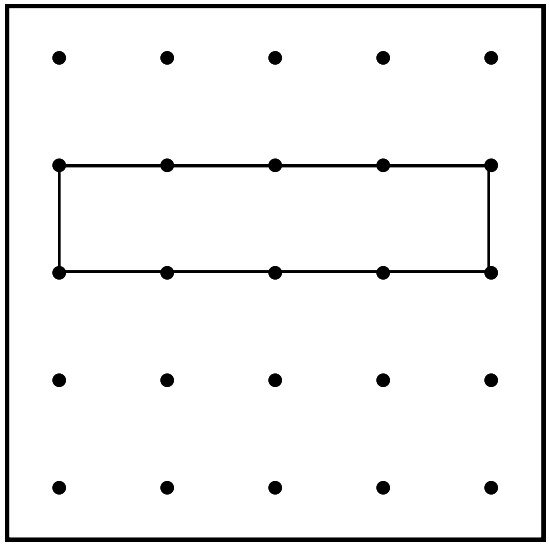
1 P = _____



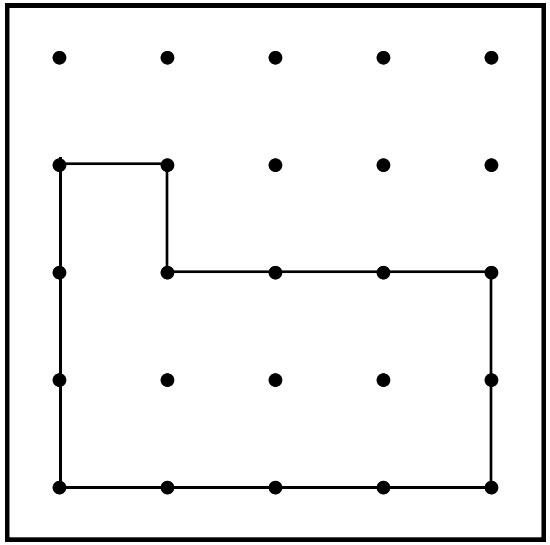
2 P = _____



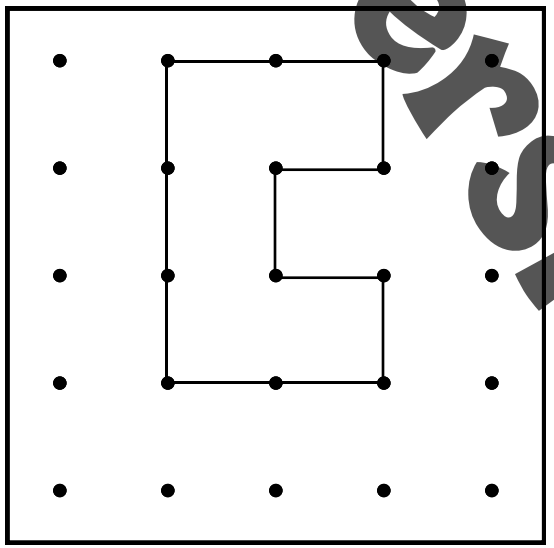
3 P = _____



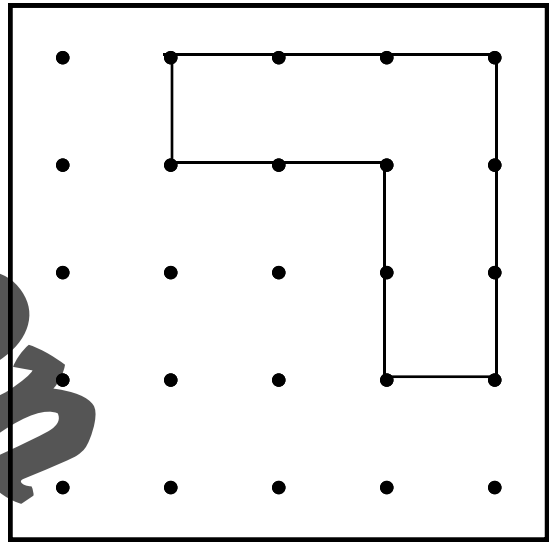
4 P = _____



5 P = _____



6 P = _____



Exploring Perimeter

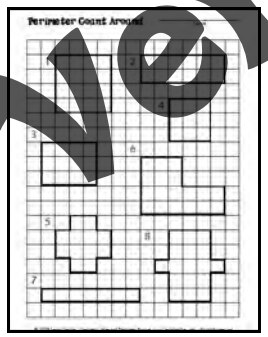
Perimeter Count Around

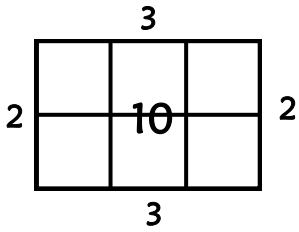
Targeted Skill
Finding perimeter by counting units around polygons on a grid

Overview
Perimeter Count Around will help students make the transition from geoboards and toothpicks to paper and pencil. Instead of counting objects, they will count units on grid paper and add them to find the total perimeter.

Materials
- Perimeter Count Around activity page (p. 12)
- Pencils
- Centimeter Rulers (optional)

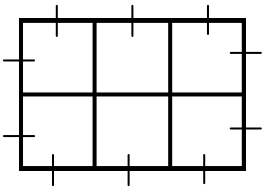
Directions
1. Review the definition of perimeter with your students. Give each student or pair of students a **Perimeter Count Around** worksheet.
2. Display a copy of the worksheet on an overhead projector or interactive whiteboard. Demonstrate how to count the number of units on each side of a polygon. Have students label each side with the number of units.
3. Ask students to count up the total units and write the perimeter inside each polygon.
4. If students are working with a partner, have them take turns with the activity. The first person counts the units and labels the lengths of each side. The other person adds the lengths and writes the perimeter in the figure. Have them switch roles for each figure.





Laura's Tips

Note that students often forget to count both sides when counting around a corner, so show them how to number each segment or make a small hash mark in each segment as shown.

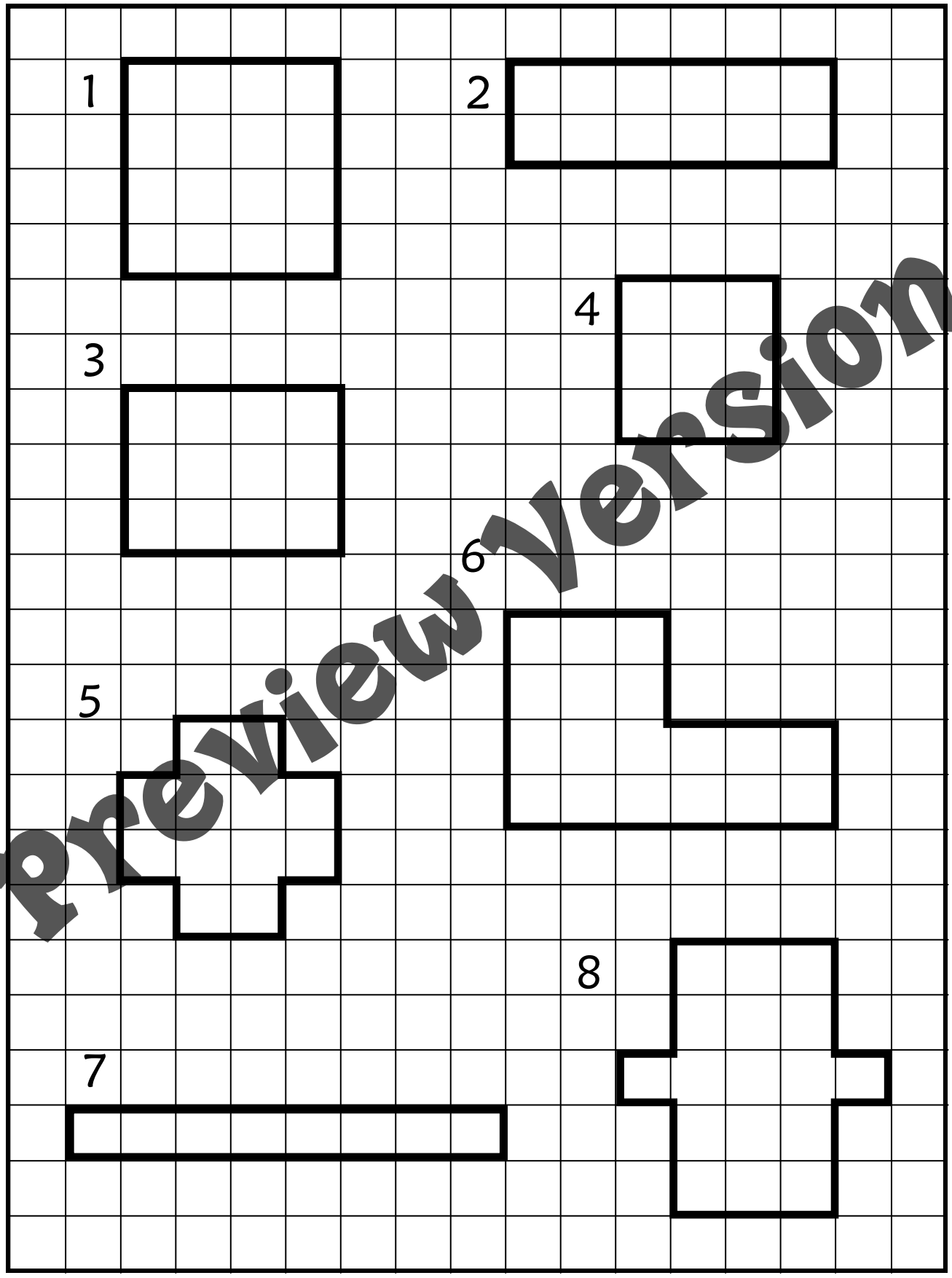


Extensions
- **Metric Measurement** - Each unit is 1 cm square, so this activity can be used to introduce ruler measurement. Show students how to measure the length of each side with a centimeter ruler.
- **Create and Trade** - Give students centimeter grid paper and a ruler. Allow them to create their own polygons and trade with a partner to find the perimeter. Tell them not to draw lines diagonally across the squares because the diagonals are not the same length as the sides of the squares.

Answers
#1 - 16, #2 - 16, #3 - 14, #4 - 12,
#5- 16, #6 - 20, #7 - 18, #8 - 20

Perimeter Count Around

Name _____



Exploring Perimeter

Measuring on a Grid

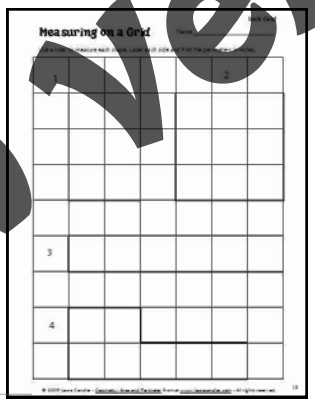
CCSS 3.MD.B.4

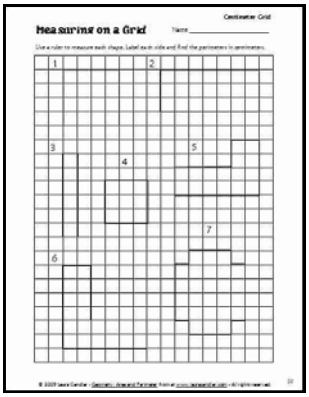
Targeted Skill
Finding perimeter by counting units on a grid; developing standard measurement concepts

Overview
In this activity, students will find the perimeter of various polygons by measuring with a ruler. They can verify their work by counting units.

Materials
- Measuring on a Grid activity pages (Pages 14 and/or 15)
- Rulers

Directions
1. Begin with the inch grid which is easier because the numbers are smaller. If your students don't know how to use a centimeter ruler, you may want to skip the centimeter grid version of the activity.
2. Demonstrate how to use a ruler to measure the length of each side on the first rectangle. Show students how to label the length and width and add to find the perimeter. Write the perimeter in the interior of the rectangle.
3. Show students how to verify their measurements by counting the number of units around the shape.
4. Have students complete the rest of the worksheet on their own.
5. Check their answers and have them complete the second worksheet as needed for additional practice.





Laura's Tip

Briefly review linear measurement on a ruler before starting this activity. For this activity, students only need to be able to measure to the nearest inch and centimeter. However, the third grade Common Core standards expect students to measure with a ruler marked off in inches and half-inches. You can skip the centimeter version of this activity if your students aren't ready for metric measurement.

Extension Activity

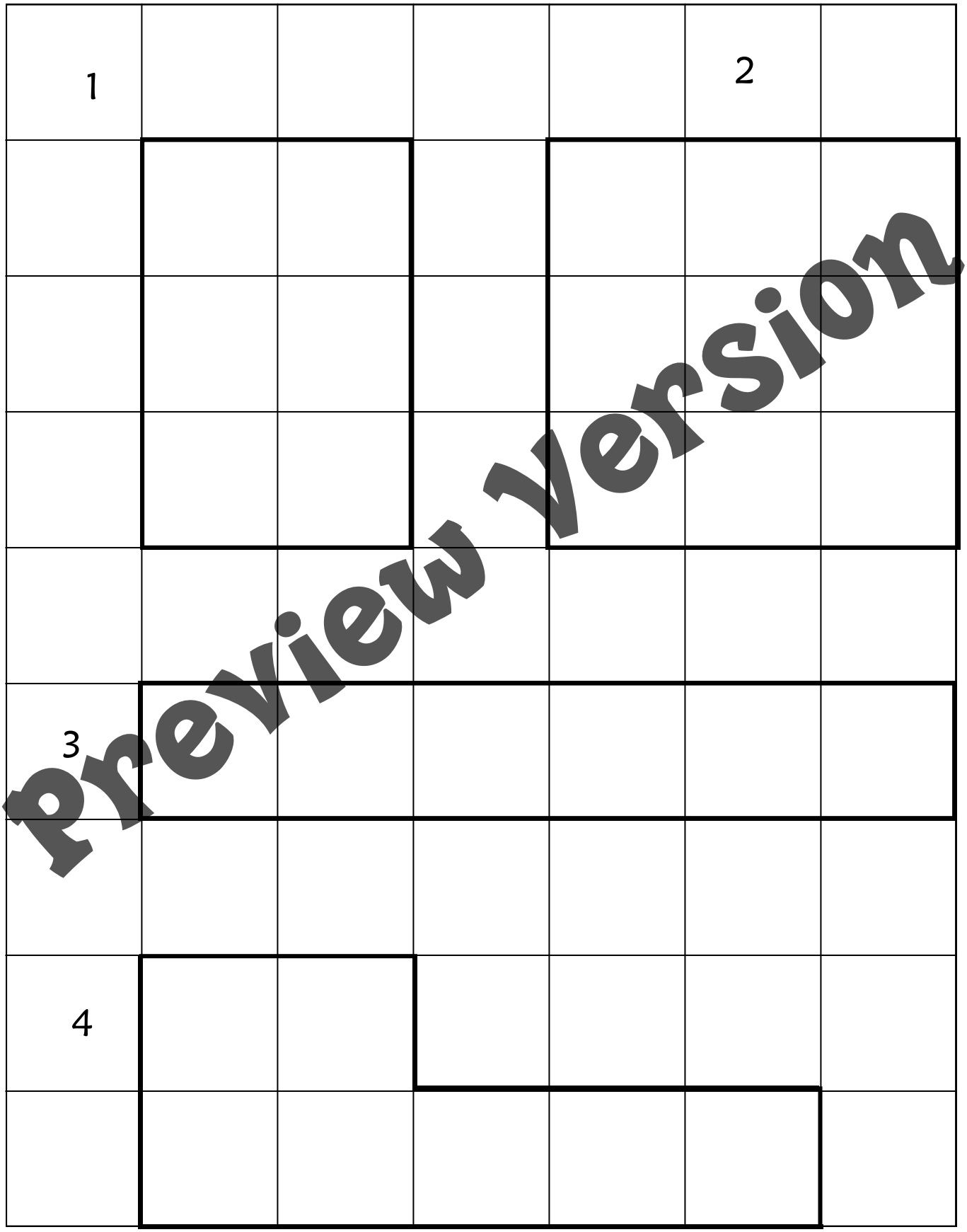
Create and Trade - Give students blank grid paper and a ruler. You can find blank grids in different sizes at the back of this packet. Allow students to create their own polygons and trade with a partner to find the perimeter. Tell them not to draw lines diagonally across the squares because the diagonals are not the same length as the sides of the squares.

Answers
- **Inch Grid (page 14)**
  #1 - 10, #2 - 12, #3 - 14, #4 - 14
- **Centimeter Grid (page 15)**
  #1 - 16, #2 - 20, #3 - 14, #4 - 12, #5- 20, #6 - 32, #7 - 22

Measuring on a Grid

Name _____

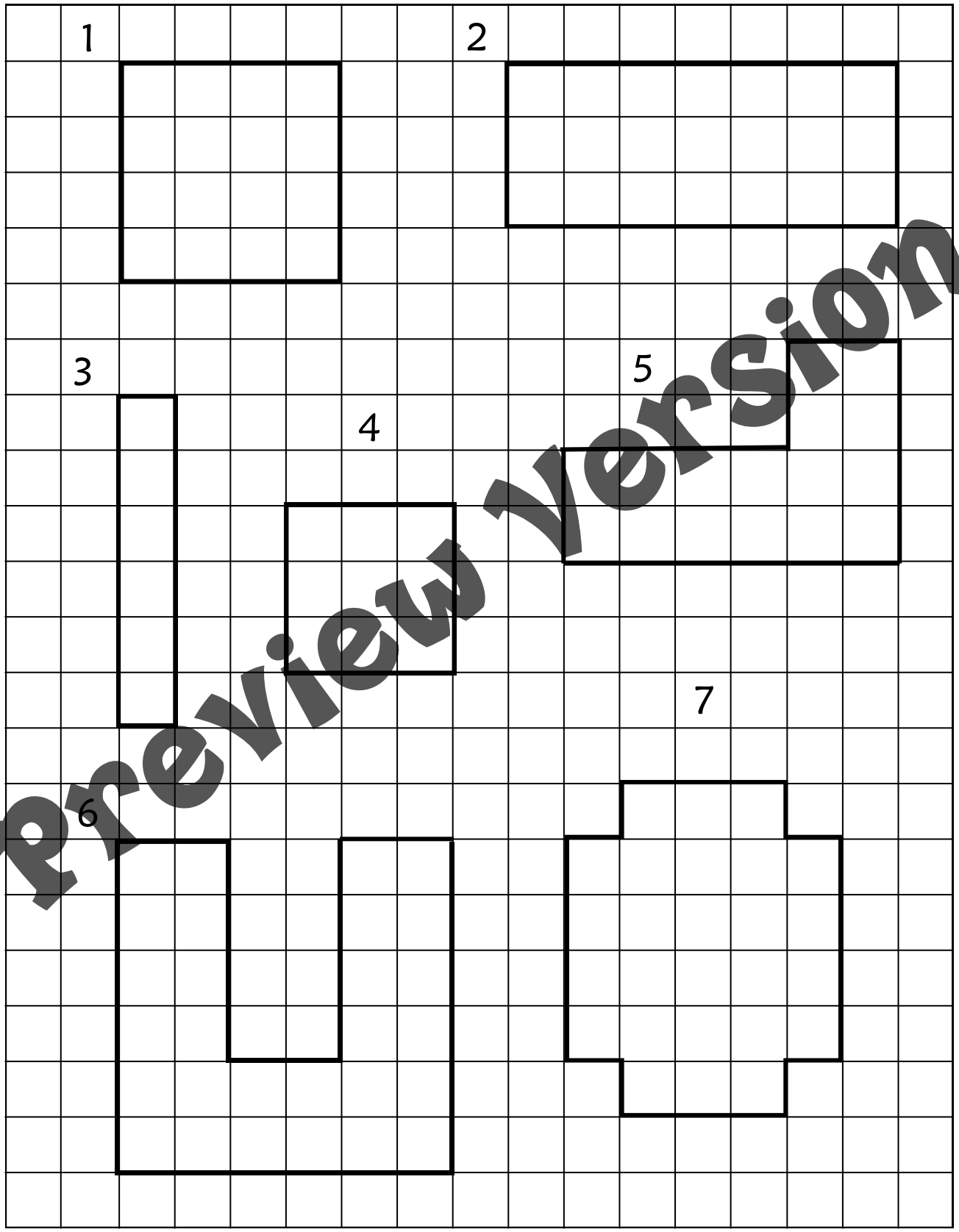
Use a ruler to measure each shape. Label each side and find the perimeters in inches.



