

Kenmore-Town of Tonawanda UFSD

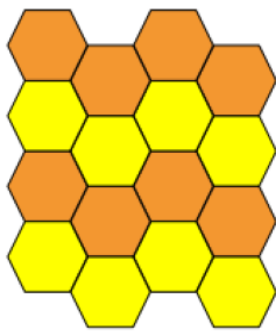
We educate, prepare, and inspire all students to achieve their highest potential



Grade 3 Module 7 Parent Handbook

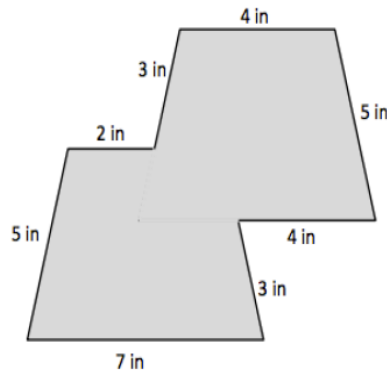
Geometry and Measurement Word Problems

In Module 7, students will get intensive practice with word problems, as well as hands-on investigation experiences with geometry and perimeter. Students will solve one- and two-step word problems, classify shapes based on their attributes, learn what a tessellation is, study perimeter and area, and end with a review of Grade 3 fundamental skills.



A simple tessellation of hexagons

Students are asked to find the perimeter of shapes in Module 7.



Students are also asked to classify shapes; for example, is this shape an octagon? Why or why not?

What Came Before this Module:

Students worked extensively with data, displaying both categorical and measurement data in bar graphs, line plots, and other types of graphs.

Key Terms and Ideas:

Attribute: any characteristic of a shape, including properties and other defining characteristics, e.g., straight sides, and non-defining characteristics, blue

Diagonal: e.g., the line drawn between opposite corners of a quadrilateral

Perimeter: boundary or length of the boundary of a two-dimensional shape

Property: e.g., having all sides equal in length

Regular polygon: polygon whose side lengths and interior angles are all equal

Tessellate: to tile a plane without gaps or overlaps

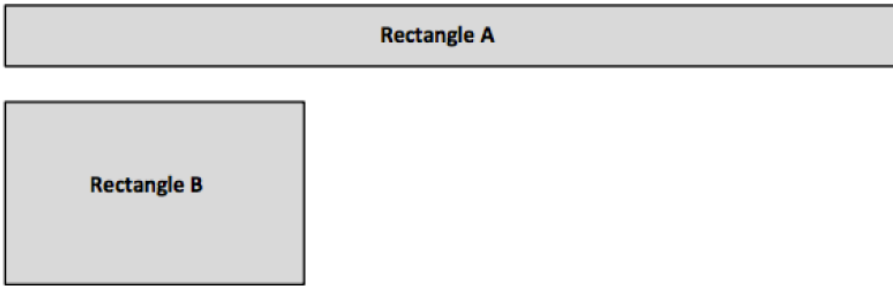
Tetrominoes: four squares arranged to form a shape so that every square shares at least one side with another square

+ How You Can Help at Home:

- Ask your student about the attributes of basic shapes that you encounter (how many sides, are the angles equal, are the sides the same length, are they parallel, etc.).
- Play Tetris, a tetrominoe-based game!

Key Common Core Standards:

- *Solve problems involving the four operations, and identify and explain patterns in arithmetic.*
- *Represent and interpret data.*
- *Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.*
- *Reason with shapes and their attributes.*



Spotlight on Math Skills:

Calculating Perimeter and Area—
foundational geometric skills

Both Rectangle A and Rectangle B are made of 15 square units. Students are asked to determine which one has the greatest perimeter, and why? They will explore what happens to perimeter as side lengths change in shapes with the same area.

A Story of Units exposes students to several key skills that will be used throughout the elementary years.

Students in Grade 3 work extensively for the first time in this module with the important geometric concepts of area. The foundations have been laid through earlier work with arrays, as well as the time spent defining and describing attributes of geometric shapes.

Now, students learn how to calculate the perimeter (the length of the boundary of a two-dimensional shape) of various figures, including rectangles and regular polygons. Students even explore a method to estimate the perimeter of a circle. They also work to understand the relationship between perimeter and area. The two rectangles above pose a typical question about the connection between perimeter and area.

Sample Problem from Module 7:
(Example taken from Module 7, Lesson 4)

The third-graders raised \$437 in a fundraiser. The fourth-graders raised \$68 less than the third-graders. How much money did the two grade levels raise altogether?

(Sample of a two-step word problem)

Geometry and Measurement Word Problems

OVERVIEW

The final module of the year offers students intensive practice with word problems, as well as hands-on investigation experiences with geometry and perimeter.

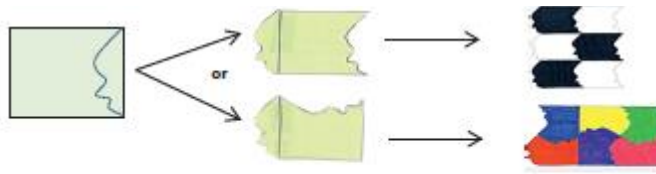
Topic A begins with solving one- and two-step word problems based on a variety of topics studied throughout the year and including all four operations (**3.OA.8**). The lessons emphasize modeling and reasoning to develop solution paths. They incorporate teacher-facilitated problem solving, opportunities for students to independently make sense of problems and persevere in solving them, and time for students to share solutions and critique peer strategies.

Topic B introduces an exploration of geometry. Students build on Grade 2 ideas about polygons and their properties, specifically developing and expanding their knowledge of quadrilaterals. They explore the attributes of quadrilaterals and classify examples into various categories, including recognizing the characteristics of polygons (**3.G.1**). Students draw polygons based on their attributes, producing sketches from descriptions like, “This shape has two long sides that are parallel, two short sides, and no right angles.”

Students next use tangrams and tetrominoes (see examples below) to compose and decompose shapes. They reason about the relationships between shapes and between attributes. For example, students understand that quadrilaterals can be decomposed into triangles and recognize that the two smallest triangles in a tangram puzzle can be put together to form a parallelogram, a square, or a medium triangle.



Students tessellate to bridge geometry experience with the study of perimeter in Topic C. They first decompose a quadrilateral and then rearrange the parts. They use the new shape to tile. Students then define perimeter in two distinct ways: (1) as the boundary of a planar region and (2) as the length of the boundary curve. Students see varied examples from the tiles used to tessellate.



Cut on the line. Then, slide the piece to the opposite side or rotate it to an adjacent side to make a new shape. Then, tile with the new shape.

As they learn about perimeter as an attribute of plane figures, students apply their knowledge to real-world situations through problem solving (**3.MD.8**). They measure side lengths of shapes in whole number units to determine perimeter and solve problems where side lengths are given. They use string and rulers to measure the length around circles of different sizes. This variation prompts students to think more flexibly about perimeter, understanding that it can be the boundary of any shape and that its measurements are not limited to whole numbers. The topic ends with problems in which some measurements around the perimeter of a polygon are unknown but can be determined by reasoning. Students consider the efficiency of their strategies and identify tools for solving; for example, they use multiplication as a tool when measurements are repeated.

Topic D utilizes the line plot, familiar from Module 6, to help students draw conclusions about perimeter and area measurements (**3.MD.4**). Early in the topic, students find different possible perimeters or areas for rectangles based on information given about the rectangles. For example, using knowledge of factors from experience with multiplication, students find the following:

- Different perimeters of rectangles composed of a given number of unit squares (**3.MD.8**). For example, given a rectangle composed of 24 unit squares, students find four possible perimeters: 50, 28, 22, and 20 length units.
- Different areas of rectangles with a given perimeter and composed of unit squares. For example, students use unit squares to build rectangles with a perimeter of 12 units and determine that they can do so using 5, 8, or 9 unit squares.