Measuring on a Grid

Name _____

Use a ruler to measure each shape. Label each side and find the perimeters in centimeters.



Exploring Perimeter

Perimeter Power Game

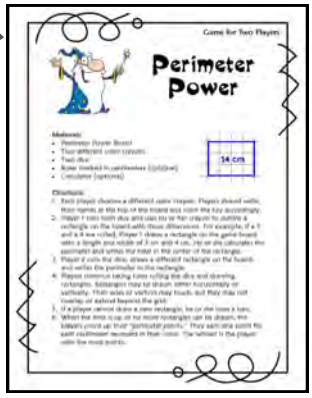
CCSS 3.MD.B.4

Targeted Skill
Finding perimeter by counting or measuring units on a grid; developing standard measurement concepts

Overview
In this game, students will take turns with a partner rolling dice to determine the dimensions of squares and rectangles to draw on a grid. They will count and/or measure to determine the perimeter of each polygon, scoring one point for each unit or centimeter.

Centimeters versus Units
The basic directions refer to the units on the board as centimeters. However, if your students are not yet familiar with a centimeter ruler, they can simply count the units around the rectangle.

Materials
- Perimeter Power Directions and Game boards
- Centimeter Rulers (optional)
- Calculators
- Crayons
- Dice



Directions
1. Display the game directions and a game board, and choose a student from the class to play against as you demonstrate the game. Remind students that they should be checking each other's work as they play.
2. Decide how you want to handle errors and explain your rules to your students. Are they allowed to correct errors found by their partner and count those points, or do they lose the turn?
3. Before distributing materials to the class, pair each student with a partner, making sure that at least one student in each pair is able to measure and/or count to find perimeter.
4. Provide time for students to play several rounds of the game. You may want to let them switch partners after each round.

Laura's Tip

If students roll the same number on both dice, they will end up drawing a square. Students may feel they have to roll again since it's not a "rectangle," but remind them that a square is actually a type of rectangle.

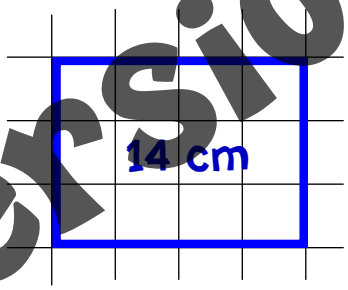
Extension Activities
- **Perimeter Power in Inches** - To play the game on an inch grid, print off two copies of the grid on page 50. Tape them together so that the grids line up and match. The same rules apply.
- **Area Power** - After you introduce area concepts, students can play the game again recording the area of each square or rectangle.
- **Island Conquer Game** - Island Conquer is a free game similar to Perimeter Power. Instead of rolling dice, students draw out cards that have coordinate graphing points to designate where the squares and rectangles are placed. You can download this freebie from the Math File Cabinet on Teaching Resources at www.lauracandler.com.

Game for Two Players

Perimeter Power

Materials:

- Perimeter Power Board
- Two different color crayons
- Two dice
- Ruler marked in centimeters (optional)
- Calculator (optional)



Directions:

1. Each player chooses a different color crayon. Players should write their names at the top of the board and color the key accordingly.
2. Player 1 rolls both dice and uses his or her crayon to outline a rectangle on the board with those dimensions. For example, if a 3 and a 4 are rolled, Player 1 draws a rectangle on the game board with the dimensions of 3 cm by 4 cm. He or she calculates the perimeter and writes the total in the center of the rectangle.
3. Player 2 rolls the dice, draws a different rectangle on the board, and writes the perimeter in the rectangle.
4. Players continue taking turns rolling the dice and drawing rectangles. Rectangles may be drawn either horizontally or vertically. Their sides or vertices may touch, but they may not overlap or extend beyond the grid.
5. If a player cannot draw a new rectangle, he or she loses a turn.
6. When the time is up or no more rectangles can be drawn, the players count up their "perimeter points." They earn one point for each centimeter recorded in their color. The winner is the player with the most points.

Perimeter Power

Player 1

Player 2

Exploring Perimeter

Comparing Gardens

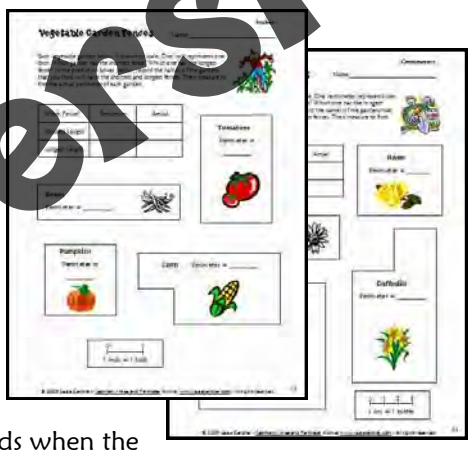
CCSS 3.MD.B.4 and 3.MD.D.8

Targeted Skill
Estimating and comparing perimeters; understanding real world applications of perimeter; interpreting scale drawings

Materials
- Vegetable Garden Fences 1 & 2 (p. 20 - 21)
- Flower Garden Fences 1 & 2 (p. 22 - 23)
- Rulers

Overview
Comparing Gardens provides an opportunity to estimate and compare the perimeters of polygons in both inches and centimeters. By using the polygons to represent gardens, students will begin to discover real life applications of perimeter concepts. Each activity page comes in two formats that are drawn to different scales.

Directions
1. Display a copy of **Vegetable Garden Fences 1** and distribute a copy to each student. Ask them to predict which garden has the shortest and longest fence and to write the names of the gardens in the appropriate boxes on the chart.
2. Then ask students to measure the length and width of the gardens and add the numbers to find their perimeters. Remind them that one inch represents one foot.
3. After they have measured all four gardens, have them write the names of the gardens with the longest and shortest fences in the appropriate boxes. Discuss predications and actual results.
4. Next, introduce **Vegetable Garden Fences 2** and ask students to notice the scale, which is 1 inch = 2 yards. Demonstrate how to measure a rectangle in inches and convert the measurement to yards when the scale is 1 to 2. Complete the rest of the assignment as in steps 1 through 3.
5. If students need additional practice, have them complete both **Flower Garden Fences** activities.



Laura's Tips

Briefly review linear measurement on a ruler before starting this activity. For this activity, students only need to be able to measure to the nearest inch and centimeter. Also, students may need additional practice understanding the concept of scale before they attempt the second variation of each garden.

Supporting Activity

Check with Grids - If students are having trouble making the transition from the grid to the ruler alone, make clear transparencies of the grids on pages 59 and 60. Allow students to use them as overlays to check their answers.

Answers
- **Vegetable Garden Fences 1 -** Tomatoes 10 ft, Beans 10 ft, Pumpkins 8 ft, Corn 12 ft
- **Vegetable Garden Fences 2 -** Tomatoes 20 yd, Beans 24 yd, Pumpkins 32 yd, Corn 16 yd
- **Flower Garden Fences 1 -** Daffodils 34 m, Daisies 26 m, Sunflowers 36 m, Roses 22 m
- **Flower Garden Fences 2 -** Daffodils 60 m, Daisies 56 m, Sunflowers 48 m, Roses 52 m

Vegetable Garden Fences

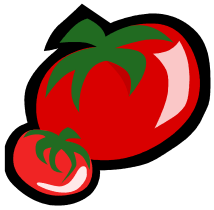
Name _____

Each vegetable garden below is drawn to scale. One inch represents one foot. Which garden has the shortest fence? Which one has the longest fence? In the prediction boxes below, record the names of the gardens that you think will have the shortest and longest fences. Then measure to find the actual perimeter of each garden.

Which Fence?	Prediction	Actual
Shortest Length		
Longest Length		

Tomatoes

Perimeter = _____



Beans

Perimeter = _____

Pumpkins

Perimeter = _____

Corn Perimeter = _____

0 1

1 inch = 1 foot

Vegetable Garden Fences 2

Name _____

Each vegetable garden below is drawn to scale. One inch represents two yards. Which garden has the shortest fence? Which one has the longest fence? In the prediction boxes below, record the names of the gardens that you think will have the shortest and longest fences. Then measure to find the actual perimeter of each garden.

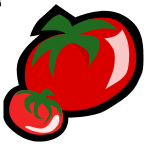
Which Fence?	Prediction	Actual
Shortest Length		
Longest Length		

Corn

Perimeter = _____

Beans

Perimeter = _____



Tomatoes

Perimeter = _____

Pumpkins

Perimeter =

_____

0 1

1 inch = 2 yards

Flower Garden Fences

Name _____

Each flower garden below is drawn to scale. One centimeter represents one meter. Which garden has the shortest fence? Which one has the longest fence? In the prediction boxes below, record the names of the gardens that you think will have the shortest and longest fences. Then measure to find the actual perimeter of each garden.

Which Fence?	Prediction	Actual
Shortest Length		
Longest Length		

Roses

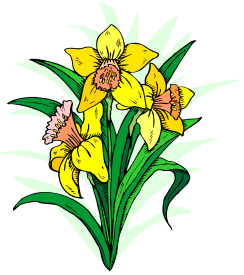
Perimeter = _____

Daisies

Perimeter = _____

Daffodils

Perimeter = _____



Sunflowers

Perimeter = _____

0 1

1 cm = 1 meter

Flower Garden Fences 2

Name _____

Each flower garden below is drawn to scale. One centimeter equals two meters. Which garden has the shortest fence? Which one has the longest fence? In the prediction boxes below, record the names of the gardens that you think will have the shortest and longest fences. Then measure to find the actual perimeter of each garden.

Which Fence?	Prediction	Actual
Shortest Length		
Longest Length		

Roses

Perimeter = _____

Daisies

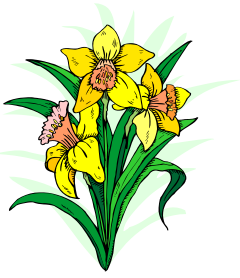
Perimeter = _____

Sunflowers

Perimeter = _____

Daffodils

Perimeter = _____



0 1

1 cm = 2 meters

Exploring Perimeter

Perimeter Partners

CCSS 3.MD.B.4

Targeted Skill
Measuring with a ruler to the nearest inch, half inch, or centimeter

Overview
Students will select 5 objects to measure and will calculate and record the perimeter of one face of each object. Then they will trade papers with a partner and check each other's answers.

Materials
- Perimeter Partners activity pages (p. 25)
- Rulers
- Variety of rectangular objects to measure

Directions
1. Pair each student with a partner. Make sure at least one person in each pair is proficient with using a ruler to measure length.
2. Duplicate copies of the **Perimeter Partners** worksheet and cut them in half. Give each person his or her own copy of the half-sheet page.
3. Gather a collection of objects that have at least one face suitable for measuring. (For example: math book, tissue box, box of crayons, etc.)
4. Demonstrate how to measure the length and width of one face of an object to determine its perimeter. Show students how to record the object's description (i.e., top cover of math book), the length of each side, and its perimeter. Be sure to let them know whether to measure to the nearest inch, half inch, or centimeter.
5. Ask students to work with their partner to select 5 objects to measure. After they measure all 5 objects and record their measurements, they compare results. Remind them that it doesn't matter the order that they record the measurements of each side; they only need to compare total perimeters. If the perimeters are more than 1/2 inch or 1 cm different, they need to remeasure together to find the actual perimeter.

Laura's Tips

If you feel your students will have difficulty with this activity, find several practice objects and list them on a copy of the worksheet. Place the objects in a math center have students work with a partner to measure them and determine their perimeters. You can also ask students to draw a copy of each object on the back of their papers so they can record each object's length and width before adding the dimensions.

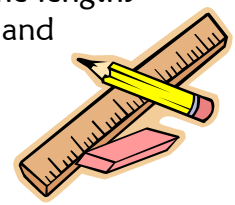
Extensions
- **Perimeter Predictions** - After your students have completed the activity once, have them repeat the activity but add one more step. Prior to measuring each object, ask students to predict the total perimeter and write the number next to the name of the item. If they are working with a partner, ask them to show their prediction to their partner before they actually measure the object. This step will keep them honest! Challenge them to increase their accuracy as they complete the assignment.
- **Area Partners** - After you introduce the concept of area to your students, have them repeat the activity and find the area of one face of each object.

Perimeter Partners

My Name _____

My Partner _____

Work with your partner to choose 5 rectangular items that you can measure easily using a ruler. Record each object in the same order on the chart below. Measure and record the lengths of the sides of one face of each object. Calculate the total perimeter of that face and record it. Finally, trade papers with your Perimeter Partner and compare your perimeters. If your measurements are not the same, work together to remeasure the object. Suggested items: chapter book cover, paper, desktop, binder, calculator, bottom of tissue box, composition book, etc.



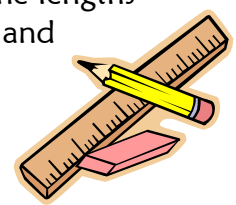
Item Descriptions	Side 1	Side 2	Side 3	Side 4	Perimeter
1.					
2.					
3.					
4.					
5.					

Perimeter Partners

My Name _____

My Partner _____

Work with your partner to choose 5 rectangular items that you can measure easily using a ruler. Record each object in the same order on the chart below. Measure and record the lengths of the sides of one face of each object. Calculate the total perimeter of that face and record it. Finally, trade papers with your Perimeter Partner and compare your perimeters. If your measurements are not the same, work together to remeasure the object. Suggested items: chapter book cover, paper, desktop, binder, calculator, bottom of tissue box, composition book, etc.



Item Descriptions	Side 1	Side 2	Side 3	Side 4	Perimeter
1.					
2.					
3.					
4.					
5.					

Exploring Perimeter

Tangram Perimeters

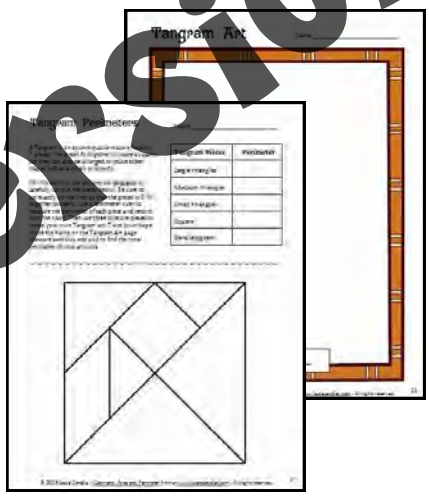
CCSS 3.MD.B.4

Targeted Skill
Calculating perimeters of polygons and artwork created with polygons

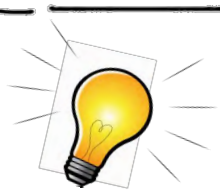
Overview
In this activity, students first learn a little about tangrams and then measure to find the perimeter of each piece in centimeters. Next, they create tangram art with three or four pieces and find its perimeter.

Materials
- Plastic or paper tangrams
- Tangram Art frame
- Tangram Art samples
- Rulers

Directions
1. If your students have not used tangrams before, give each child a complete set of 7 tangrams or the pattern on page 27 to cut out. Allow a little time for students to explore.
2. Use a ruler to demonstrate how to measure around one of the large triangles and calculate the perimeter. When you measure each side, round it to the nearest centimeter and record it on scrap paper or a dry erase board, then add to find the total. Have students repeat your steps with the remaining tangram pieces and fill out the chart at the top of page 27. Check their work before continuing.
3. Next, explain that the ancient Chinese enjoyed using tangram pieces to create artwork in the form of shapes that looked like objects. Show the 2 examples on page 28 and ask students to tell you what the shapes look like. Point out how the shapes are arranged so that the sides are touching but not overlapping.
4. Finally challenge students to create their own artwork with three or four pieces (no more). Have them trace the shape inside the **Tangram Art** frame (page 29). Then ask them to measure the length of each side to the nearest centimeter, label it with the length, and then add to find the perimeter. Demonstrate with your own example. They are only finding the perimeter of the outside of the shape and not each piece.



Laura's Tips



Plastic tangram pieces are better than paper pieces for this activity because they are easier to trace. However, you may want to duplicate the tangram pattern on cardstock and let students actually glue their tangram art onto the page.

Additional Suggestions
- **Guided Math Groups** - Students will probably need a lot of guidance with this activity. You may want to complete it in small guided math groups. Restrict students to just three pieces for their first attempts.
- **Coloring the Artwork** - When students trace their pieces, they will probably want to color their artwork as well. If so, have them trace the outside of the shape with a dark line to identify the perimeter.
- Read **Grandfather Tang's Story** to your students. The story is told with tangrams forming the various characters, and children enjoy recreating the shapes with their own tangrams.

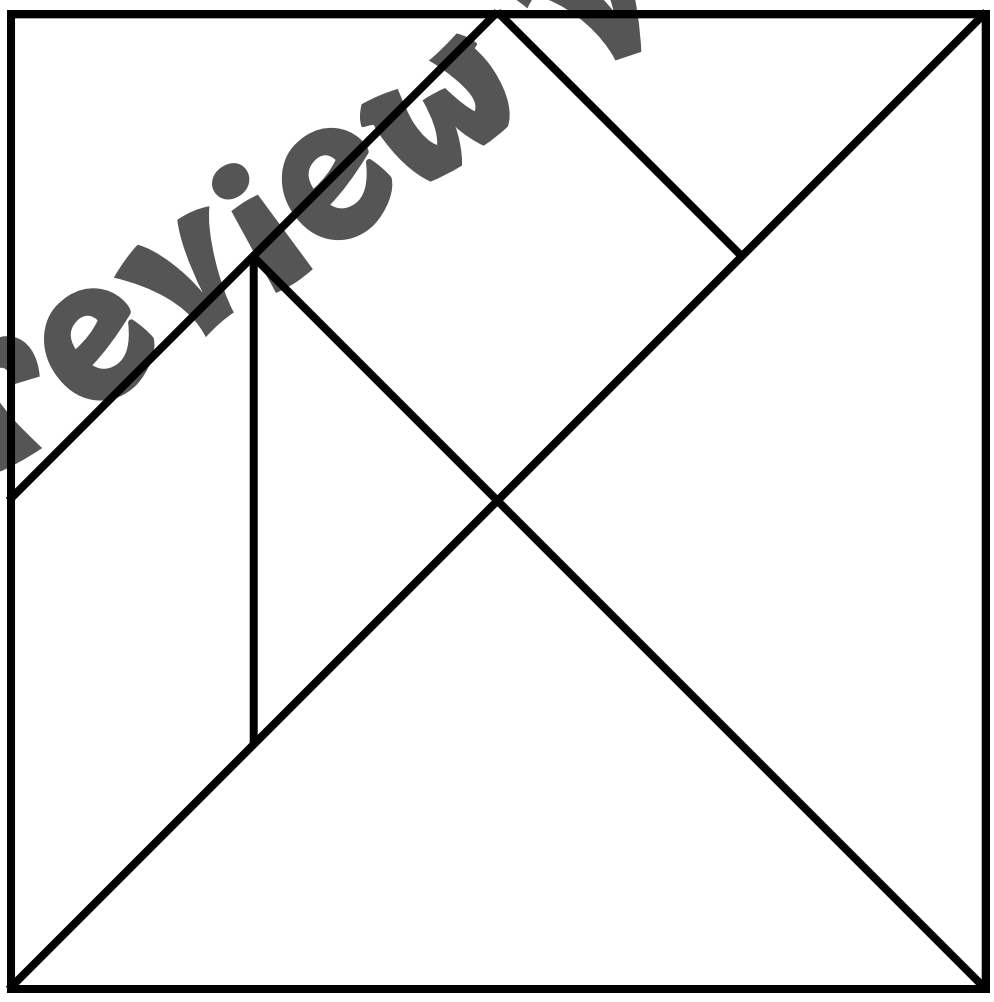
Tangram Perimeters

Name _____

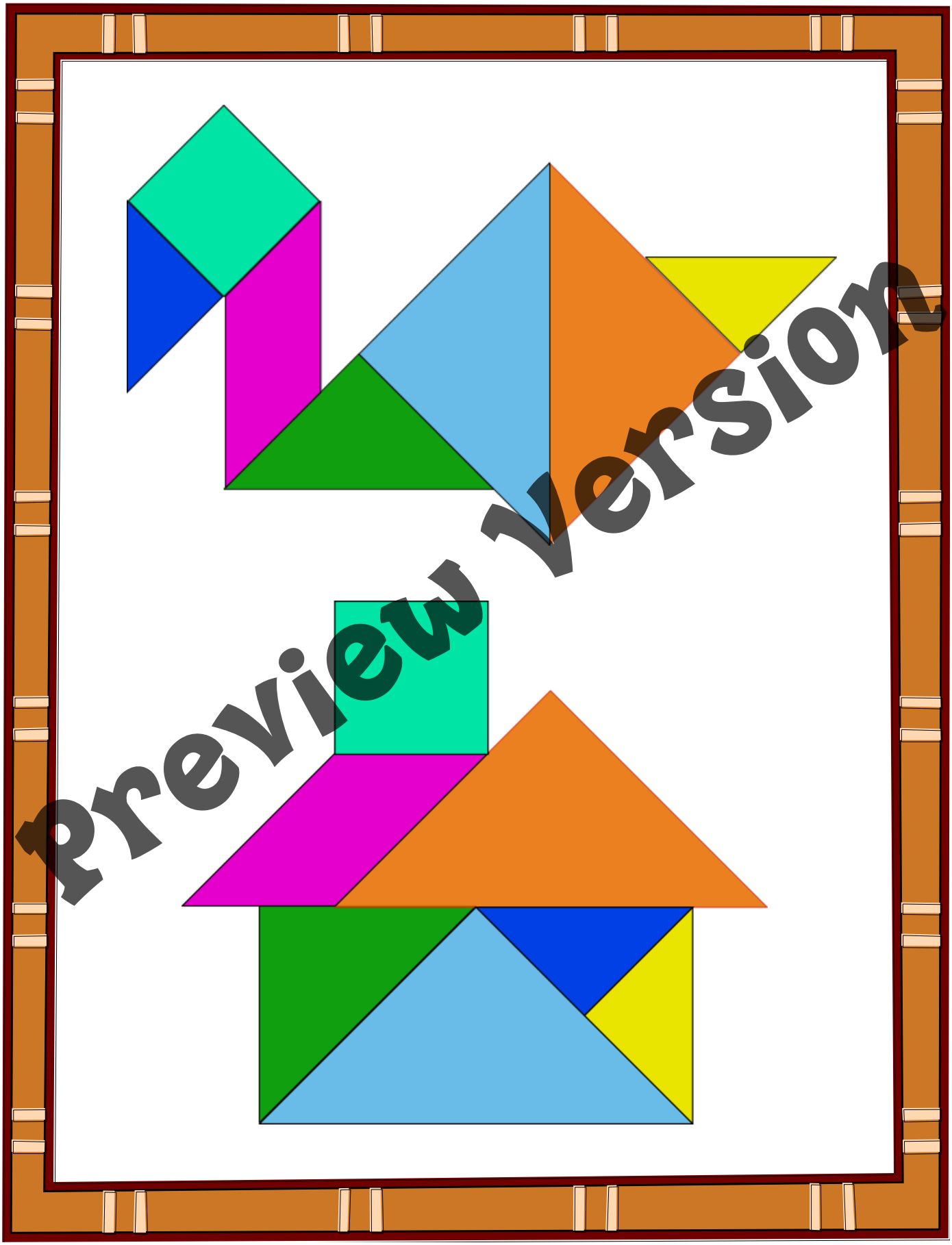
A tangram is an ancient puzzle made of exactly 7 pieces. The pieces fit together to make a square, but they can also be arranged to make other shapes such as animals or objects.

For this activity, use commercial tangrams or carefully cut out the pieces below. Be sure to cut exactly on the lines so that the pieces will fit together properly. Use a centimeter ruler to measure the perimeter of each piece and record it on the chart. Then use three or four pieces to create your own tangram art. Trace your shape inside the frame on the **Tangram Art** page. Measure each side and add to find the total perimeter of your artwork.

Tangram Pieces	Perimeter
Large triangles	
Medium triangle	
Small triangles	
Square	
Parallelogram	



Tangram Art with 7 Shapes



Tangram Art

Name _____

Perimeter = _____

Exploring Perimeter

Calculating Perimeters

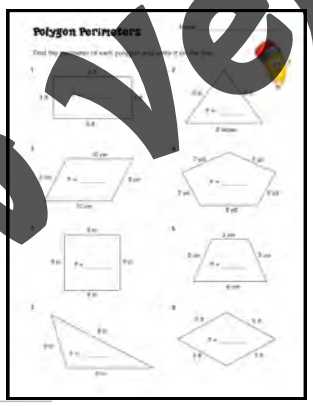
CCSS 3.MD.D.8

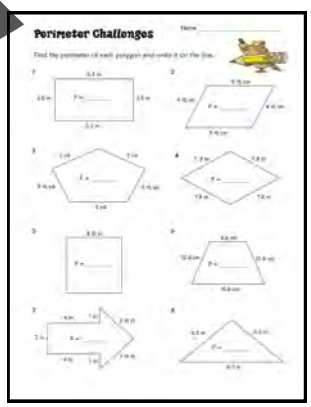
Targeted Skill
Calculating perimeters of polygons with given dimensions

Overview
This activity provides an opportunity for students to calculate perimeters when given the lengths of the sides.

Materials
- Polygon Perimeters worksheet (page 31)
- Polygon Challenges worksheet (page 32)
- Calculator (optional)

Directions
1. Give each student a copy **Polygon Perimeters**.
2. Demonstrate how to calculate the perimeter of a polygon by adding the lengths of the sides. Remind students to include the unit of measurement in their answers. This activity does not involve measuring the sides, so students don't need a ruler.
3. Provide time for students to complete the worksheet and circulate around the room checking their work.
4. For those students who need more of a challenge, offer the **Polygon Challenges** activity which involves addition of fractions and decimals. Allowing students to use a calculator is helpful.





Laura's Tips

To save paper, have students work with a partner. Print half as many pages and have students take turns completing the problems. After each student completes one problem, his or her partner checks the work before moving to the next problem.

You may need to review abbreviations for the units of measurement used in this activity.

Answers

- **Polygon Perimeters (page 31)**
  #1 - 18 ft, #2 - 20 in, #3 - 36 in, #4 - 32 yd, #5 - 36 in, #6 - 19 cm, #7 - 18 in, #8 - 20 ft

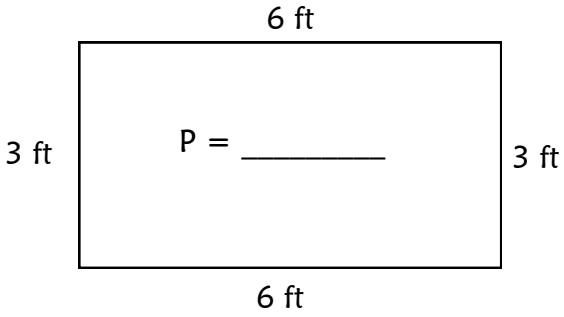
- **Perimeter Challenges (page 32)**
  #1 - 20.4 m, #2 - 20 cm, #3 - 33 yd, #4 - 31.2 m, #5 - 34 in, #6 - 50 cm, #7 - 19 in, #8 - 22.5 m

Polygon Perimeters

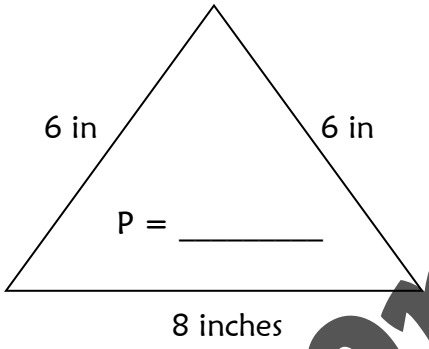
Name _____

Find the perimeter of each polygon and write it on the line.

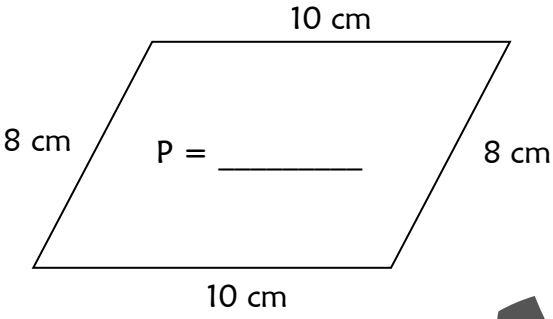
1



2



3



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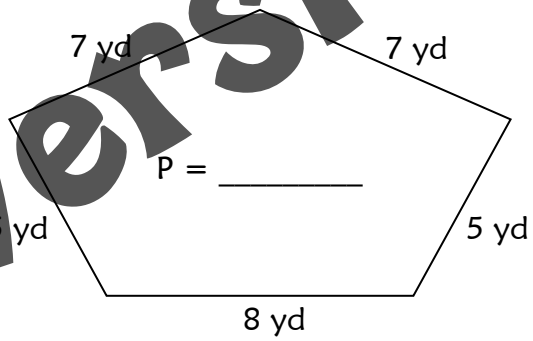

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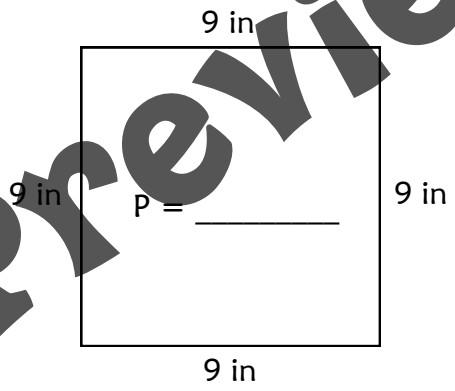

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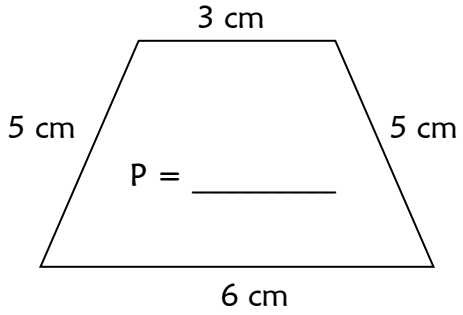

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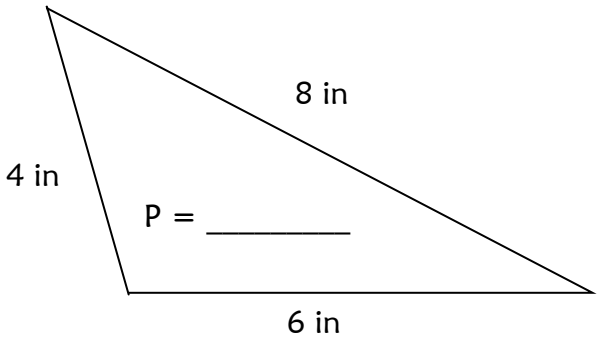

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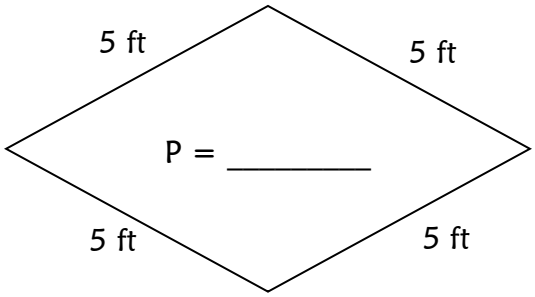
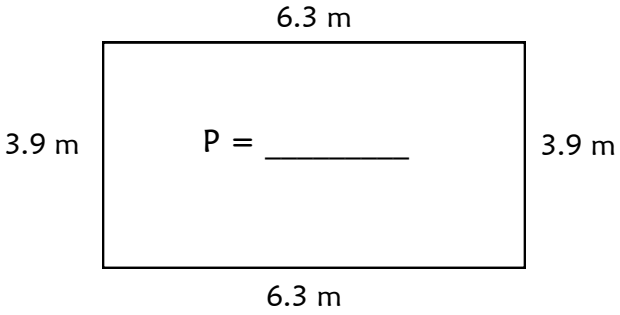


Perimeter Challenges

Name _____

Find the perimeter of each polygon and write it on the line.

1



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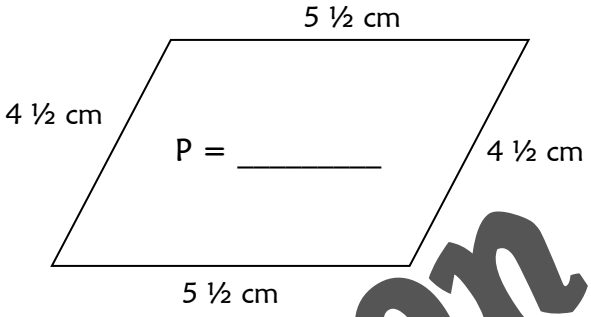

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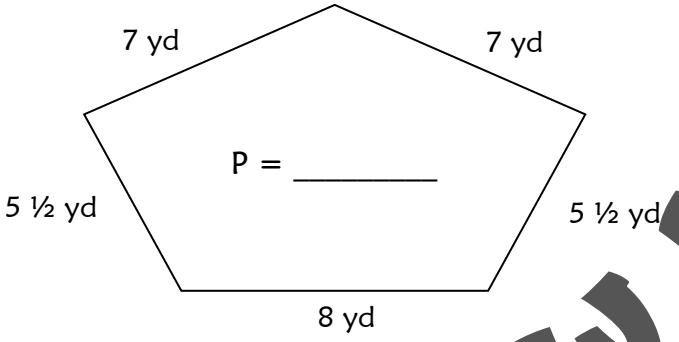

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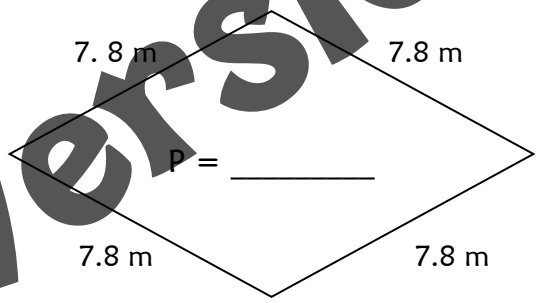

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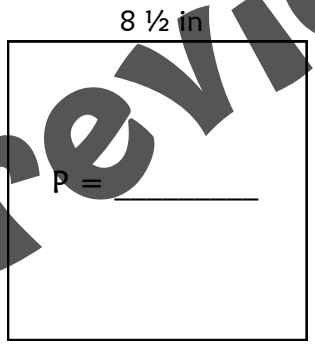

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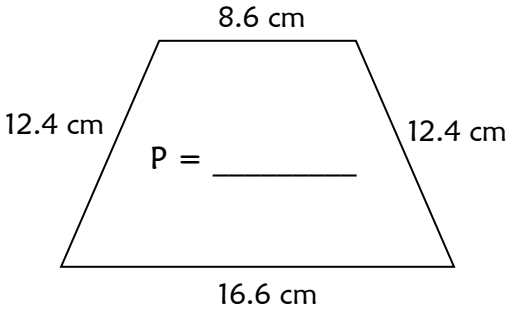

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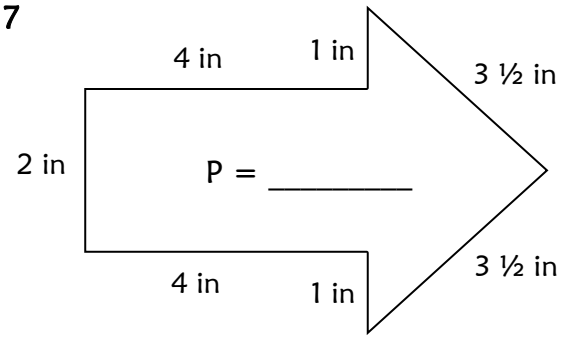

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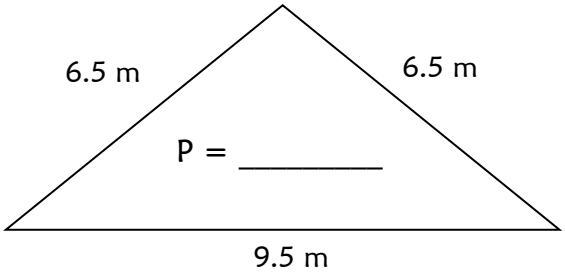


Exploring Perimeter

Missing Side Perimeters

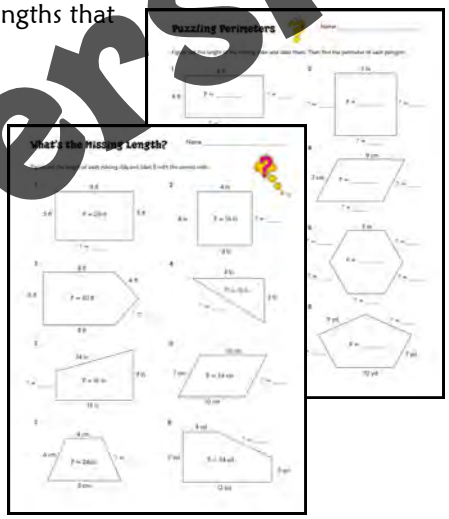
CCSS 3.MD.D.8

Targeted Skill
Determining the lengths of unlabeled sides and unknown perimeters

Overview
Missing Side Perimeters is a 2-part lesson. The first activity asks students to find the length of a missing side when given the total perimeter. The second activity requires students to apply knowledge of polygon properties to find the missing side lengths and to find the perimeter.