(Forming rectangles with unit squares results in whole number side lengths.)

Students use line plots to show the number of rectangles they were able to construct for each set of given information. The line plots are tools that students use to help them analyze and draw conclusions about their data. Students draw their rectangles on grid paper and reason about their findings. They notice, for example, that for rectangles of a given area, those with side lengths that are equal or almost equal (more square-like) have smaller perimeters than those whose side lengths are very different (a long and narrow shape).

By the end of the topic, students are able to conclude that there is no direct relationship between area and perimeter. If an area is given, there is no way of knowing a shape's corresponding perimeter without more information about the side lengths.

In Topic E, students solve problems involving area and perimeter. After an initial lesson of problem solving with perimeter, students create a robot composed of rectangles. Given specific perimeter measurements for the rectangles, they reason about the different possible side lengths. Students compare and analyze their work, discussing how different choices for side lengths can affect area while conforming to the criteria for perimeter. Students synthesize their learning in the final lessons through solving word problems involving area and perimeter using all four operations (**3.OA.8**).

Topic F concludes the school year with a set of engaging lessons that briefly review the fundamental Grade 3 concepts of fractions, multiplication, and division. This topic comes after the End-of-Module Assessment. It begins with a pair of lessons on fractions, engaging students in analyzing and creating unusual representations of one-half, such as those shown below. Students analyze and discuss these representations, using their knowledge of fractions to justify their constructions and critique the work of others. The final lessons in this topic are fluency based and engage students in games that provide practice to solidify their automaticity with Grade 3 skills. Using simple origami techniques, students create booklets of these games. The booklets go home and become resources for summer practice.



Terminology

New or Recently Introduced Terms

- Diagonal (e.g., the line drawn between opposite corners of a quadrilateral)
- Perimeter (the boundary or length of the boundary of a two-dimensional shape)
- Regular polygon (a polygon whose side lengths and interior angles are all equal)
- Tessellate (to tile a plane without gaps or overlaps)
- Tetromino (a shape composed of four squares that are connected so that every square shares at least one side with another square)

Familiar Terms and Symbols

- Area (the measurement of two-dimensional space in a bounded region)
- Attribute (any characteristic of a shape, including properties and other defining characteristics, e.g., straight sides and non-defining characteristics such as the color blue)
- Compose (to put two or more objects or numbers together)
- Decompose (to break an object or number into smaller parts)
- Heptagon (a flat figure enclosed by seven straight sides and seven angles)
- Hexagon (a flat figure enclosed by six straight sides and six angles)
- Octagon (a flat figure enclosed by eight straight sides and eight angles)
- Parallel (lines that do not intersect, even when extended in both directions)*
- Parallelogram (a quadrilateral with both pairs of opposite sides parallel)
- Pentagon (a flat figure enclosed by five straight sides and five angles)
- Polygon (a closed figure with three or more straight sides, e.g., triangle, quadrilateral, pentagon, hexagon)*
- Quadrilateral (a four-sided polygon, e.g., square, rhombus, rectangle, parallelogram, trapezoid)*
- Rectangle (a flat figure enclosed by four straight sides, having four right angles)
- Rhombus (a flat figure enclosed by four straight sides of the same length)*
- Right angle (e.g., a square corner)*
- Square (a rectangle with four sides of the same length)
- Tangram (a special set of puzzle pieces with five triangles and two quadrilaterals that compose a square)
- Trapezoid (a quadrilateral with at least one pair of parallel sides)*
- Triangle (a flat figure enclosed by three straight sides and three angles)

Suggested Tools and Representations

- Cardstock (for making student copies of templates)
- Circular objects (a variety of sizes for students to measure)
- Grid paper
- Index cards (to use as right angle tools)
- Pattern blocks
- Rulers (measuring to the nearest quarter inch, constructed by students in Module 6)
- String
- Square tiles
- Tangrams (see the example illustrated in the Module Overview narrative)
- Tetrominoes (see the example illustrated in the Module Overview narrative)

Grade 3 Module 7 Topic A

Solving Word Problems

Focus Standard:

- 3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (This standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order [Order of Operations].)

Instructional Days Recommended: 3

In Topic A, students use all four operations to solve one- and two-step word problems within various contexts that were studied throughout the year. The problems are challenging and require students to carefully consider solution paths as they “make sense of problems and persevere in solving them” (MP.1).

Guided practice with strategies for problem solving is built into Lessons 1 and 2. These lessons emphasize the use of modeling through the Read-Draw-Write (RDW) process and revisit models such as tape diagrams and number bonds. Students flexibly use a letter to represent the unknown as they solve. This practice readies them for problem solving with perimeter and area in Topics C and E.

In Lesson 3, students’ level of independence within the lesson increases. They work together or on their own to develop solution paths and then share strategies and solutions. Students think critically about their own work and that of others through peer review and critique. They discuss the clarity, practicality, and efficiency of different models and strategies, refining their own understandings and approaches. Student presentations of work and protocols for critiquing are structures that provide a platform for this dialogue.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 1 - 2

Objective: Solve word problems in varied contexts using a letter to represent the unknown.

Homework Key (1)

1. a. \$34 2. 9
- b. 4 3. \$2
- c. 7 minutes 4. 32

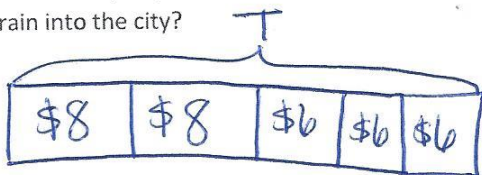
Homework Sample

Max's family takes the train to visit the city zoo. Use the RDW process to solve the problems about Max's trip to the zoo. Use a letter to represent the unknown in each problem.

1. The sign below shows information about the train schedule into the city.

Train Fare—One Way	
Adult.....	\$ 8
Child.....	\$ 6
Leaves every 15 minutes starting at 6:00 a.m.	

- a. Max's family buys 2 adult tickets and 3 child tickets. How much does it cost Max's family to take the train into the city?



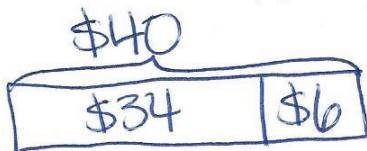
$$T = 8 + 8 + 6 + 6 + 6$$

$$= 16 + 18$$

$$= 34$$

It costs Max's family \$34 to take the train into the city.

- b. Max's father pays for the tickets with \$10 bills. He receives \$6 in change. How many \$10 bills does Max's father use to pay for the train tickets?



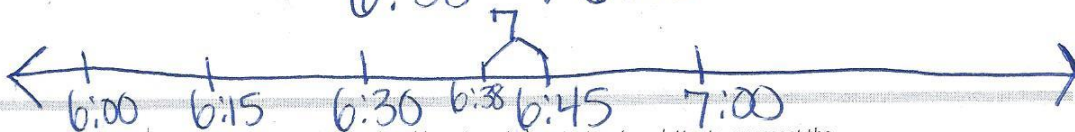
Max's father used four \$10 bills to pay for the tickets.

$$10 + 10 + 10 + 10 = 40$$

- c. Max's family wants to take the fourth train of the day. It's 6:38 a.m. now. How many minutes do they have to wait for the fourth train?

They have to wait 7 minutes for the train.

$$6:38 \xrightarrow{+7 \text{ minutes}} 6:45$$



Lesson 2

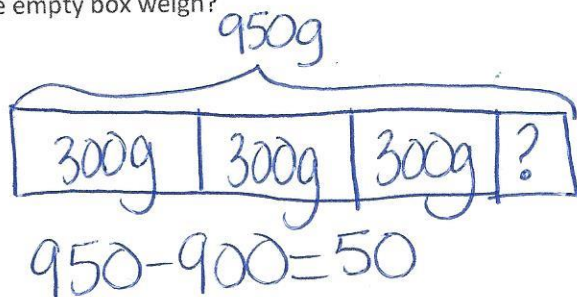
Homework Key

- 50 grams
- 7
- 360 square inches
- 4
- 307 grams
- 11 centimeters

Homework Sample

Use the RDW process to solve. Use a letter to represent the unknown in each problem.

- A box containing 3 small bags of flour weighs 950 grams. Each bag of flour weighs 300 grams. How much does the empty box weigh?



The empty box weighs 50 grams.

Lesson 3

Objective: Share and critique peer solution strategies to varied word problems.

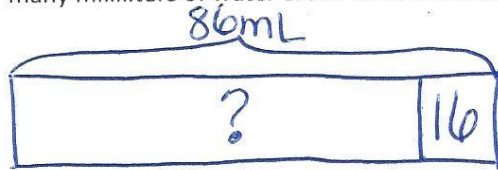
Homework Key

- 10 milliliters
- 21 minutes
- 120
- a. \$65
b. \$194
- 6 inches

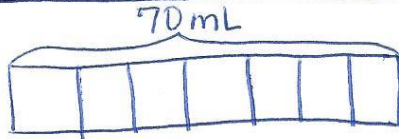
Homework Sample

Use the RDW process to solve the problems below. Use a letter to represent the unknown in each problem.

1. Jerry pours 86 milliliters of water into 8 tiny beakers. He measures an equal amount of water into the first 7 beakers. He pours the remaining water into the eighth beaker. It measures 16 milliliters. How many milliliters of water are in each of the first 7 beakers?



$$86 - 16 = 70$$



$$70 \div 7 = 10$$

There are 10 mL of water in each of the first 7 beakers.

Grade 3 Module 7 Topic B

Attributes of Two-Dimensional Figures

Focus Standard:

3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Instructional Days Recommended: 6

In Topic B, students use their understanding of geometry from Grade 2 to explore quadrilaterals. In Lesson 4, they learn that different shapes (e.g., squares, rectangles, and rhombuses) have shared attributes that can fall within a larger category (parallelograms, quadrilaterals, and trapezoids). They explore these new, larger categories and understand, for example, that any quadrilateral can be decomposed into two triangles. As they learn which attributes are shared, the process of comparing shapes also leads to discussion about the differences between shapes; students learn, for example, that not all rectangles are squares.

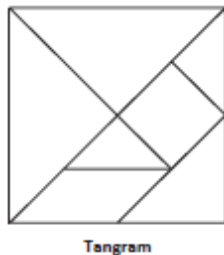
Students use their understanding of the attributes of quadrilaterals to compare other polygons in Lesson 5. They look for shared attributes and learn to recognize polygons with sides that are equal—regular polygons—which helps lay a foundation for problem solving with perimeter in later topics.

While students analyze the attributes of given shapes in Lessons 4 and 5, in Lesson 6 they draw shapes based on given attributes. For example, students may be asked to draw a quadrilateral with at least two right angles and talk about which shapes are possibilities. They also draw quadrilaterals that do not fit any subcategories. Prompts such as “draw a polygon with only two sides and two angles” spark investigative discussion through which students determine the impossibility of such a shape. This lesson helps students solidify their intuitive understanding of polygons.

In Lesson 7, students work with tetrominoes. They use grid paper to construct a set and then reason about how to create larger shapes, such as rectangles, using them. This develops spatial structuring skills by way of manipulating and composing shapes.



Students use their experience with composing shapes to help them decompose a square to create a tangram puzzle (pictured to the right). Lesson 8 guides students through the process of decomposing, and then reconstructing, the original square using the seven puzzle pieces.



In Lesson 9, students learn to analyze relationships between tangram pieces. For example, students might discover that the two largest triangles compose one larger triangle or that the two smallest triangles can be manipulated to compose a small square, parallelogram, or medium triangle.

Students solve tangram puzzles using their pieces and discuss whether or not there is more than one way to compose a given polygon. Describing their strategies provides engaging context for using the vocabulary of attributes: “I found that the right angle of the small triangle forms the top of the duck’s head.” Students may create their own polygons and trade with partners to see if a peer can use their tangram pieces to complete the outline.



**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 4


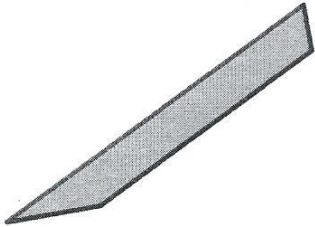
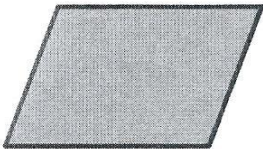
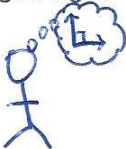

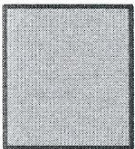
Objective: Compare and classify quadrilaterals.

Homework Key

1. Answer provided
 - True
 - True
 - False
 - True
2. a. Parallel sides traced with a colored pencil
 - b. A shape with at least 1 set of parallel sides drawn

Homework Sample

1. Complete the chart by answering true or false.

Attribute	Polygon	True or False
Example: 3 Sides		True
4 Sides		True
2 Sets of Parallel Sides		True
4 Right Angles 		False
Quadrilateral		True

Lesson 5

Objective: Compare and classify other polygons.

Homework Key

- Hexagon matches *At least 1 right angle* and *All sides are not equal*
Rectangle matches *At least 1 right angle*, *All sides are not equal*, and *At least 1 set of parallel sides*
Regular octagon matches *All sides are equal* and *At least 1 set of parallel sides*
Decagon matches *All sides are not equal*
Pentagon matches *All sides are not equal*
Square matches *All sides are equal*, *At least 1 right angle*, and *At least 1 set of parallel sides*
- Answers will vary.
- Yes; explanations will vary.

Homework Sample

- Match the polygons with their appropriate clouds. A polygon can match to more than 1 cloud.



Lesson 6

Objective: Draw polygons with specified attributes to solve problems.

Homework Key

1. Triangle with no right angles drawn
2. Square, rectangle, or trapezoid drawn
3. Quadrilateral with 2 equal sides drawn; equal side lengths labeled
4. Hexagon with at least 2 equal sides drawn; equal side lengths labeled
5. Pentagon with at least 2 equal sides drawn; equal side lengths labeled
6. Regular triangle with side lengths of 4 cm drawn

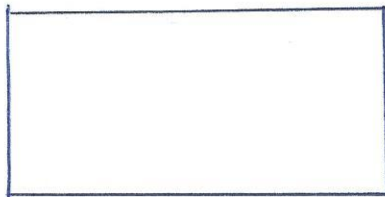
Homework Samples

Use a ruler and a right angle tool to help you draw the figures with the given attributes below.

1. Draw a triangle that has no right angles.



2. Draw a quadrilateral that has at least 2 right angles.



Lesson 7

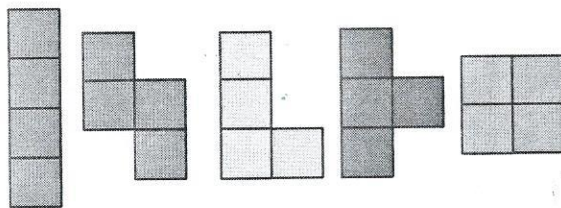
Objective: Reason about composing and decomposing polygons using tetrominoes.