Materials
- What's the Missing Length? (p. 34)
- Puzzling Perimeters (p. 35)
- Calculators (optional)
- Rulers (optional)

Directions
1. Begin with **What's the Missing Length?** Demonstrate how to find the length of each missing side. This is easy to do by adding the side lengths that are given and subtracting the total from the perimeter.
2. As students work on the assignment, circulate around the room and check to be sure they are responding correctly.
3. After the assignment is completed, review the answers together and ask students if they noticed any patterns. They may have noticed that it's easy to find the length of a missing side on a regular polygon because the sides are congruent.
4. Display a copy of **Puzzling Perimeters**. Point out the perimeters are not given, so students can't use subtraction to find the missing side lengths. Also, some of the polygons have several sides that are not labeled. Instead, they will need to use their knowledge of polygon properties to determine the lengths of the missing sides and then add to find the perimeters.
5. Distribute the worksheets and monitor students carefully as they work. Check answers when finished.



Laura's Tips

Puzzling Perimeters is a more challenging activity than the first one, so you may want to work through the problems as a class, step by step. Give each student a worksheet, but display the problems and solve them one at a time after discussing strategies. Even though the polygons are not drawn to scale, students can use a ruler to determine which sides are congruent.

Variation
Polygons with Hash Marks - Some teachers introduce hash marks as a way of indicating that the sides of a polygon that are congruent. If your students understand the meaning of hash marks, you can use the variation of **Puzzling Perimeters** on page 36 instead of the one on page 35. The answers are the same.

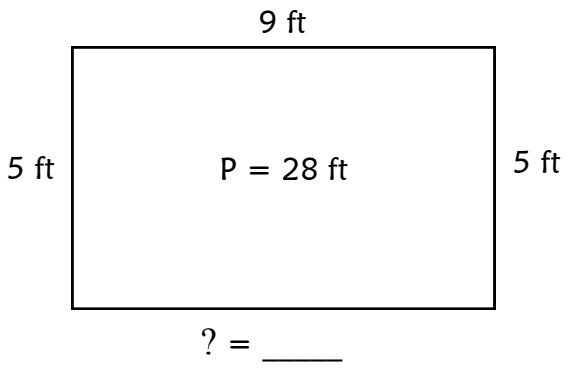
Answers
- **What's the Missing Length? (page 34)**
  #1 - 9 ft, #2 - 4 in, #3 - 4 ft, #4 - 5 in,
  #5 - 5 in, #6 - 7 cm, #7 - 6 cm, #8 - 8 yd
- **Puzzling Perimeters (pages 35 and 36)**
  #1 - S = 4, 8 ft, P = 24, #2 - S = 3 in, P = 12 in,
  #3 - S = 7 ft, P = 28 ft, #4 - S = 9, 7 ft,
  P = 32 ft, #5 - S = 4 in, P = 14 in, #6 - S = 5 in,
  P = 30 in, #7 - S = 8 cm, P = 31 cm
  #8 - S = 9, 7 yd, P = 42 yd

What's the Missing Length?

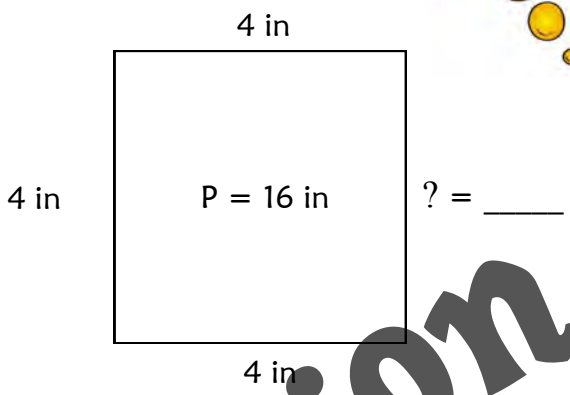
Name _____

Figure out the length of each missing side and label it with the correct unit of measurement.

1



2



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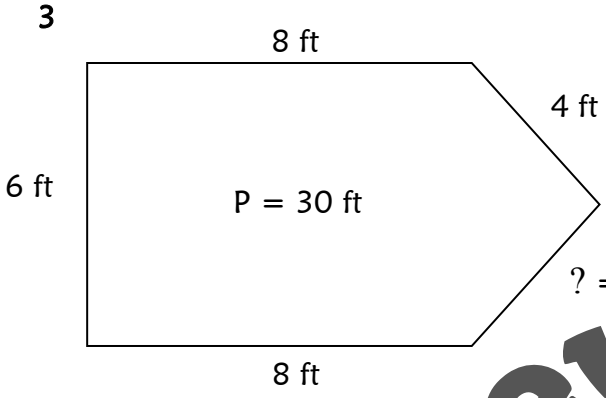

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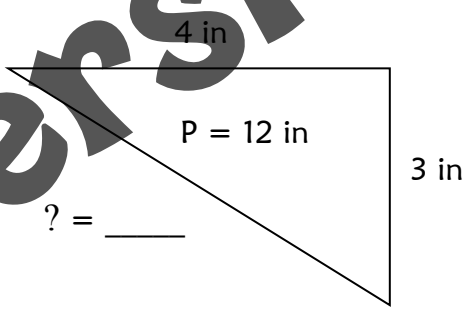
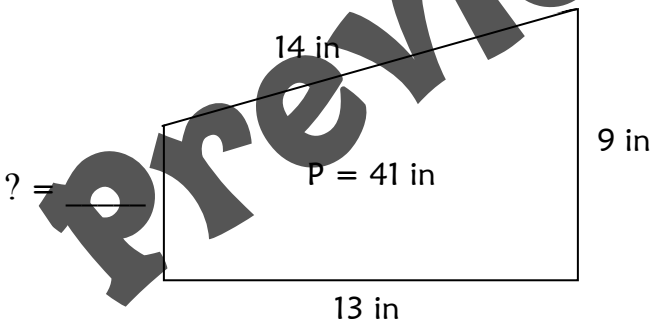


5



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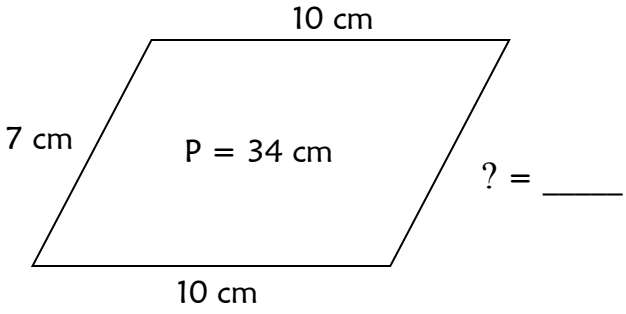

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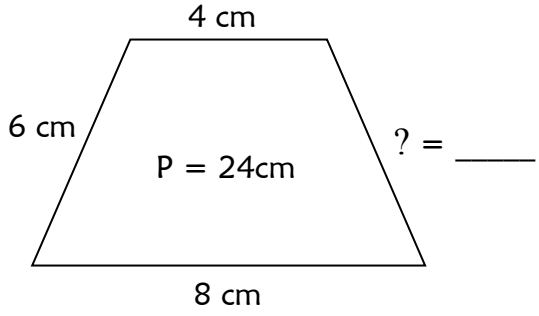

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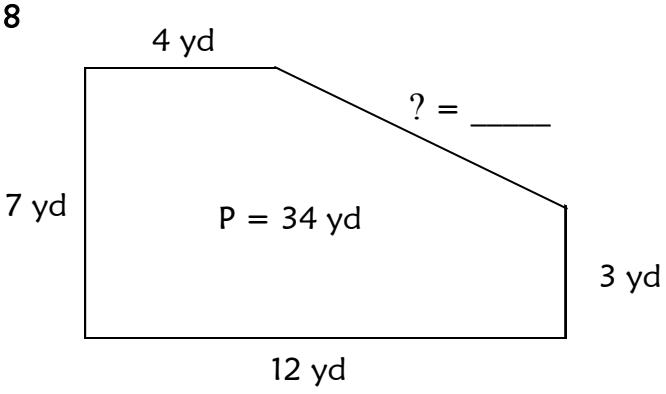
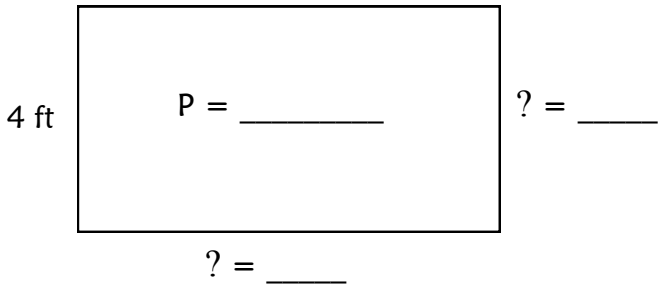


Puzzling Perimeters

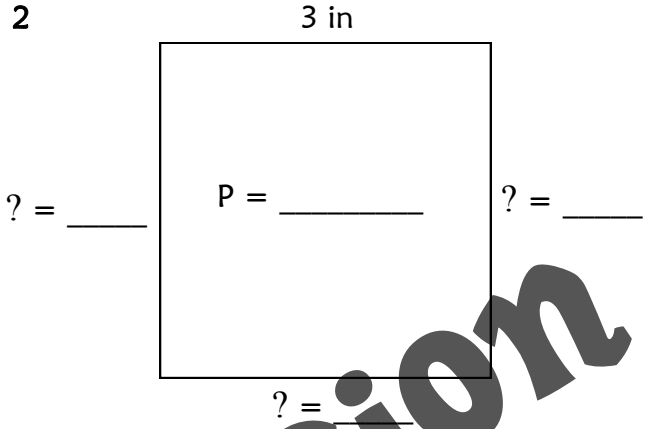
Name _____

Figure out the length of the missing sides and label them. Then find the perimeter of each polygon.

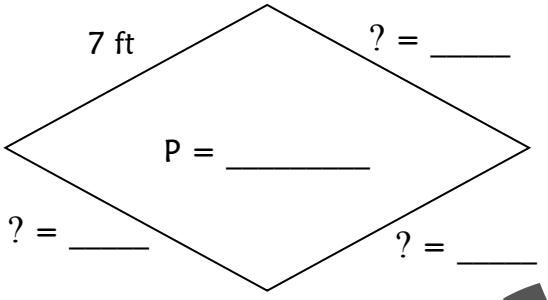
1



2



3



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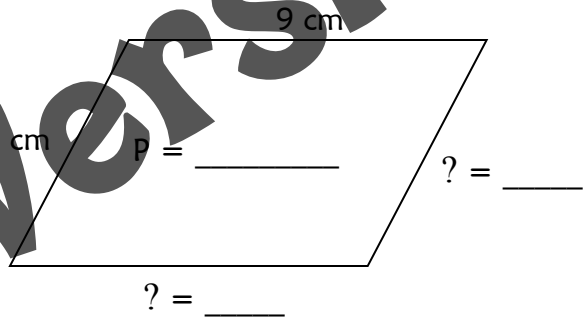

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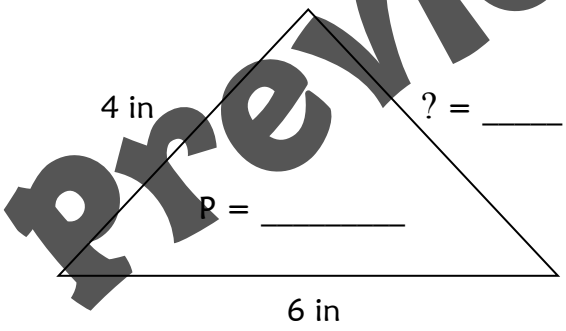

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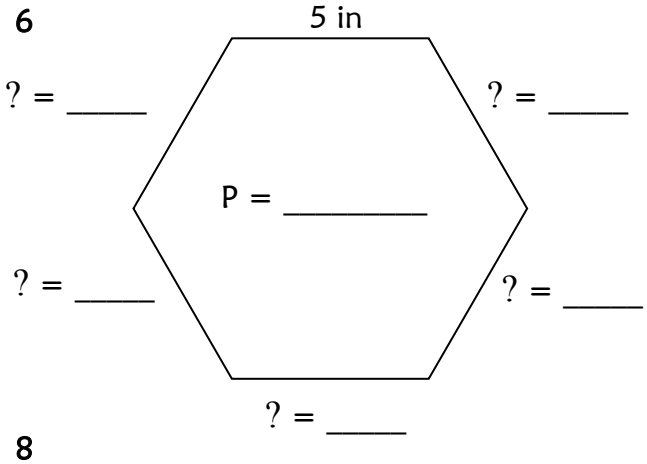

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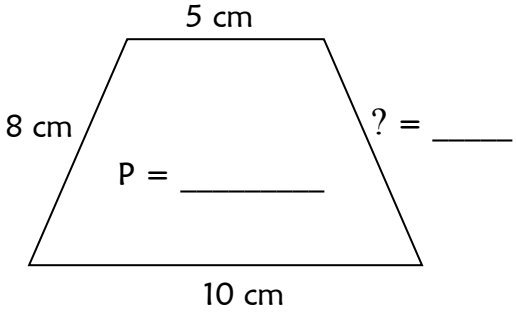
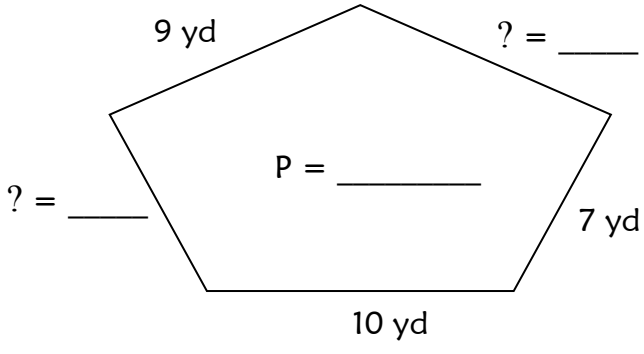


8



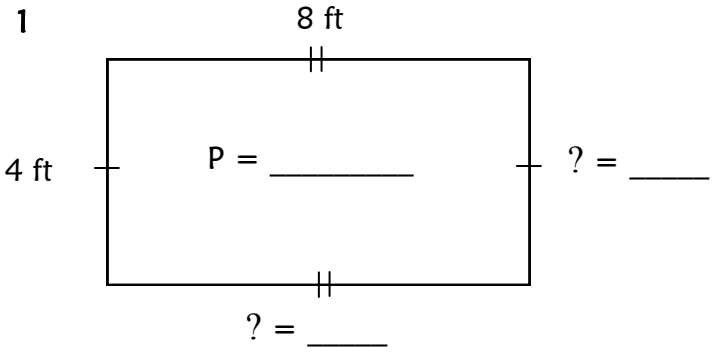
Puzzling Perimeters

With Hash Marks

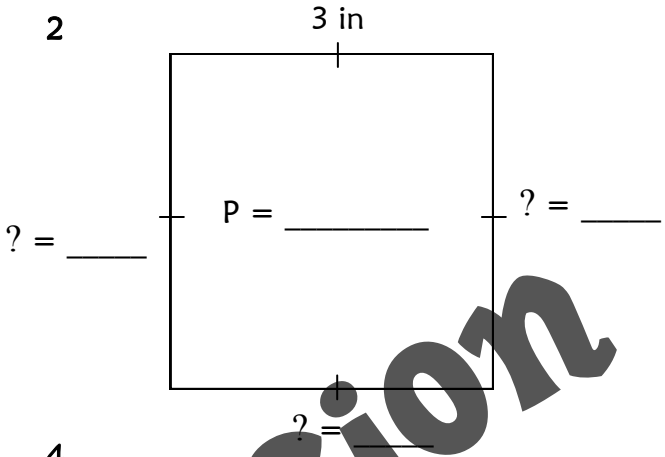
Name _____

Figure out the length of the missing sides and label them. Then find the perimeter of each polygon.