Homework Key

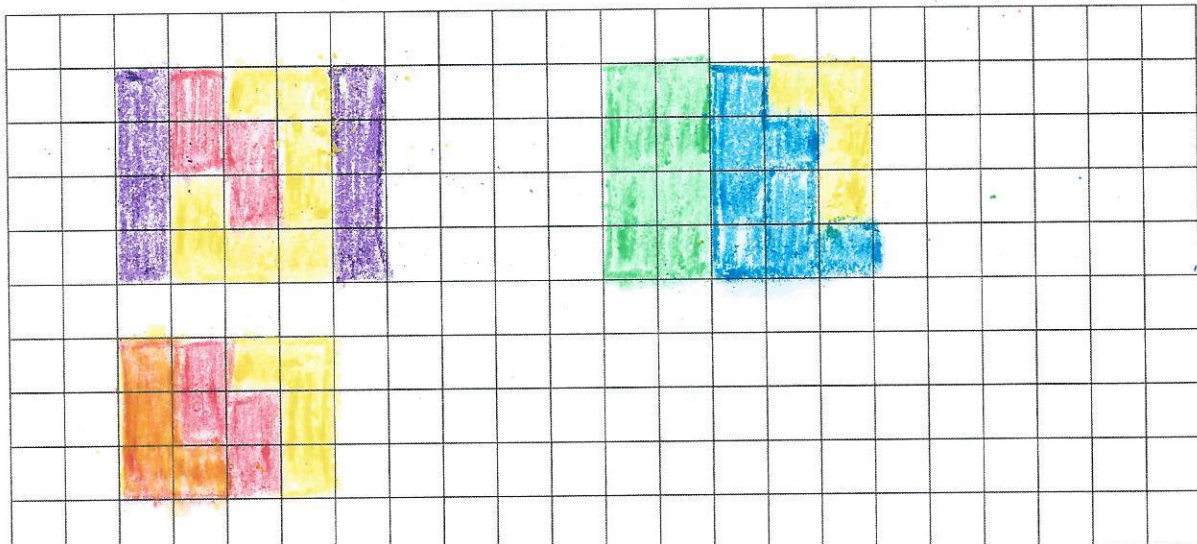
- 3 rectangles colored
- a. Square with 16 units colored
b. 2 rectangles with 24 units colored
- Explanations will vary.

Homework Sample

- Color tetrominoes on the grid to create three different rectangles. You may use the same tetromino more than once.



Tetrominoes



Lesson 8

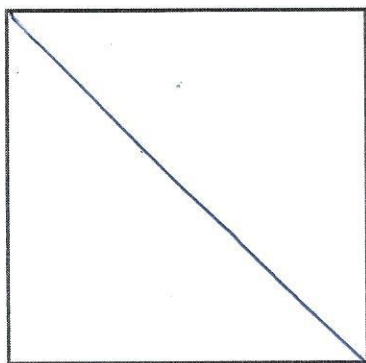
Objective: Create a tangram puzzle and observe relationships among the shapes.

Homework Key

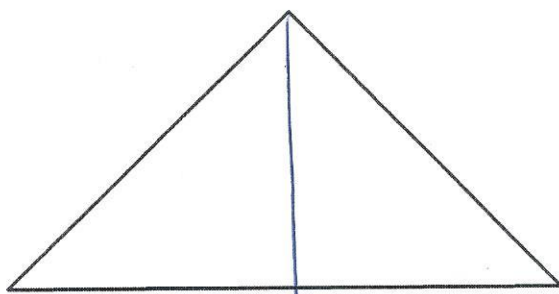
1. Line drawn to divide square
2. Line drawn to divide triangle
3. Line drawn to divide trapezoid
4. Line drawn to divide quadrilateral
5. 4 lines drawn to divide square into 8 equal triangles
6. Descriptions will vary.

Homework Samples

1. Draw a line to divide the square below into 2 equal triangles.



2. Draw a line to divide the triangle below into 2 equal, smaller triangles.



Lesson 9

Objective: Reason about composing and decomposing polygons using tangrams.

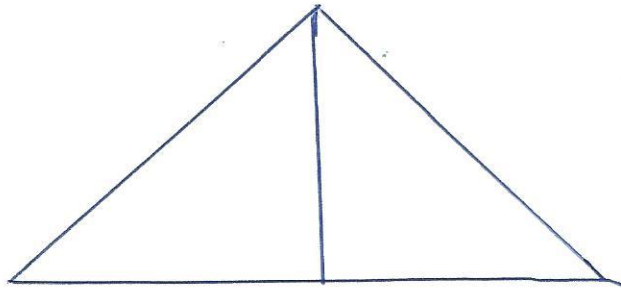
Homework Key

- a. Drawings will vary.
b. Drawings will vary.
c. Drawings will vary.
d. Drawings will vary.
- Lines are drawn correctly on the cat.
- Drawings will vary.

Homework Sample

- Use at least two tangram pieces to make and draw each of the following shapes. Draw lines to show where the tangram pieces meet.

- A triangle.



Grade 3 Module 7 Topic C

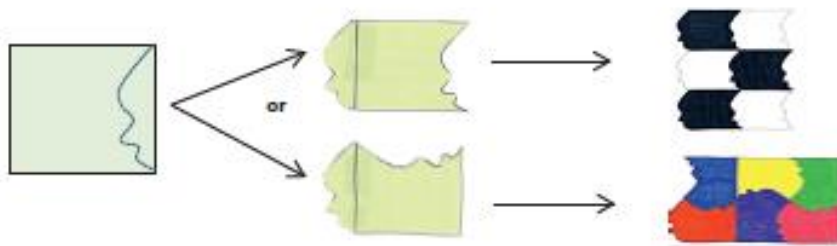
Problem Solving with Perimeter

Focus Standards:

- 3.MD.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.

Instructional Days Recommended: 8

Students are introduced to perimeter in Topic C. Conceptual exploration begins by creating tessellations. In Lessons 10 and 11, students decompose a quadrilateral. They rearrange the parts to form a new shape. They then use the new shape to tile, tracing its perimeter until a new larger shape (the complete tessellation) is formed. Through this work, students define perimeter as the boundary of a two-dimensional shape and use their new vocabulary in context as they describe the process of tessellating. These lessons begin the study of perimeter with unusual shapes to encourage flexible thinking about perimeter and avoid the misconception that it is a property of rectangles alone.



Cut on the line. Then, slide the piece to the opposite side, or rotate it to an adjacent side to make a new shape.

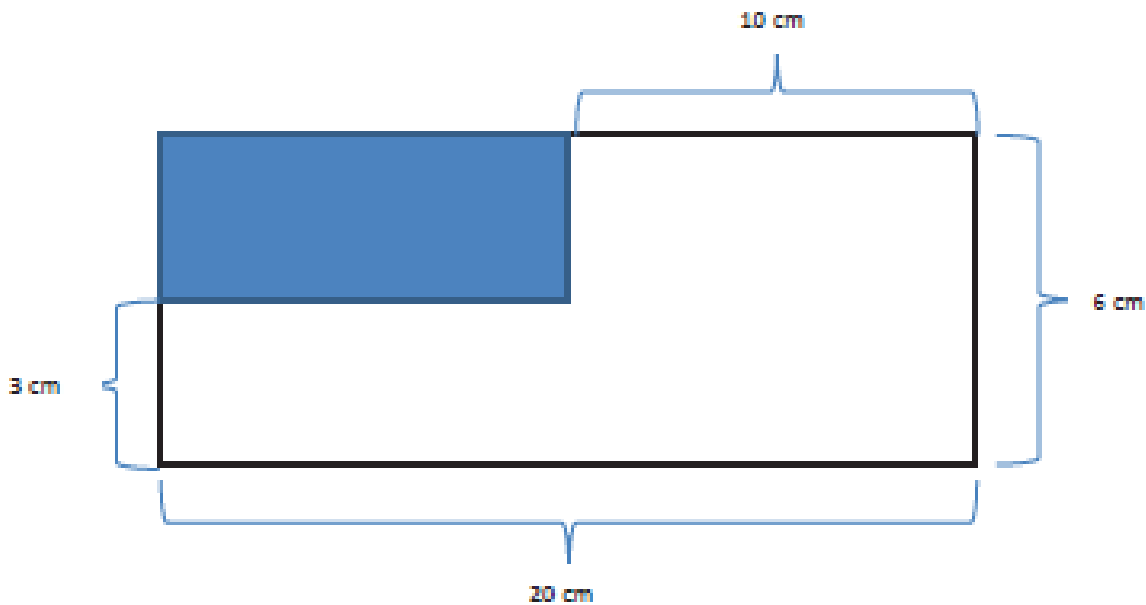
In Lesson 12, students measure side lengths and calculate perimeters. They measure the side lengths of polygons (in whole number units) using rulers and then use these side lengths to determine perimeter. Students attend to units as they solve and discuss the efficiency of strategies for adding side lengths. The complexity increases in Lesson 13 when students are given pictorial models, including the side lengths of polygons, from which they determine the perimeter.

Lesson 14 provides more complex problem solving; students determine the perimeter of a figure when whole number side length measurements are unknown. Students use their knowledge of attributes of shapes to fill in unknown information and then calculate the perimeter. For example, they may be told that a hexagon is regular and that one side length is 5 centimeters. Based on that information, students fill in the unknown side lengths and calculate the perimeter and discuss whether addition or multiplication is a more efficient strategy for solving the problem.

In Lesson 15, students apply their basic understanding of perimeter to real-world contexts. They explore how perimeter is used in everyday life and develop strategies for calculating perimeters using known information.

Lesson 16 extends students' knowledge of perimeter to circles. In this lesson, students wrap string around various circular objects, such as lids. Students measure their strings to the nearest quarter inch using rulers and record their measurements for comparison and discussion. This lesson reinforces that perimeter is a measurable attribute for any shape, not just polygons, and that those measurements can occur in both whole and fractional units.

Lesson 17 involves using all four operations to determine a perimeter and any unknown measurements. Students develop strategies for finding the perimeter of part of a larger shape, for example, the shaded rectangle in the figure below. In this example, students understand that they can subtract the known part of the length from the total length to find the unknown measurement. The unknown measurements may then be used to find the perimeter of the shaded rectangle.



What is the perimeter of the shaded rectangle?

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 10

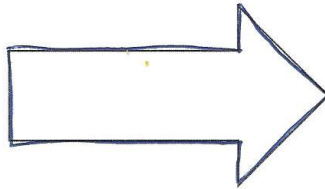
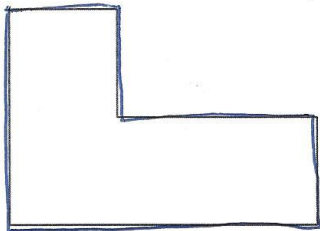
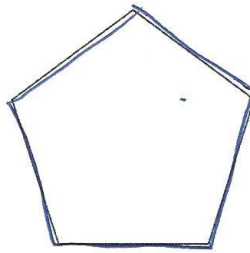
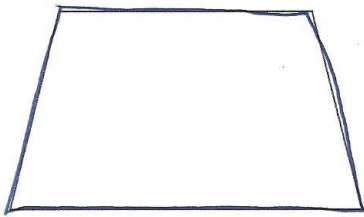
Objective: Decompose quadrilaterals to understand perimeter as the boundary of a shape.

Homework Key

1. Perimeter of each shape traced
 - a. Explanations will vary.
 - b. Explanations will vary.
2. Rectangle drawn on grid
 - a. Perimeter traced
 - b. Area shaded
 - c. Explanations will vary.
3. Maya; explanations will vary.

Homework Sample

1. Trace the perimeter of the shapes below.



- a. Explain how you know you traced the perimeters of the shapes above.

I know I traced the perimeters of the shapes because I colored the boundary of each shape and the boundary of a shape is its perimeter.

- b. Explain how you could use a string to figure out which shape above has the greatest perimeter.

I could measure the perimeter of a shape using a piece of string and marking where it meets the end after going all the way around once, and then comparing where I marked the string for the different shapes to see which one was the longest.

Lesson 11

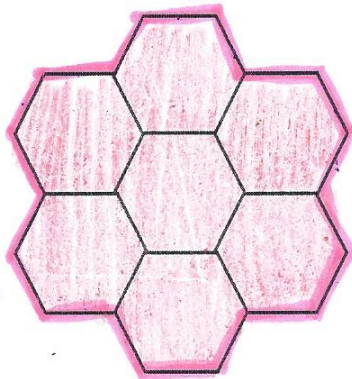
Objective: Tessellate to understand perimeter as the boundary of a shape.

Homework Key

- a. Shape outlined with highlighter
b. Explanations will vary.
c. 18
d. Shape shaded in with colored pencil
- Drawings will vary.
- Frank; explanations will vary.
- a. Triangle drawn correctly
b. Yes, explanations will vary.

Homework Sample

- Samson tessellates regular hexagons to make the shape below.



- Outline the perimeter of Samson's new shape with a highlighter.

- Explain how Samson could use a string to measure the perimeter of his new shape.

Samson could measure the perimeter with string by placing the string along the boundary of the shape and marking off where the end was, then measure the piece of string.

- How many sides does his new shape have? 18 sides.

Lesson 12

Objective: Measure side lengths in whole number units to determine the perimeter of polygons.

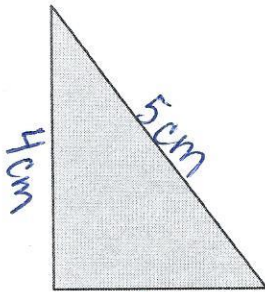
Homework Key

- a. Labeled 3 cm, 4 cm, 5 cm; 3, 4, 5; 12
b. Labeled 6 cm, 4 cm, 6 cm, 4 cm; 6 cm + 4 cm + 6 cm + 4 cm; 20
c. Labeled 3 cm, 4 cm, 5 cm, 4 cm; 3 cm + 4 cm + 5 cm + 4 cm; 16
d. Labeled each side 5 cm; 5 cm + 5 cm + 5 cm + 5 cm; 20
e. Labeled 8 cm, 3 cm, 2 cm, 2 cm, 4 cm, 2 cm, 2 cm, 4 cm;
8 cm + 3 cm + 2 cm + 2 cm + 4 cm + 2 cm + 2 cm + 4 cm; 27
- Labeled each side 3 cm; Perimeter = 3 cm + 3 cm + 3 cm + 3 cm + 3 cm + 3 cm = 18 cm
- No; explanations will vary.
- No; explanations will vary.

Homework Sample

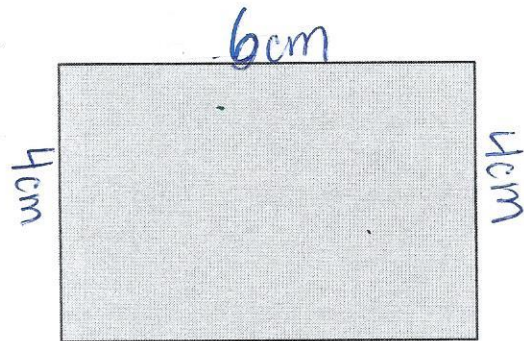
- Measure and label the side lengths of the shapes below in centimeters. Then, find the perimeter of each shape.

a.



$$\begin{aligned} \text{Perimeter} &= 4 + 5 + 3 \\ &= 12 \text{ cm} \end{aligned}$$

b.



$$\begin{aligned} \text{Perimeter} &= 6\text{cm} + 4\text{cm} + 6\text{cm} + 4\text{cm} \\ &= 20 \text{ cm} \end{aligned}$$

Lesson 13

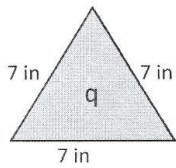
Objective: Explore perimeter as an attribute of plane figures and solve problems.