1



2



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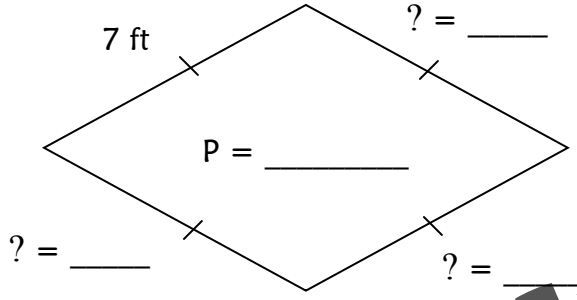
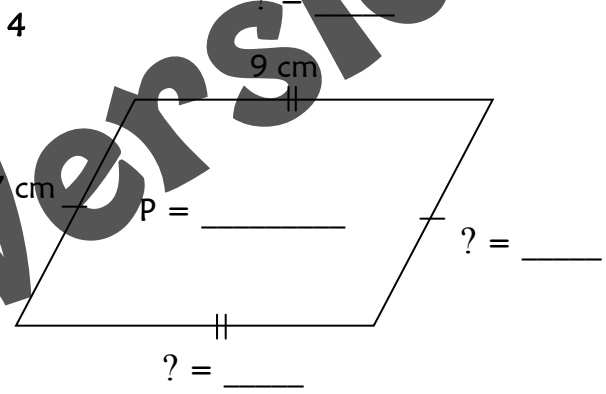
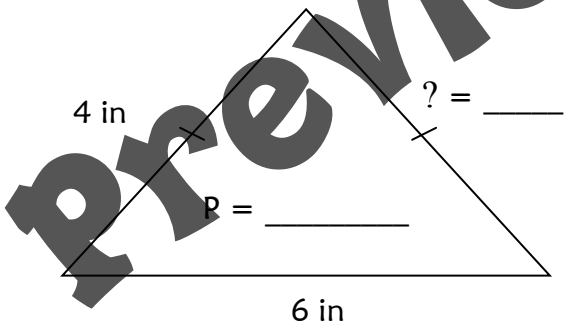


4



5



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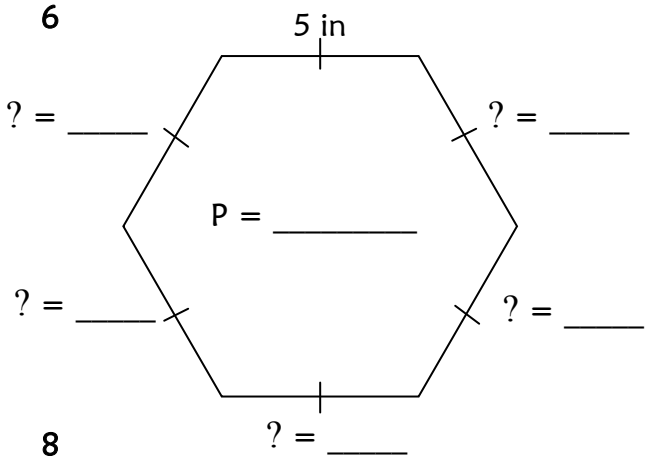
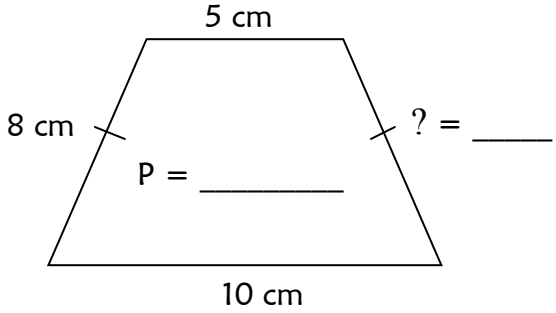


7



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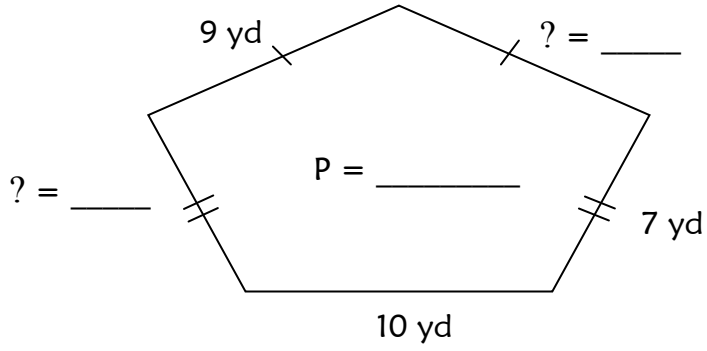


Exploring Perimeter

Mystery Perimeters

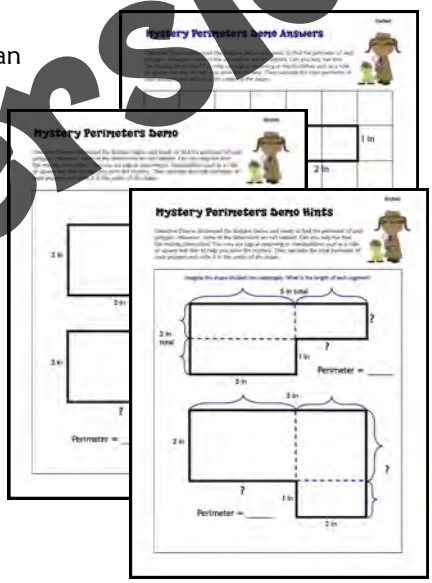
CCSS 3.MD.D.8

Targeted Skill
Determining the lengths of unlabeled sides of irregular polygons in order to calculate perimeter

Overview
The Mystery Perimeters lesson involves using logical reasoning to find out the lengths of irregular polygons. There are two forms of the activity, one using inches (pages 38 to 42) and one using centimeters (pages 43 to 47). The directions are the same for both lessons.

Materials
- Mystery Perimeter Demo Pages
- Mystery Perimeter student pages
- Rulers

Directions
1. Start with the **Mystery Perimeters Demo** on page 38 and display it on an interactive whiteboard or projector. Ask students how they might be able to figure out the lengths of the missing sides. Discuss options.
2. If your class is ready for logical reasoning, use the **Mystery Perimeters Demo Hints** page to show them how to divide each polygon into three rectangles and use addition or subtraction to find the missing side lengths. If they find this method confusing, they can use a ruler to measure the sides in inches.
3. To check answers, display the **Mystery Perimeters Demo Answers** on page 40. The grid is a visual confirmation of the side lengths.
4. Assign the **Mystery Perimeters** worksheet on page 41 (no grid) or 42 (with the grid). If students are having difficulty, allow them to work with a partner and discuss strategies.
5. For more practice, repeat the activity using the **Mystery Perimeters** lesson with centimeters for the unit of measurement (pages 43 - 47).



Laura's Tips

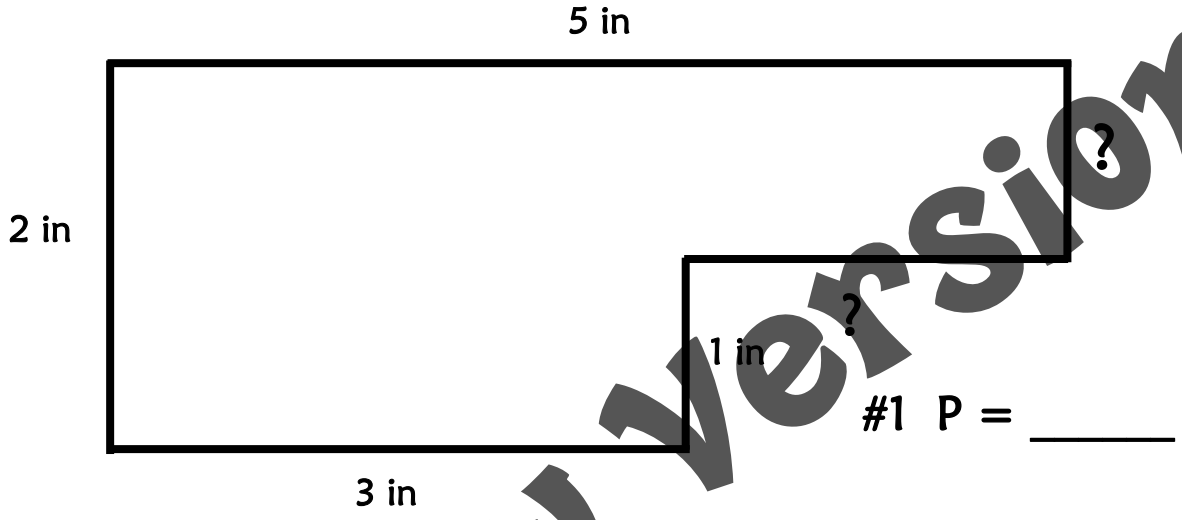
To help students identify the opposite horizontal and vertical parallel sides, have them color code the lines. For example, they can outline all of the horizontal lines in blue and the vertical lines in green. When using addition or subtraction to find the missing side lengths, they will be able to focus on just the lines in a particular color. (Thanks to Joy Darden for this tip!)

Supporting Activity
Floor Tile Perimeters - Use square floor tiles to teach perimeter. Create a large irregular polygon made of 2 rectangles like the ones in this lesson. Mark the dimensions of a few of the sides using the length of one tile as a unit. Show the polygon to your students and ask them to figure out the missing lengths. Place polygon on the floor and line up with the tiles to check.

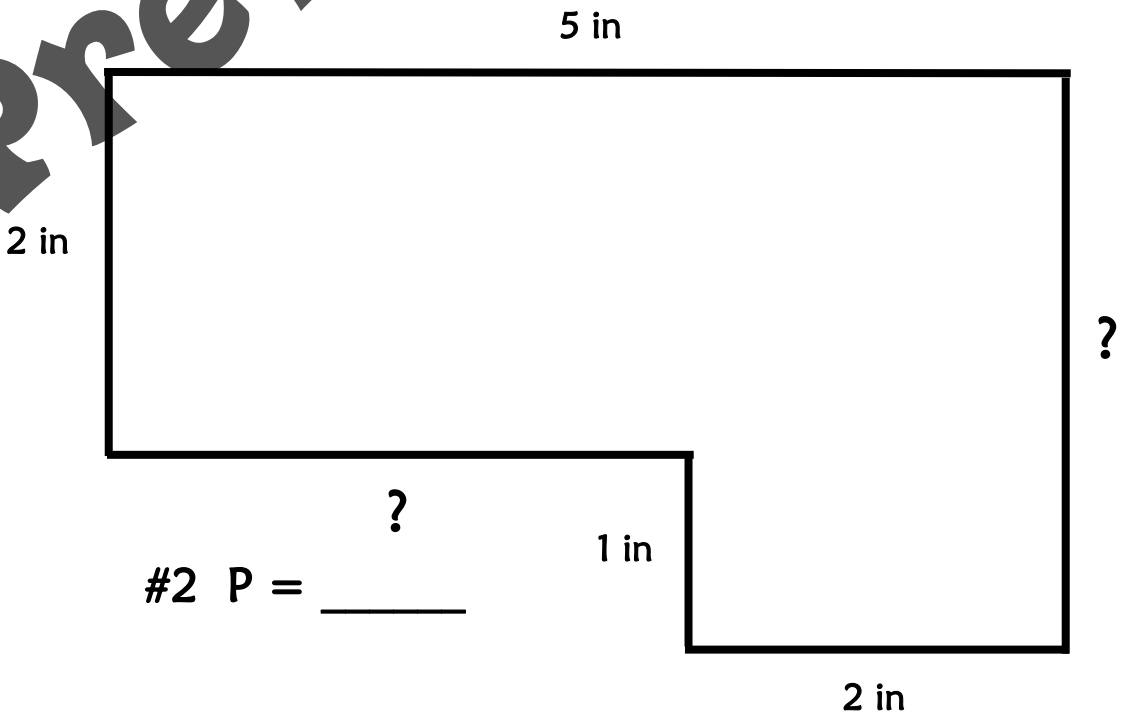
Answers
- **Mystery Perimeters (Inches - pages 41 & 42)**
  #1 - S = 2 in and 3 in, P = 18 in
  #2 - S = 4 in and 4 in, P = 20 in
- **Mystery Perimeters (Cm - pages 46 & 47)**
  #1 - S = 4 cm and 4 cm, P = 30 cm
  #2 - S = 4 cm and 4 cm, P = 28 cm
  #3 - S = 3 cm and 4 cm, P = 28 cm
  #4 - S = 7 cm, 4 cm, 2 cm, P = 38 cm

Mystery Perimeters Demo

Detective Dianne discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help her find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler or square inch tiles to help you solve the mystery. Then calculate and record the total perimeter of each polygon.



#1 P = _____

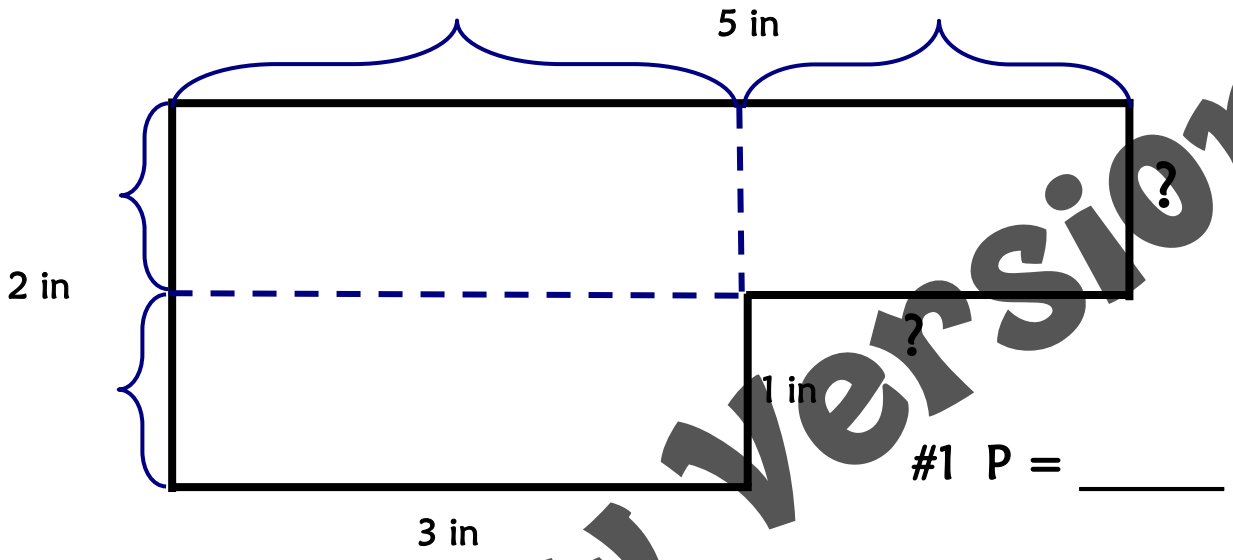


#2 P = _____

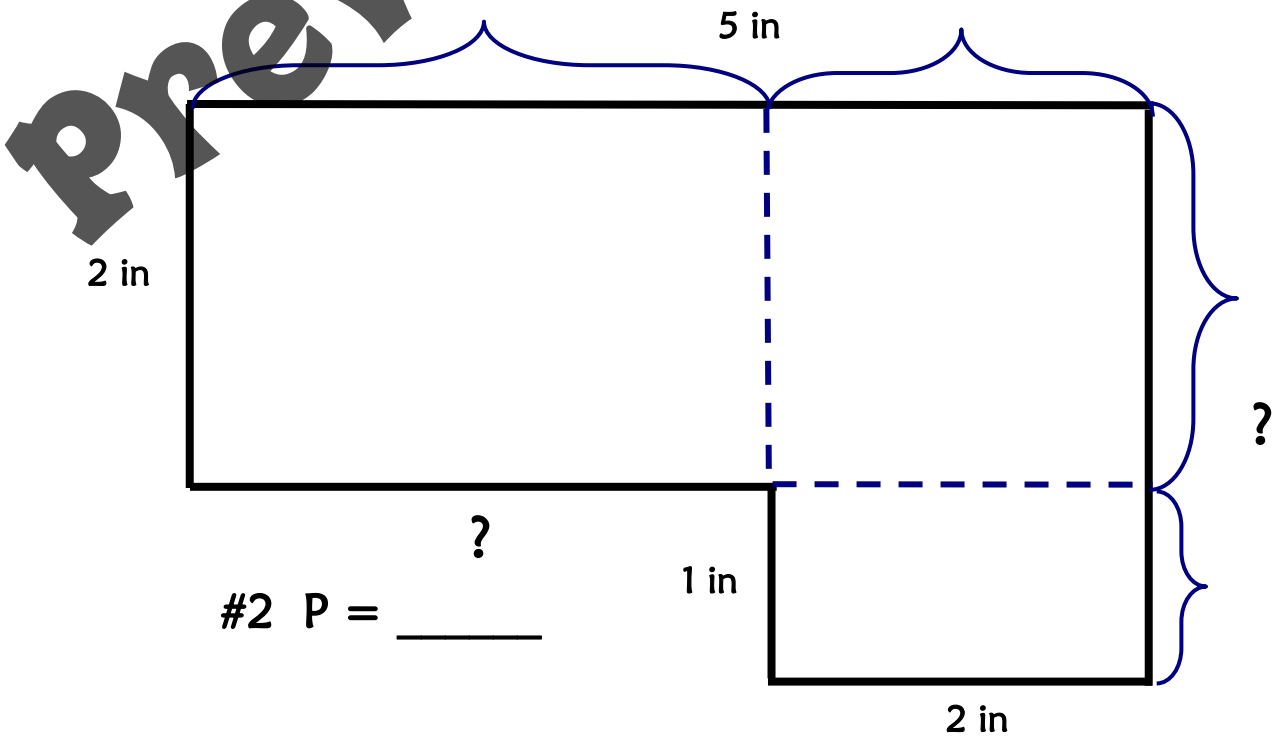
Mystery Perimeters Demo Hints

Detective Dianne discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help her find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler or square inch tiles to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

Imagine the polygon divided into rectangles. What is the length of each segment?



#1 P = _____



#2 P = _____

Mystery Perimeters Demo Answers

Detective Dianne discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help her find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler or square inch tiles to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

5 in

2 in

1 in

2 in

1 in

#1 P = 14 in

3 in

5 in

2 in

3 in

3 in

#2 P = 16 in

1 in

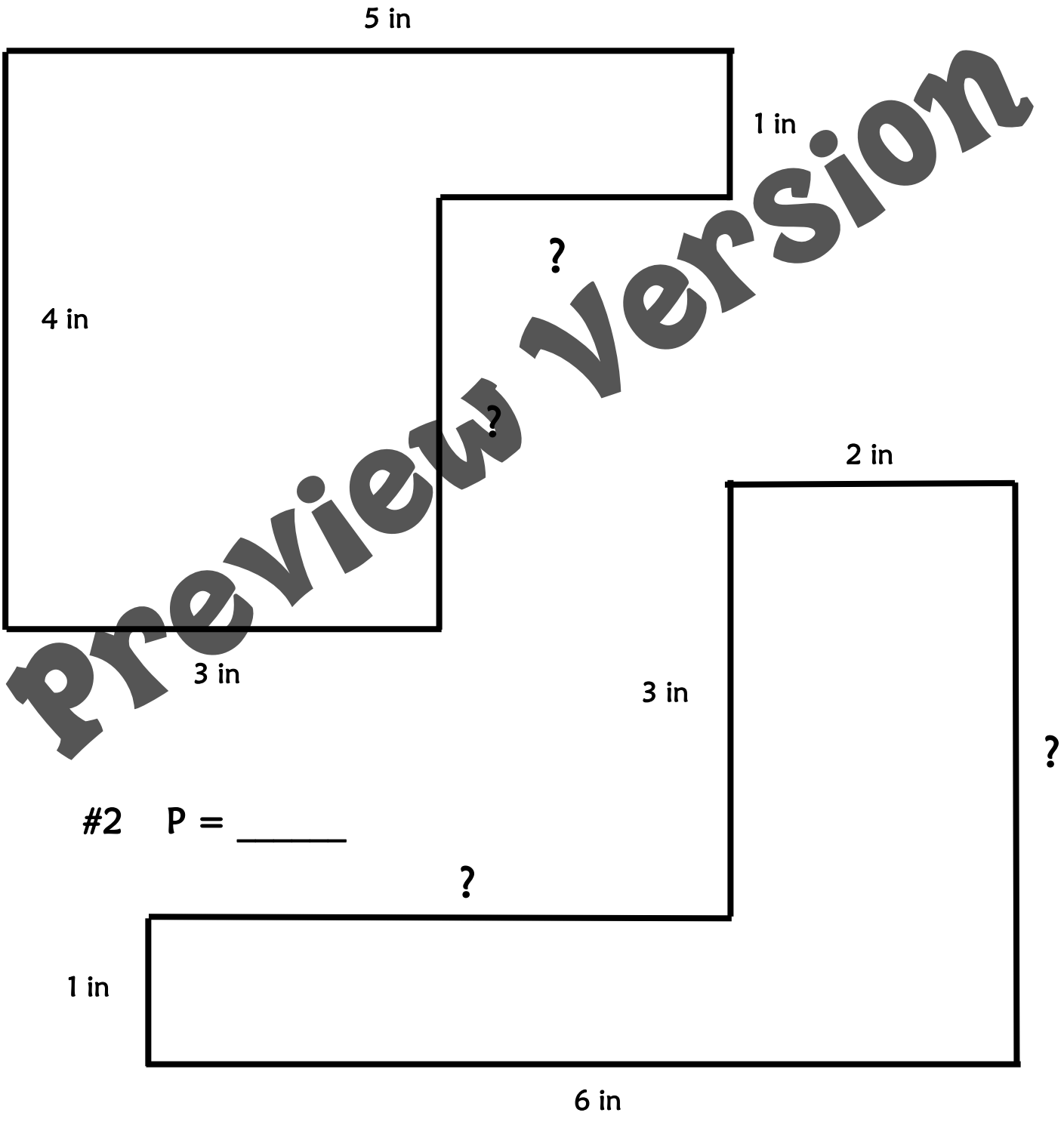
2 in

Mystery Perimeters

Name _____

Detective Dianne discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help her find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler or square inch tiles to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

#1 P = _____

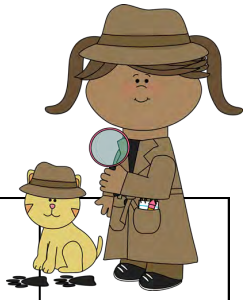


#2 P = _____

Mystery Perimeters

Name _____

Detective Dianne discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help her find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler or square inch tiles to help you solve the mystery. Then calculate and record the total perimeter of each polygon.