Homework Key

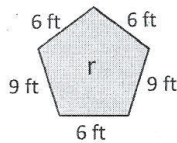
- Shape q: Answer provided
 Shape r: $P = 6\text{ ft} + 9\text{ ft} + 6\text{ ft} + 6\text{ ft} + 9\text{ ft}$; $P = 36\text{ ft}$
 Shape s: $P = 7\text{ cm} + 5\text{ cm} + 7\text{ cm} + 5\text{ cm}$; $P = 24\text{ cm}$
 Shape a: $P = 9\text{ yd} + 7\text{ yd} + 5\text{ yd} + 7\text{ yd}$; $P = 28\text{ yd}$
 Shape m: $P = 4\text{ in} + 4\text{ in} + 4\text{ in} + 4\text{ in}$; $P = 16\text{ in}$
 Shape e: $P = 8\text{ cm} + 5\text{ cm} + 8\text{ cm} + 5\text{ cm}$; $P = 26\text{ cm}$
 Shape u: $P = 6\text{ m} + 3\text{ m} + 7\text{ m} + 4\text{ m}$; $P = 20\text{ m}$
 Shape l: $P = 4\text{ m} + 3\text{ m} + 4\text{ m} + 2\text{ m} + 2\text{ m}$; $P = 15\text{ m}$
 Square meals
- 160 ft
- a. 33 in
 b. Yes; 8 sides

Homework Sample

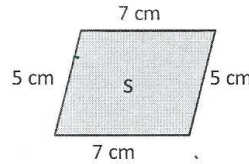
- Find the perimeters of the shapes below. Include the units in your number sentences. Match the letter inside each shape to its perimeter to solve the riddle. The first one has been done for you.



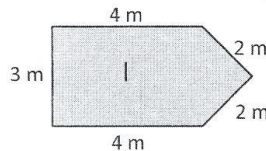
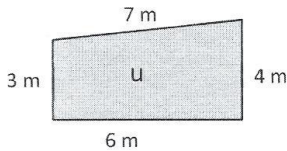
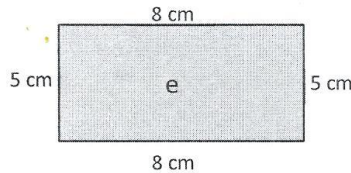
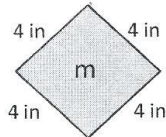
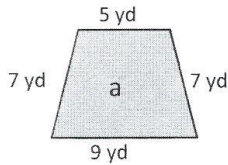
$P = 7\text{ in} + 7\text{ in} + 7\text{ in}$
 $P = 21\text{ in}$



$P = 6 + 6 + 9 + 6 + 9$
 $= 36\text{ ft}$

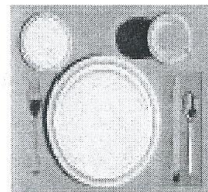


$P = 5\text{ cm} + 7\text{ cm} + 5\text{ cm} + 7\text{ cm}$
 $= 12 + 12$
 $= 24\text{ cm}$



What kind of meals do math teachers eat?

S q u a r e m e a l s !
 24 21 20 28 36 26 16 26 28 15 24



Lesson 14

Objective: Determine the perimeter of regular polygons and rectangles when whole number measurements are unknown.

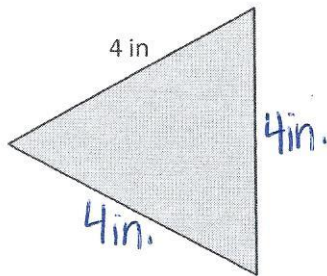
Homework Key

- a. Labeled each side 4 in; 12
b. Labeled each side 8 cm; 32
c. Labeled each side 9 m; 72
d. Labeled each side 6 in; 36
- Labeled 4 cm and 9 cm; 26
- 35 cm
- 96 m
- 38 in

Homework Sample

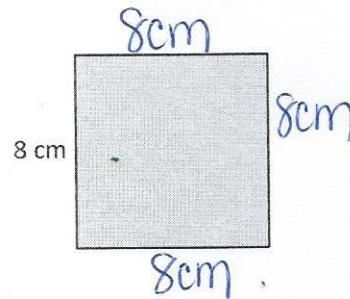
- Label the unknown side lengths of the regular shapes below. Then, find the perimeter of each shape.

a.



Perimeter = 12 in

b.



Perimeter = 32 cm

Lesson 15

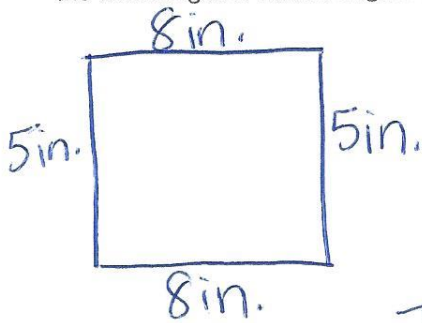
Objective: Solve word problems to determine perimeter with given side lengths.

Homework Key

- | | |
|-----------|----------|
| 1. 26 in | 4. 36 in |
| 2. 40 ft | 5. 64 ft |
| 3. 160 yd | 6. 32 ft |

Homework Sample

1. Miguel glues a ribbon border around the edges of a 5-inch by 8-inch picture to create a frame. What is the total length of ribbon Miguel uses?



$$\begin{aligned} P &= 5 + 8 + 5 + 8 \\ &= 10 + 16 \\ &= 26 \text{ in.} \end{aligned}$$

The total length of ribbon Miguel uses is 26 inches.

Lesson 16

Objective: Use string to measure the perimeter of various circles to the nearest quarter inch.

Homework Key

- a. Answers will vary.
b. Explanations will vary.
- Shape A: 8 in; Shape B: $8\frac{3}{4}$ in
 - Shape B
 - About 1 in; answers may vary.
- Answers will vary.

Homework Sample

- a. Find the perimeter of 5 circular objects from home to the nearest quarter inch using string. Record the name and perimeter of each object in the chart below.

Object	Perimeter (to the nearest quarter inch)
Example: Peanut Butter Jar Cap	$9\frac{1}{2}$ inches
cd	$15\frac{1}{2}$ inches
flashlight	7 inches
coffee mug	$5\frac{1}{4}$ inches
olive oil bottle	$10\frac{1}{2}$ inches
pie pan	$26\frac{1}{2}$ inches

- b. Explain the steps you used to find the perimeter of the circular objects in the chart above.

I wrapped the string around the perimeter of the object, then marked where it went all the way around. Then, I laid out the piece of string and used measuring tape to measure the length of the string.

Lesson 17

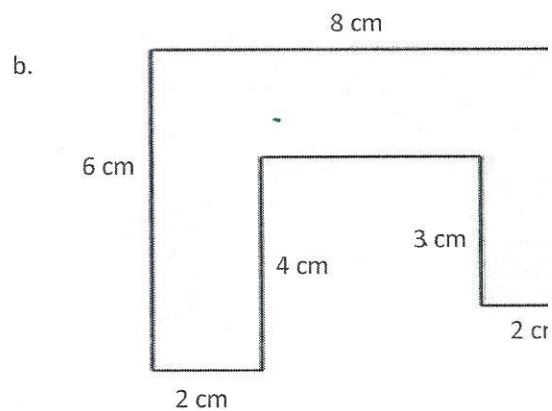
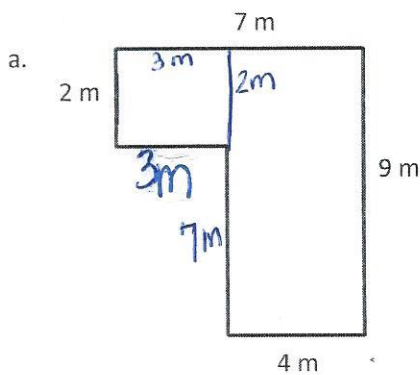
Objective: Use all four operations to solve problems involving perimeter and unknown measurements.

Homework Key

- Labeled 3 m, 7 m; $P = (2 \times 7 \text{ m}) + 3 \text{ m} + 2 \text{ m} + 9 \text{ m} + 4 \text{ m} = 32 \text{ m}$ (equations may vary)
 - Labeled 4 cm; $P = (2 \times 2 \text{ cm}) + (2 \times 4 \text{ cm}) + 3 \text{ cm} + 5 \text{ cm} + 6 \text{ cm} + 8 \text{ cm} = 34 \text{ cm}$ (equations may vary)
 - Labeled 2 in, 6 in, 4 in; $P = (2 \times 2 \text{ in}) + (3 \times 4 \text{ in}) + (2 \times 6 \text{ in}) + 12 \text{ in} = 40 \text{ in}$ (equations may vary)
 - Labeled 3 ft, 3 ft; $P = (4 \times 3 \text{ ft}) + 1 \text{ ft} + 2 \text{ ft} + 7 \text{ ft} + 8 \text{ ft} = 30 \text{ ft}$ (equations may vary)
- 72 cm
- $a = 13 \text{ in}$, $b = 6 \text{ in}$; 38 in

Homework Sample

- The shapes below are made up of rectangles. Label the unknown side lengths. Then, write and solve an equation to find the perimeter of each shape.



$$\begin{aligned} P &= 2 \text{ m} + (2 \times 3 \text{ m}) + (2 \times 4 \text{ m}) + 7 \text{ m} + 9 \text{ m} \\ &= 2 \text{ m} + 6 \text{ m} + 8 \text{ m} + 16 \text{ m} \\ &= 16 \text{ m} + 16 \text{ m} \\ &= 32 \text{ m}. \end{aligned}$$

$P = \underline{\hspace{2cm}}$

Grade 3 Module 7 Topic D

Recording Perimeter and Area Data on Line Plots

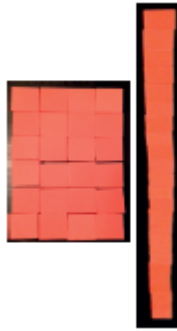
Focus Standards:

- 3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.
- 3.MD.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.

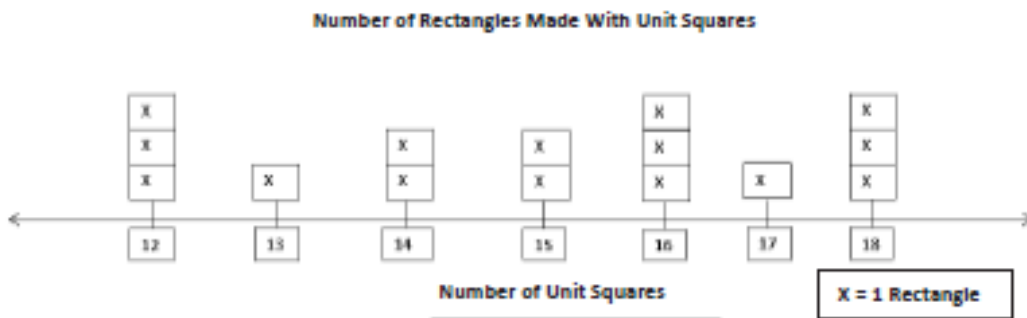
Instructional Days Recommended: 5

In Topic D, students utilize a line plot to draw conclusions about perimeter and area measurements.

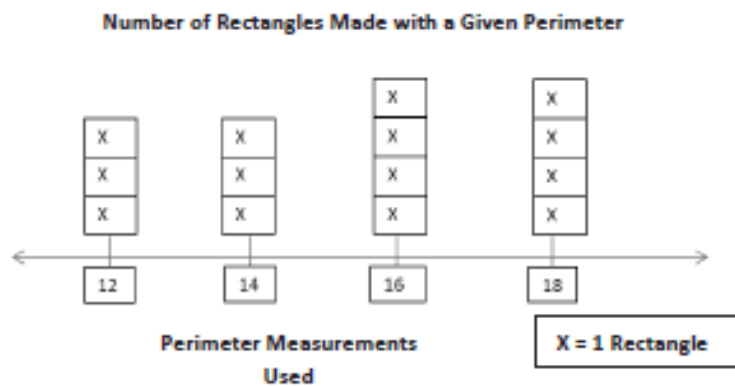
Students use a given number of unit squares to build and determine different perimeters of rectangles in Lesson 18. For example, given a rectangle composed of 24 unit squares, students find there are four possible perimeters: 50, 28, 22, and 20 length units. They draw their rectangles on grid paper and discuss the fact that rectangles with side lengths that are equal or almost equal (squares or square-like rectangles) have smaller perimeters than rectangles whose side lengths are very different (long and narrow rectangles). Students continue to explore with different numbers of unit squares and record the number of possibilities, noting when they have found all the possible combinations. They recognize that area and perimeter are measured in different units and conclude that, in general, there is no way of knowing an exact perimeter for any number of unit squares without more information about the side lengths.



In Lesson 19, students use a given number of unit squares to make all possible rectangles. They construct line plots showing the number of rectangles they constructed for each number of unit squares. Students analyze the line plot and draw conclusions based on the data. They discuss why some numbers of unit squares, such as 13, produce only one possible perimeter.



Using the understanding that perimeter is double the sum of the length and width, in Lessons 20 and 21, students find the different areas of rectangles made with unit squares and a given perimeter. For example, they are asked to build rectangles with a perimeter of 12 unit squares and divide 12 by 2 to find that the sum of the length and width is 6. Students then determine that they can make three rectangles whose lengths and widths add up to 6, which results in rectangles made with 5, 8, and 9 unit squares. Students discuss differences in the areas of rectangles with the same perimeter. They record their findings for use in Lesson 22, when they again construct a line plot and draw conclusions about the data.