#1 P = _____

5 in

1 in

?

4 in

?

2 in

3 in

3 in

?

#2 P = _____

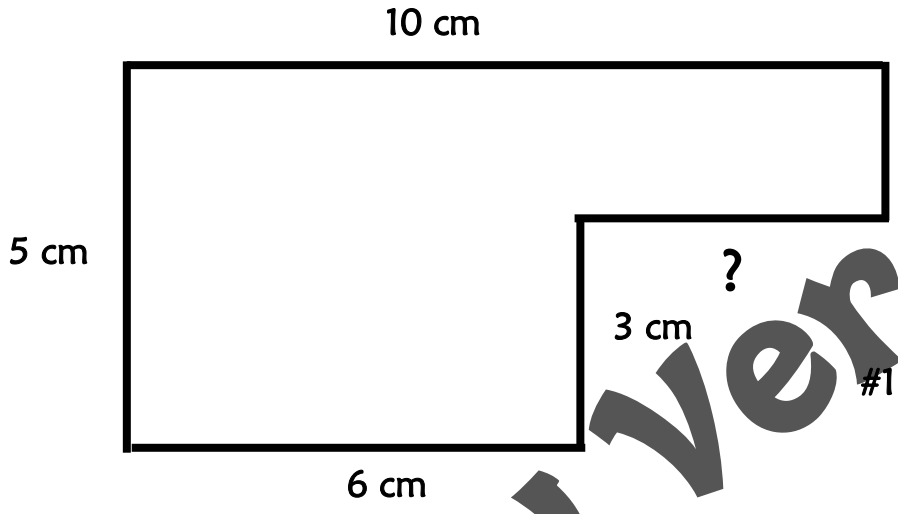
?

1 in

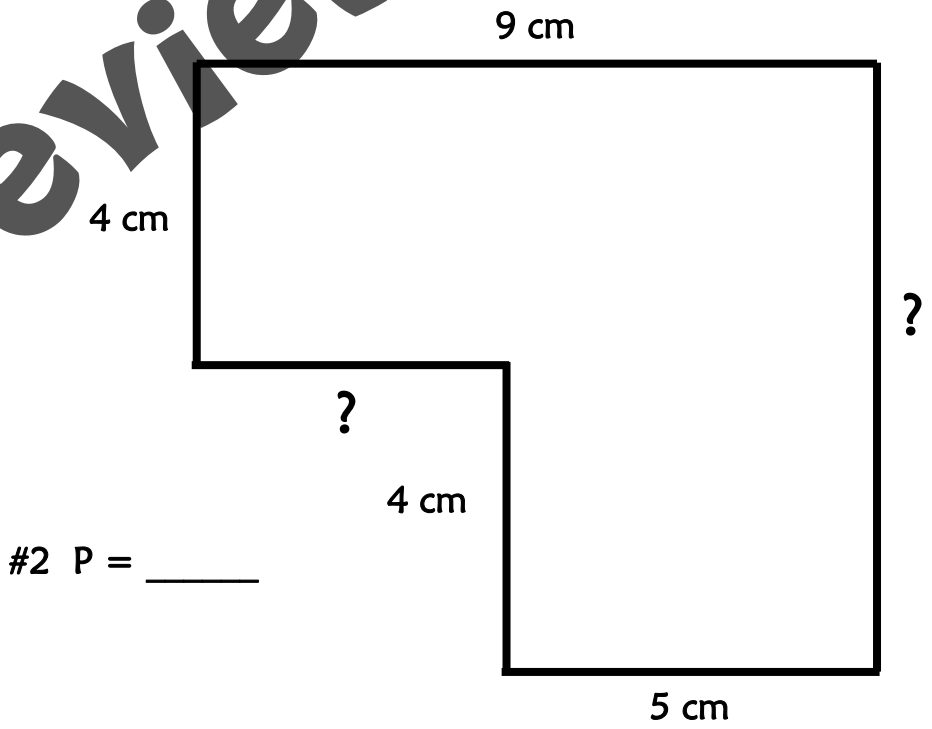
6 in

Mystery Perimeters Demo

Detective Dave discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help him find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler, Cuisenaire rods, or centimeter cubes to help you solve the mystery. Then calculate and record the total perimeter of each polygon.



#1 P = _____

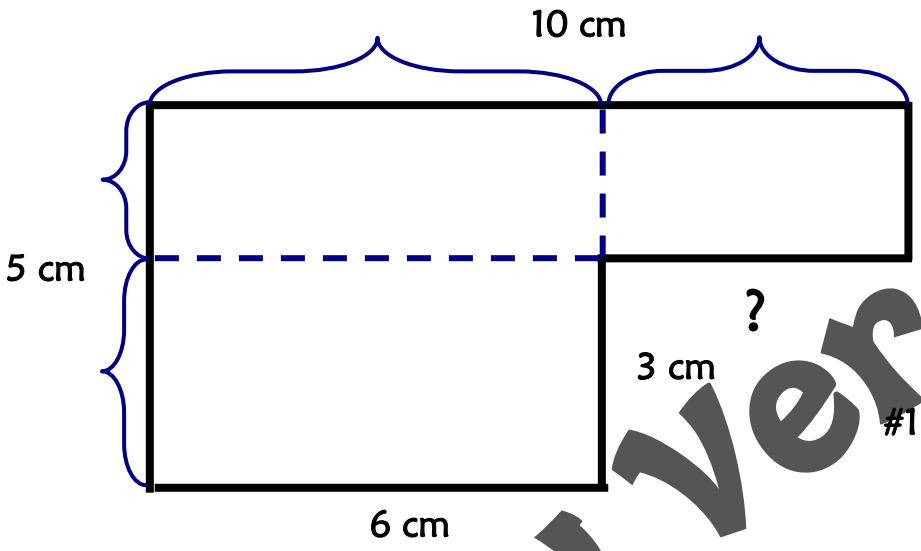


#2 P = _____

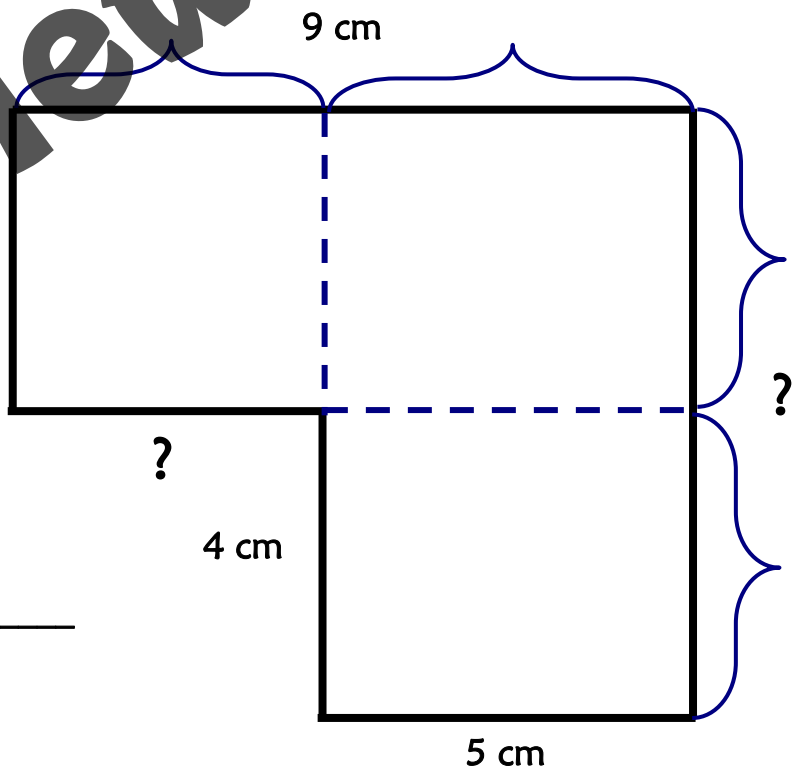
Mystery Perimeters Demo Hints

Detective Dave discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help him find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler, Cuisenaire rods, or centimeter cubes to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

Imagine the polygon divided into rectangles. What is the length of each segment?



#1 P = _____



#2 P = _____

Mystery Perimeters Demo Answers

Detective Dave discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help him find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler, Cuisenaire rods, or centimeter cubes to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

10 cm

2 cm

5 cm

4 cm

3 cm

#1 P = 30 cm

6 cm

9 cm

4 cm

8 cm

4 cm

4 cm

#2 P = 34 cm

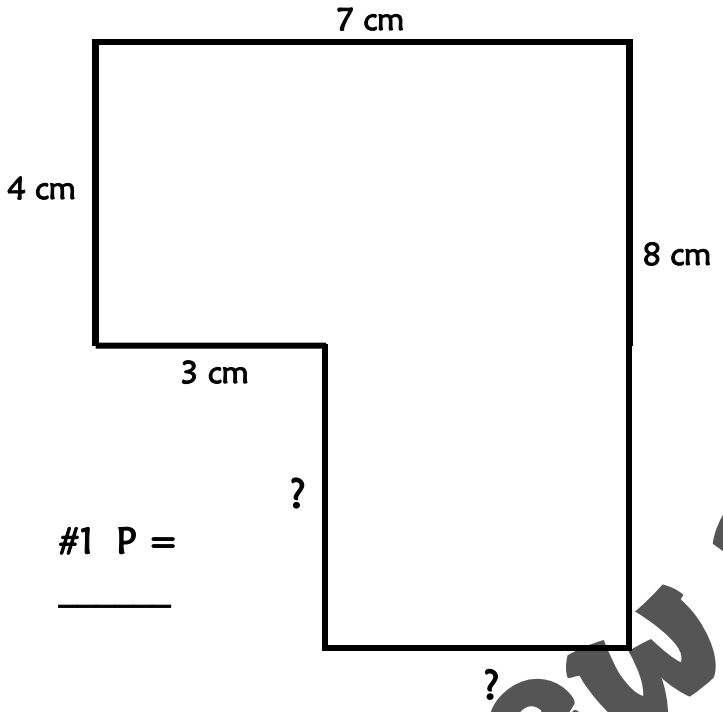
5 cm

Mystery Perimeters

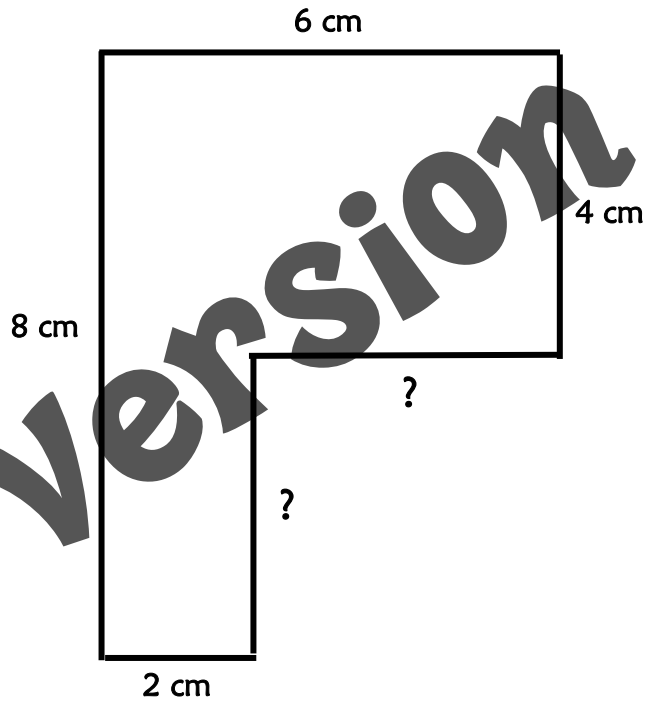
Name _____

Detective Dave discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help him find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler, Cuisenaire rods, or centimeter cubes to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

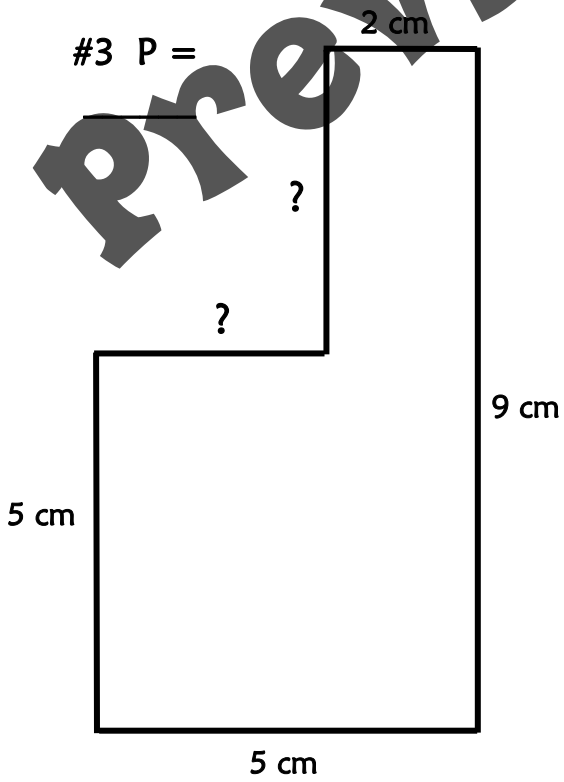
#1 P = _____



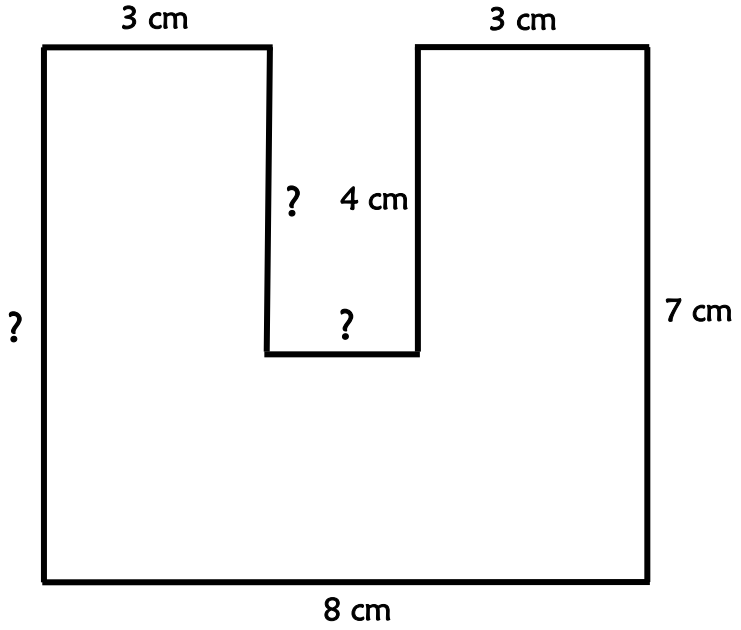
#2 P = _____



#3 P = _____



#4 P = _____



Mystery Perimeters

Name _____

Detective Dave discovered the sketches below and needs to find the perimeter of each polygon. However, some of the dimensions are not labeled. Can you help him find the missing dimensions? You may use logical reasoning or manipulatives such as a ruler, Cuisenaire rods, or centimeter cubes to help you solve the mystery. Then calculate and record the total perimeter of each polygon.

#1 P = _____

7 cm
4 cm
8 cm
3 cm
?
?

#2 P = _____

6 cm
4 cm
8 cm
?
?
2 cm

#3 P = _____

2 cm
?
?
9 cm
5 cm
5 cm

#4 P = _____

3 cm
3 cm
? 4 cm
?
?
7 cm
8 cm

Exploring Perimeter

Finding Formulas

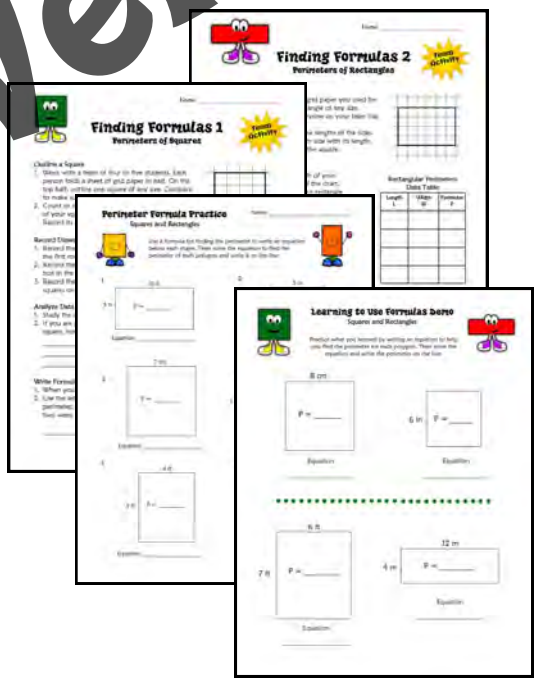
CCSS 3.MD.D.8 and 4.MD.A.3

Targeted Skill
Developing and applying the formulas for finding the perimeters of squares and rectangles

Overview
Finding Formulas is a multi-part lesson, so it may take more than one day to complete the activities. This lesson was designed as a teacher-directed, hands-on lesson to help students develop an understanding of formulas for the perimeter of a square or rectangle.

Directions
1. Seat students in teams of three or four and give each person a copy of **Finding Formulas 1** and a sheet of centimeter grid paper or graph paper. Display a copy of the assignment page for the class to view.
2. Explain each part of the activity step-by-step, and have students complete that step immediately after you describe it. (Refer to the sample student responses on page 50 for possible answers.)
3. Next, introduce the activities on **Finding Formulas 2** and have students complete each step after you explain it.
4. Display the **Learning to Use Formulas Demo** and work through the problems together, one at a time. Show students how to write an equation to find the perimeter of each polygon.
5. Finally, assign the **Perimeter Formula Practice** worksheet. Have students complete the assignment alone or by taking turns with a partner.

Materials
- Finding Formulas 1 and 2 student pages (pp. 49 and 51)
- Learning to Use Formulas Demo (p. 52)
- Centimeter grid or graph paper (p. 62)
- Rulers (optional)
- Perimeter Formula Practice (p. 55)

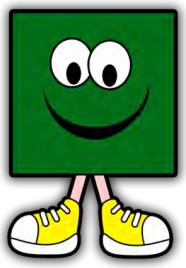


Laura's Tips

Discussing different options for writing formulas provides a perfect chance to apply the commutative property for addition to a real problem. For example the perimeter of a rectangle can be written as L + L + W + W or L + W + L + W. The order of the addends does not matter.

Extension Activity
Tangram Perimeter Formulas - Students can create formulas for each of the seven tangram pieces. Shapes include a parallelogram, a square, and five isosceles triangles.

Answers
Possible student answers are shown on pages 50, 52, 54, and 56.



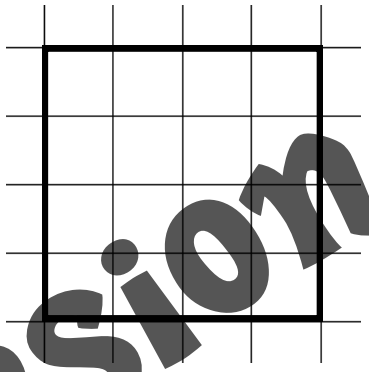
Name _____

Finding Formulas 1

Perimeters of Squares

Outline a Square

1. Work with a team of three or four students. Each person folds a sheet of grid paper in half. On the top half, outline one square of any size. Each student should have a different-sized square.
2. Count or measure to find the lengths of the sides of your square. Label each side with its length. Record its perimeter inside the square.



Record Dimensions

1. Record the lengths of each side of your square on the first row of the chart under the *S*.
2. Record the perimeter of your square in the first box in the Perimeter column.
3. Record the data for your teammates' squares on the remaining rows.

Square Perimeters Data Table

Side Lengths S	Perimeter P

Analyze Data

1. Study the data table. What patterns do you see?
2. If you are given the length of one side of any square, how can you find its perimeter? Explain:

_____

_____

_____

Write Formulas

1. When you write this as an algebraic equation, it's called a **formula**.
2. Use the letter S to stand for the length of each side and P to stand for the perimeter. On the lines below, write the formula for the perimeter of a square two ways. (Hint: One way uses addition and the other uses multiplication.)

_____ _____

Sample Student Responses / Key

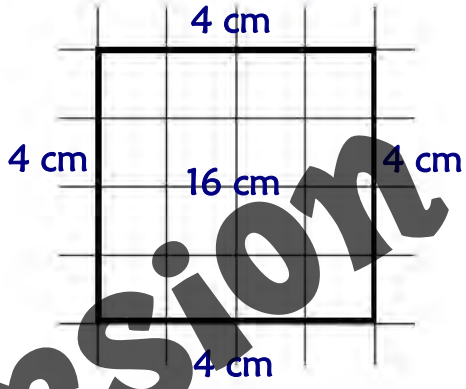
Finding Formulas 1

Perimeters of Squares

Team Activity

Outline a Square

1. Work with a team of three or four students. Each person folds a sheet of grid paper in half. On the top half, outline one square of any size. Each student should have a different-sized square.
2. Count or measure to find the lengths of the sides of your square. Label each side with its length. Record its perimeter inside the square.



Record Dimensions

1. Record the lengths of each side of your square on the first row of the chart under the *S*.
2. Record the perimeter of your square in the first box in the Perimeter column.
3. Record the data for your teammates' squares on the remaining rows.

Square Perimeters Data Table

Side Lengths S	Perimeter P
4 cm	16 cm
10 cm	40 cm
7 cm	28 cm
9 cm	36 cm

Analyze Data

1. Study the data table. What patterns do you see?
2. If you are given the length of one side of any square, how can you find its perimeter? Explain:

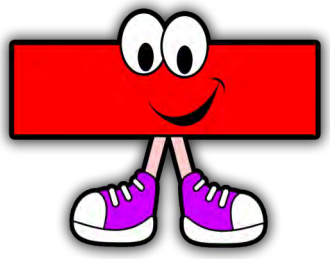
You can add all four sides or multiply the length of one side by 4 since all sides are the equal in length.

Write Formulas

1. When you write this as an algebraic equation, it's called a **formula.**
2. Use the letter *S* to stand for the length of each side and P to stand for the perimeter. On the lines below, write the formula for the perimeter of a square two ways. (Hint: One way uses addition and the other uses multiplication.)

$S + S + S + S = P$
or $P = S + S + S + S$

$4 \times S = P$, $S \times 4 = P$, or $4S = P$
May also be written with P on the left



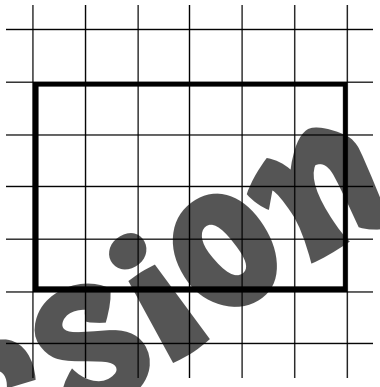
Name _____

Finding Formulas 2

Perimeters of Rectangles

Outline a Rectangle

1. On the bottom half of the grid paper you used for the square, outline one rectangle of any size. Each student on your team should have a different-sized rectangle.
2. Count or measure to find the length and width of the sides of your rectangle. Label each side with its length. Record its perimeter inside the square.



Record Dimensions

1. Record the length and width of your rectangle on the first row of the chart.
2. Record the perimeter of your rectangle in the first box in the Perimeter column.
3. Record the data for your teammates' rectangles on the remaining rows.

Rectangular Perimeters Data Table

Length L	Width W	Perimeter P

Analyze Data

1. Study the data table. What patterns do you see?
2. If you are given the length and width of any rectangle, how can you find its perimeter? Explain:

_____

_____

_____

Write Formulas

1. When you write this as an algebraic equation, it's called a **formula**.
2. Use the letter L to stand for the length, W to stand for the width, and P to stand for the perimeter. On the lines below, write the formula for the perimeter of a rectangle two ways.

_____ _____

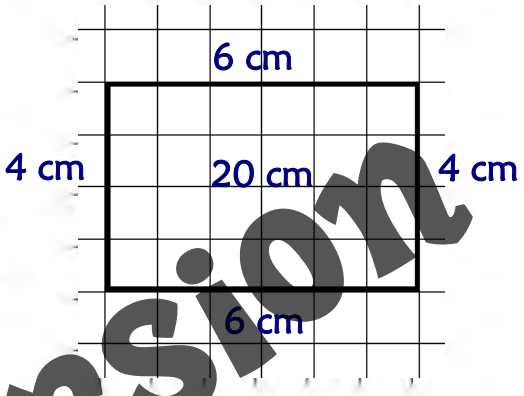
Finding Formulas 2

Perimeters of Rectangles

Team Activity

Outline a Rectangle

1. On the bottom half of the grid paper you used for the square, outline one rectangle of any size. Each student on your team should have a different-sized rectangle.
2. Count or measure to find the length and width of the sides of your rectangle. Label each side with its length. Record its perimeter inside the square.



Record Dimensions

1. Record the length and width of your rectangle on the first row of the chart.
2. Record the perimeter of your rectangle in the first box in the Perimeter column.
3. Record the data for your teammates' rectangles on the remaining rows.

Rectangular Perimeters Data Table

Length L	Width W	Perimeter P
4 cm	6 cm	20 cm
10 cm	15 cm	50 cm
7 cm	5 cm	24 cm
8 cm	6 cm	28 cm

Analyze Data

1. Study the data table. What patterns do you see?
2. If you are given the length and width of any rectangle, how can you find its perimeter? Explain:

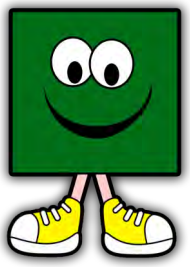
You can add all four sides or add the length and width and double the total. Or you can multiply the length and width by two and add those numbers.

Write Formulas

1. When you write this as an algebraic equation, it's called a **formula**.
2. Use the letter L to stand for the length, W to stand for the width, and P to stand for the perimeter. On the lines below, write the formula for the perimeter of a rectangle two ways.

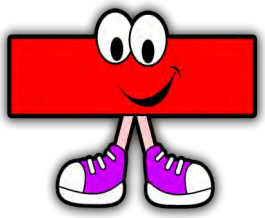
L + W + L + W = P
or P = L + L + W + W

2L + 2W = P or 2 x L + 2 x W = P
Advanced: 2(L + W) = P
May also be written with P on the left



Learning to Use Formulas Demo

Squares and Rectangles



Practice what you learned by writing an equation to help you find the perimeter for each polygon. Then solve the equation and write the perimeter on the line.

9 cm

P = _____

Equation

_____

6 in

P = _____

Equation

_____

6 ft

7 ft

P = _____

Equation

_____

12 m

4 m

P = _____

Equation

_____

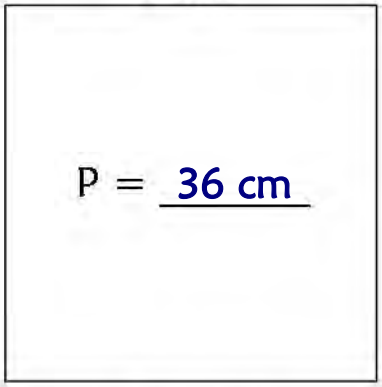
Sample Responses / Key

Learning to Use Formulas Demo

Squares and Rectangles

Practice what you learned by writing an equation to help you find the perimeter for each polygon. Then solve the equation and write the perimeter on the line.

9 cm

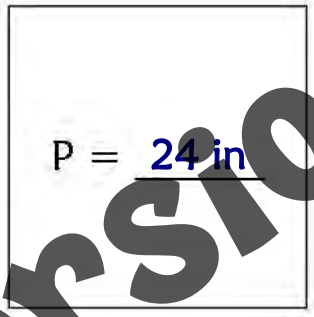


P = 36 cm

Equation

P = 9 x 4
or P = 9 + 9 + 9 + 9

6 in



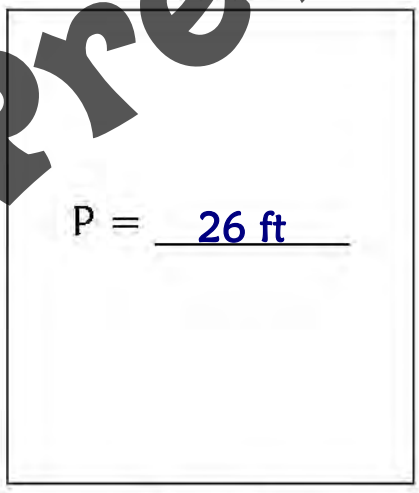
P = 24 in

Equation

P = 6 x 4
or P = 6 + 6 + 6 + 6

6 ft

7 ft



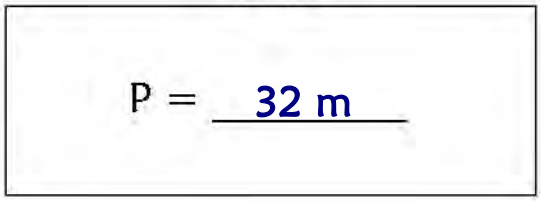
P = 26 ft

Equation

P = 6 + 6 + 7 + 7
or P = (2 x 6) + (2 x 7)

12 m

4 m



P = 32 m

Equation

P = 4 + 4 + 12 + 12
or P = (2 x 4) + (2 x 12)
Advanced: P = 2(4 + 12)

Perimeter Formula Practice

Squares and Rectangles

Name _____

Use a formula for finding the perimeter to write an equation below each rectangle or square. Then solve the equation to find the perimeter of each polygon and write it on the line.

1

10 ft

5 ft

P = _____

Equation _____

2

5 in

P = _____

Equation _____

3

7 cm

P = _____

Equation _____

4

9 m

3 m

P = _____

Equation _____

5

4 ft

5 ft

P = _____

Equation _____

6

3 cm

P = _____

Equation _____

Perimeter Formula Practice

Sample Student Responses / Key

Squares and Rectangles

Use a formula for finding the perimeter to write an equation below each rectangle or square. Then solve the equation to find the perimeter of each polygon and write it on the line.

1

10 ft

5 ft

P = 30 ft

Equation P = 5 + 5 + 10 + 10

or P = (2 x 5) + (2 x 10)

Advanced P = 2(5 +10)

2

5 in

P = 20 in

Equation P = 5 + 5 + 5 + 5

or P = 5 x 4

3

7 cm

P = 28 cm

Equation 7 + 7 + 7 + 7= P

or P = 7 x 4

4

9 m

3 m

P = 24 m

Equation P = 9 + 9 + 3 + 3

or P = (2 x 9) + (2 x 3)

Advanced P = 2(9 +3)

5

4 ft

5 ft

P = 18 ft

Equation P = 4 + 4 + 5 + 5

or P = (2 x 4) + (2 x 5)

Advanced P = 2(4 +5)

6

3 cm

P = 12 m

Equation 3 + 3 + 3 + 3= P

or P = 3 x 4

Exploring Perimeter

Perimeter Problems

CCSS 3.MD.D.8 and 4.MD.A.3

Targeted Skill
Solving word problems that require application of perimeter concepts

Materials
- Perimeter Problems 1 and 2 (pp. 58 and 59)
- Calculators (optional)

Overview
Perimeter Problems give students an opportunity to solve real word problems using perimeter concepts. There are two variations of the problem-solving page; **Perimeter Problems 1** uses customary measurement units and **Perimeter Problems 2** uses the metric system.

Directions
You can use the problem solving pages in a variety of ways. Here are a few suggestions to get you started:

- **Daily Problem Solving** - Give each student a worksheet, but have them complete just one problem a day. Collect papers daily and check the answer to each problem right away. Review the answer with the class before allowing students to complete the next problem.
- **Math Buddy Chat** - Give each student a worksheet, but have them work each problem using Math Buddy Chat, a method that requires students to alternately work problems and discuss them with a partner. You can download the directions in PowerPoint format from www.lauracandler.com.
- **Mix-Freeze-Pair** - Display one problem on a whiteboard or projector for the class. Ask students to mix around the room, freeze, and then pair with a partner. Students work the problem individually on dry erase boards or paper and then check the answer with their partner. Discuss answers as a class, then post a new problem. Repeat the process for each problem.

Laura's Tips

If your students are used to drawing the solutions to math problems, demonstrate how to do this. Encourage students to keep their drawings as simple as possible, only including details that help solve the problem. If you have a document camera, allow students to sketch their solutions on dry erase boards and then come to the front of the room to share their drawings with the class.

Extensions
- **Brainstorming Perimeter Uses** - Ask your students to brainstorm a list of situations that involve finding perimeter. Topics include building fences, measuring wood for a picture frame, buying wooden trim to go around the edge of a room.
- **Creating Perimeter Problems** - Have students work with a partner to create a perimeter word problem and its solution. Students switch problems with classmates and solve them.

Answers
- **Perimeter Problems 1 (page 58)**
  #1 - 28 ft, #2 - 20 ft, #3 - 4 yd, #4 - 3 yd
- **Perimeter Problems 2 (page 59)**
  #1 - 84 cm, #2 - 400 cm or 4 m, #3 - 6 m, #4 - 4 m

Perimeter Problems 1

Name _____

Draw a picture to help you solve each of the problems below and write each answer on the line below it. Be sure to label your illustrations to show how you solved each problem.

1. Greg wants to put a fence around his square garden. It measures 7 feet on each side. How much fence material should he buy?

Answer: _____

2. Mrs. Dillon needs to buy lace for the edge of a rectangular tablecloth. It measures 6 feet by 4 feet. How much lace should she buy?

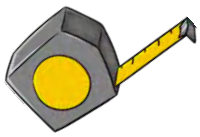
Answer: _____

3. Thomas knows that the perimeter of his bedroom is 18 yards. If the length of the room is 5 yards, what is its width?

Answer: _____

4. The fence around a square dog pen is 12 yards long. What is the length of each side?

Answer: _____



Perimeter Problems 2

Metric Measurement

Name _____

Draw a picture to help you solve each of the problems below and write each answer on the line below it. Be sure to label your illustrations to show how you solved each problem.

1. A picture frame has a length of 18 cm and a width of 24 cm. What is the perimeter of the frame?

Answer: _____

2. Sharon needs to buy lace to trim the edge of a baby blanket. If the blanket is 80 cm by 120 cm, how much lace should she buy?

Answer: _____

3. Mr. McDonald's living room has a perimeter of 22 meters. If the length of the room is 5 meters, what is its width?

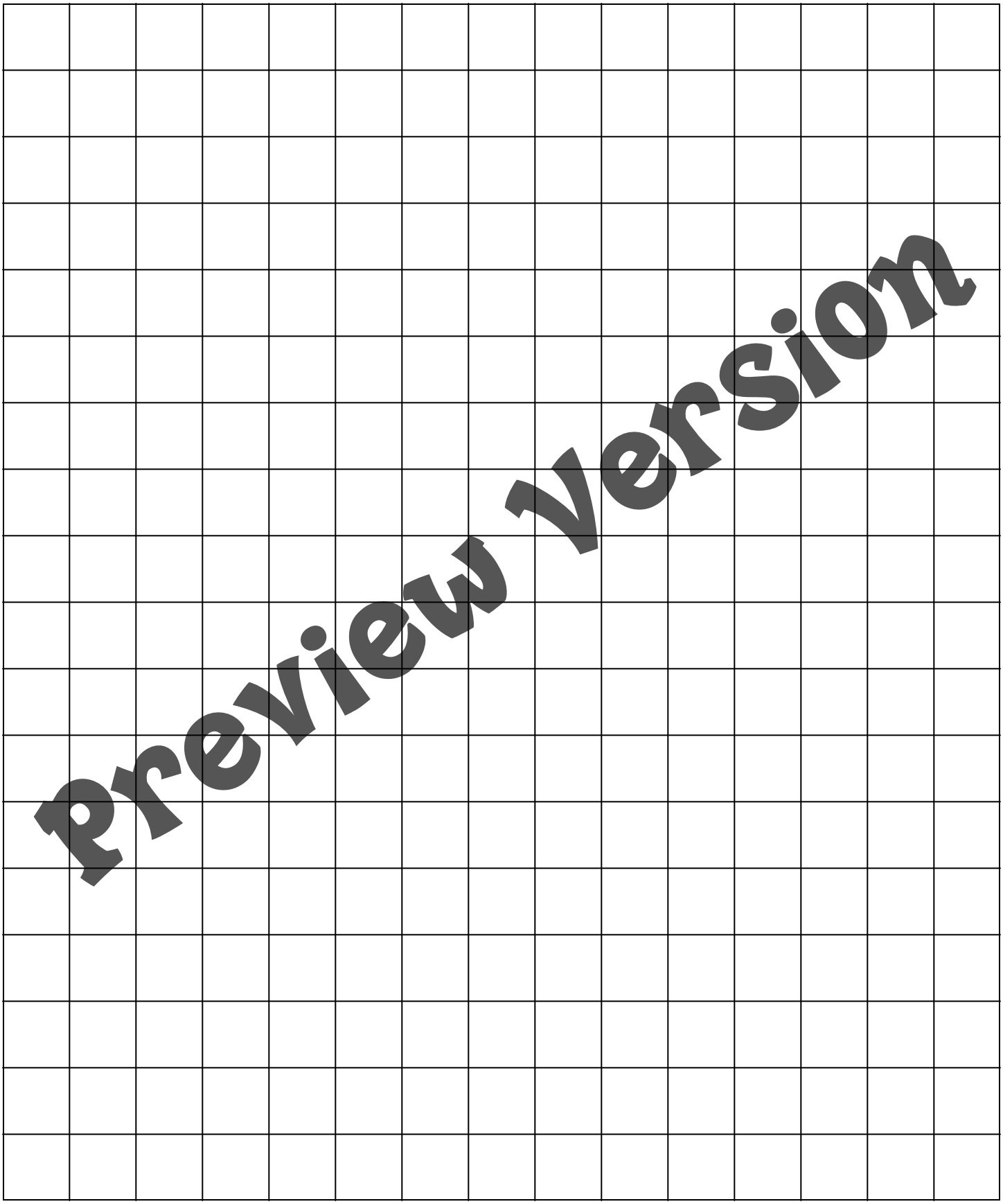
Answer: _____

4. The fence around a square garden is 16 meters long. What is the length of each side?

Answer: _____

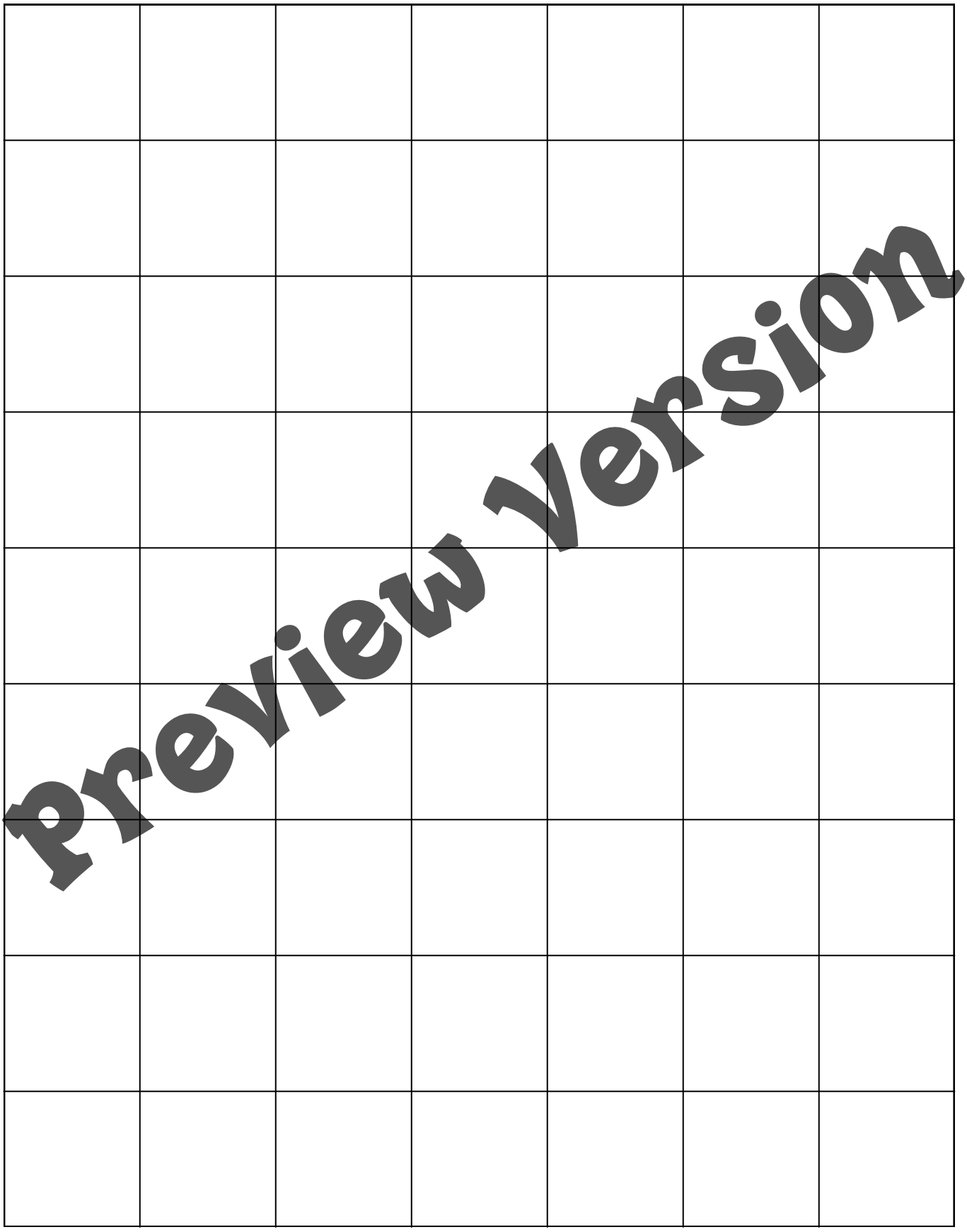
Half Inch Grid

Name _____



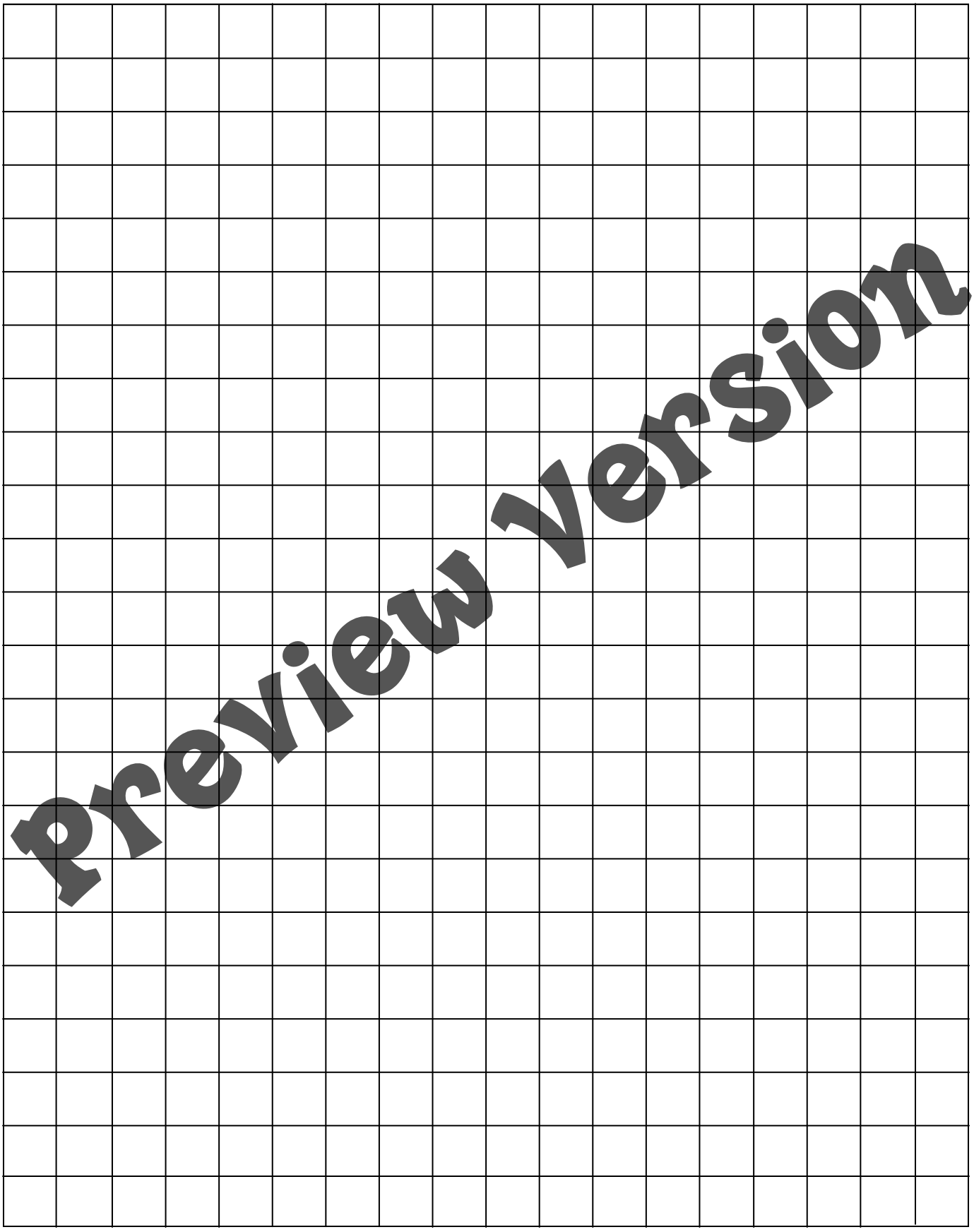
Inch Grid

Name _____



Centimeter Grid

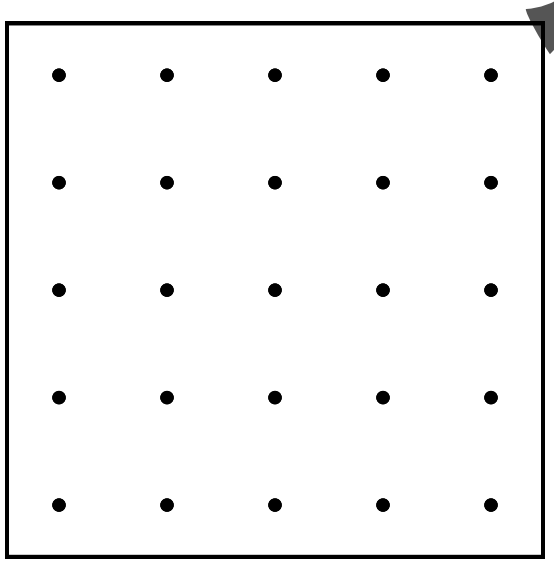
Name _____



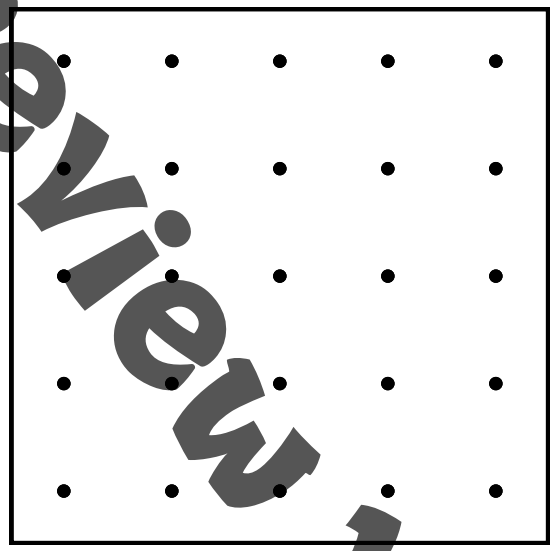
Geoboard Dot Paper

Name _____

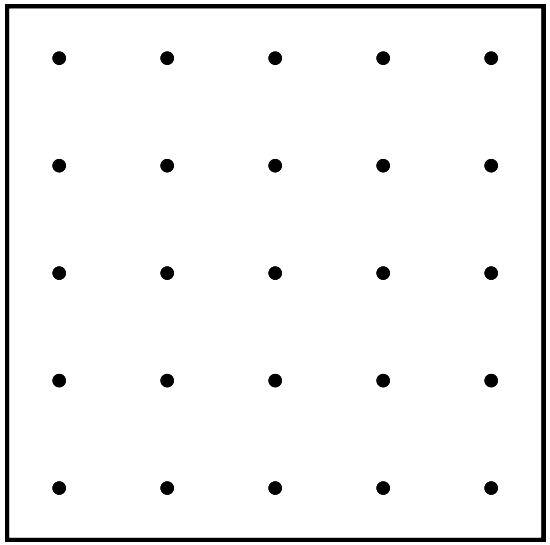
1



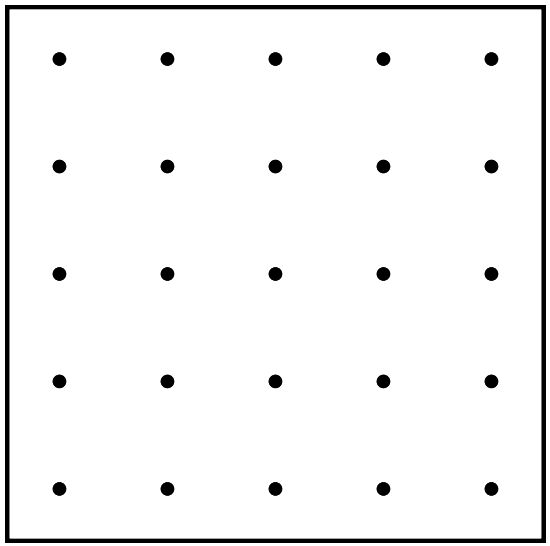
2



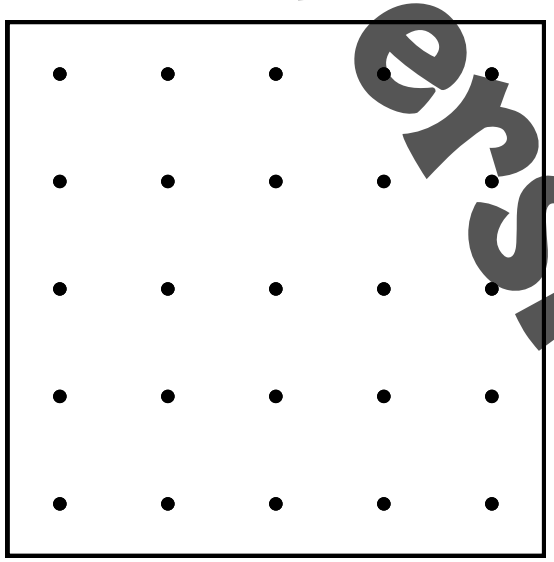
3



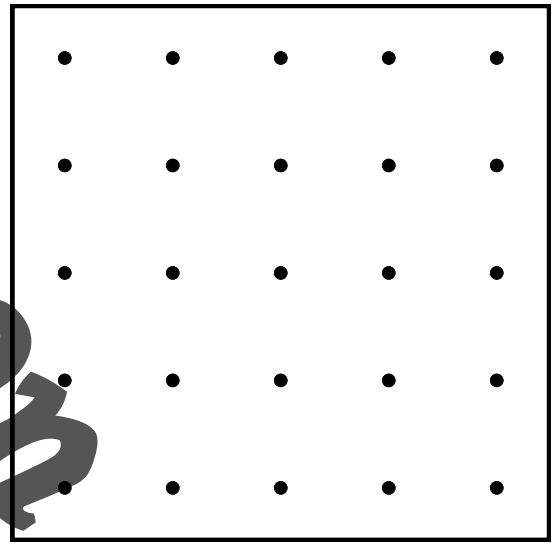
4



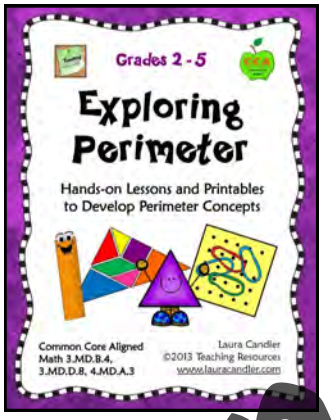
5



6



Common Core Aligned Math Standards



The activities in ***Exploring Perimeter*** are aligned with the CCSS Standards below. Be sure to refer to the Common Core Connections chart on page 5 to see which activities are aligned with each standard.

Content Standards

3rd Grade

3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

3.MD.D.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

4th Grade

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.

Mathematical Practice Standards (All Grades)

MP1 Make sense of problems and persevere in solving them.
MP2 Reason abstractly and quantitatively.
MP4 Model with mathematics.
MP5 Use appropriate tools strategically.
MP7 Look for and make use of structure.
MP8 Look for and express regularity in repeated reasoning.

Laura Candler's TpT Store

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Laura Candler

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- Character Bio Reports
- Analyzing Character Traits
- Powerful Poetry Combo
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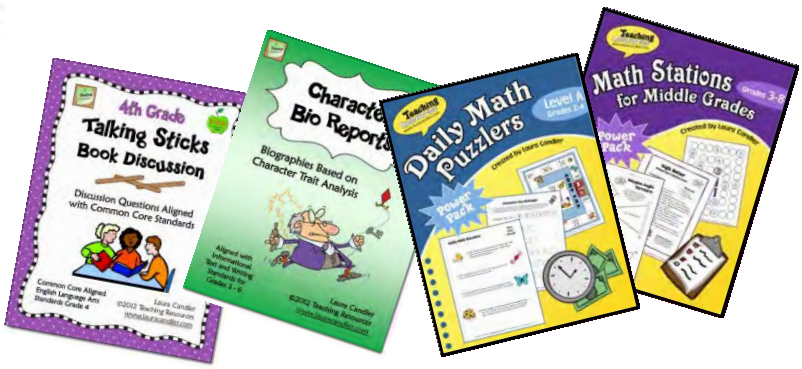
- Sentence Go Round
- Writing Powerful Poetry
- Customary Measurement Conversions

Seasonal Teaching Packs

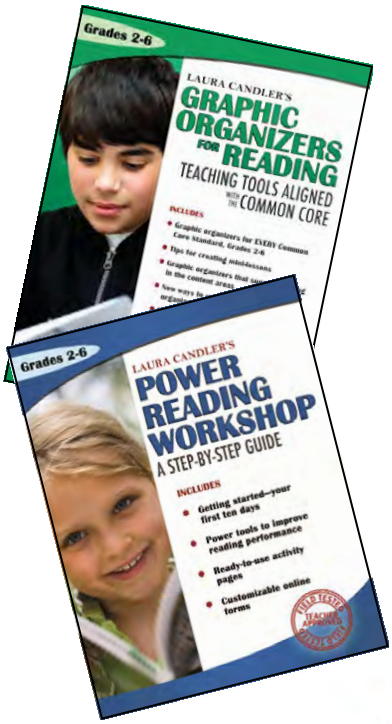
- October
- November
- December
- January
- February (Free!)
- March
- April

- Geometry: Exploring the Basics
- Math Stations for Middle Grades (3-8)
- Polygon Explorations
- Talking Sticks Discussions (CCSS Aligned)
- Teaching Multiple Intelligence Theory
- Place Value Spinner Games
- Fraction Spinner Games
- Simplify and Snap Fraction Game
- Order of Operations Bingo



Teaching Resources Website

www.lauracandler.com



Ready-to-Use Resources for Teachers!

- Free printables and activity sheets
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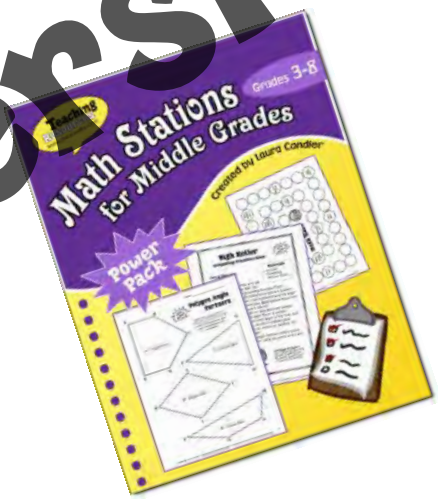
- Literacy & Reading Workshop strategies
- Mathematics instructional resources
- Candler's Classroom Connections Newsletters



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