**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 18

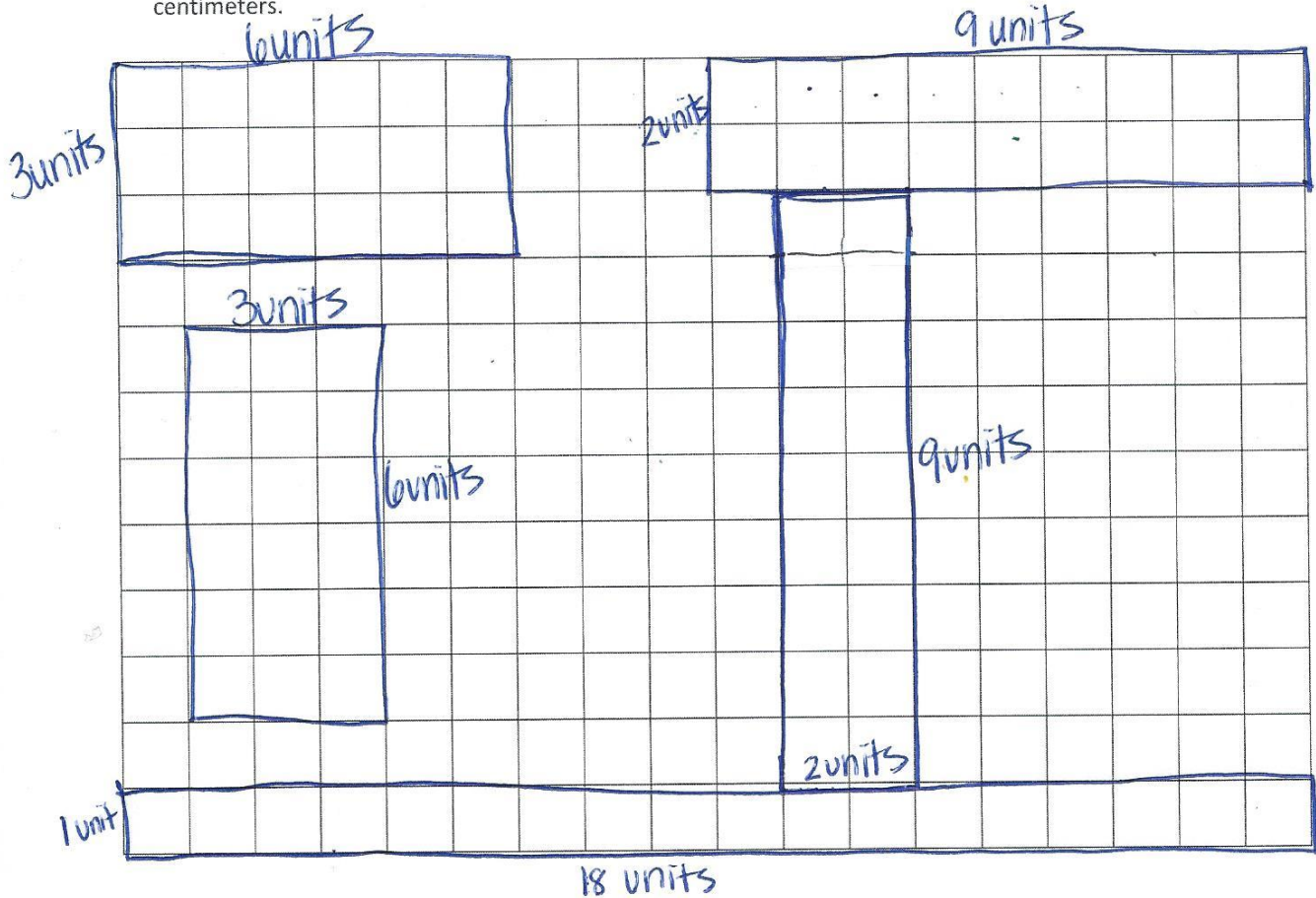
Objective: Construct rectangles from a given number of unit squares and determine the perimeters.

Homework Key

- 3 rectangles shaded correctly on the grid
- Answers will vary.
- 3 rectangles drawn with side lengths labeled correctly
 - The 1×20 rectangle will have the greatest perimeter. Explanations will vary.
 - The 4×5 rectangle will have the smallest perimeter. Explanations will vary.

Homework Sample

- Shade in squares on the grid below to create as many rectangles as you can with an area of 18 square centimeters.



Lesson 19

Objective: Use a line plot to record the number of rectangles constructed from a given number of unit squares.

Homework Key

1. 2, 1, 6, 2, 3; 1, 1, 7; 2, 1, 8, 2, 4; 2, 1, 9, 3, 3; 2, 1, 10, 2, 5; 1, 1, 11

2. Line plot created

a. No; explanations will vary.

b. 2; explanations will vary.

Homework Sample

1. Cut out the unit squares at the bottom of the page. Then, use them to make rectangles for each given number of unit squares. Complete the charts to show how many rectangles you can make for each given number of unit squares. You might not use all the spaces in each chart.

Number of unit squares = 6	
Number of rectangles I made: <u>2</u>	
Width	Length
1	6
2	3

Number of unit squares = 7	
Number of rectangles I made: <u>1</u>	
Width	Length
1	7

Number of unit squares = 8	
Number of rectangles I made: <u>2</u>	
Width	Length
1	8
2	4

Lesson 20 - 21

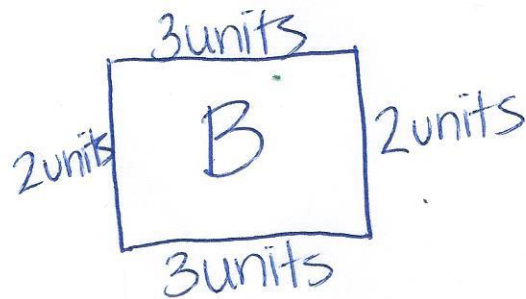
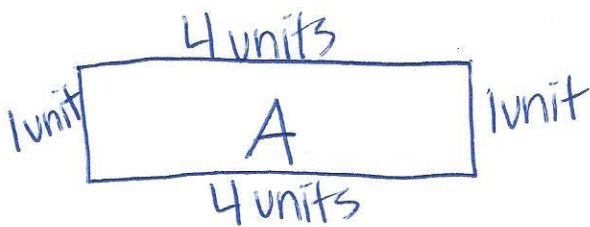
Objective: Construct rectangles with a given perimeter using unit squares and determine their areas.

Homework Key (20)

- a. 2 rectangles drawn and labeled
b. 4 square units, 6 square units
- Yes; explanations will vary.
- a. 5 cm by 5 cm square drawn and labeled
b. 25 sq cm
c. Different rectangle drawn
d. Katie's square

Homework Sample

- Cut out the unit squares at the bottom of the page. Then, use them to make as many rectangles as you can with a perimeter of 10 units.
 - Estimate to draw your rectangles below. Label the side lengths of each rectangle.



- Find the areas of the rectangles in Part (a) above.

$$\begin{aligned} A &= 1 \text{ unit} \times 4 \text{ units} \\ &= 4 \text{ sq. units} \end{aligned}$$

$$\begin{aligned} B &= 2 \text{ units} \times 3 \text{ units} \\ &= 6 \text{ sq. units} \end{aligned}$$

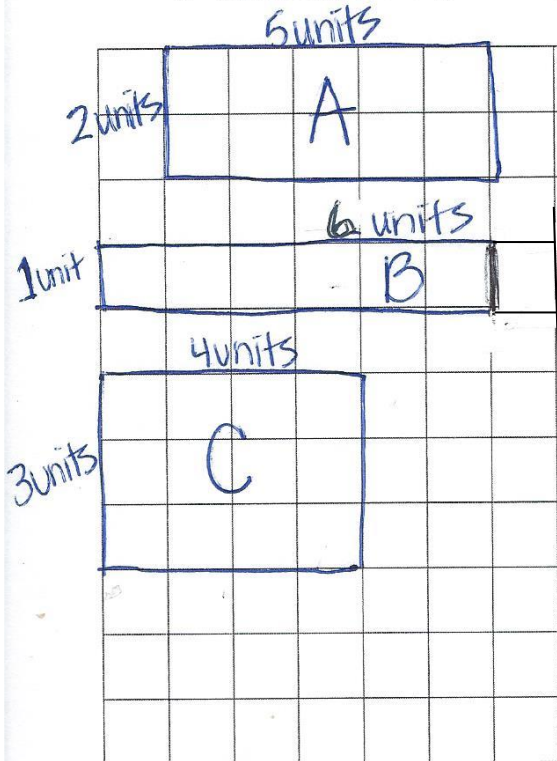
Lesson 21

Homework Key

- a. 3 rectangles shaded and labeled
b. 6 sq cm, 10 sq cm, 12 sq cm
c. Answers will vary.
- a. 4, 2 units, 7 units, 14 sq units; 3 units, 6 units, 18 sq units; 4 units, 5 units, 20 sq units
b. Explanations will vary.
- Answers will vary.

Homework Sample

- Margo finds as many rectangles as she can with a perimeter of 14 centimeters.
 - Shade Margo's rectangles on the grid below. Label the length and width of each rectangle.



- Find the areas of the rectangles in Part (a) above.

$$A = 2 \text{ units} \times 5 \text{ units} \\ = 10 \text{ sq. units}$$

$$C = 3 \text{ units} \times 4 \text{ units} \\ = 12 \text{ sq. units}$$

$$B = 1 \text{ unit} \times 6 \text{ units} \\ = 6 \text{ sq. units}$$

- The perimeters of the rectangles are the same. What do you notice about the areas?

The areas are not the same because the side lengths are different.

Lesson 22

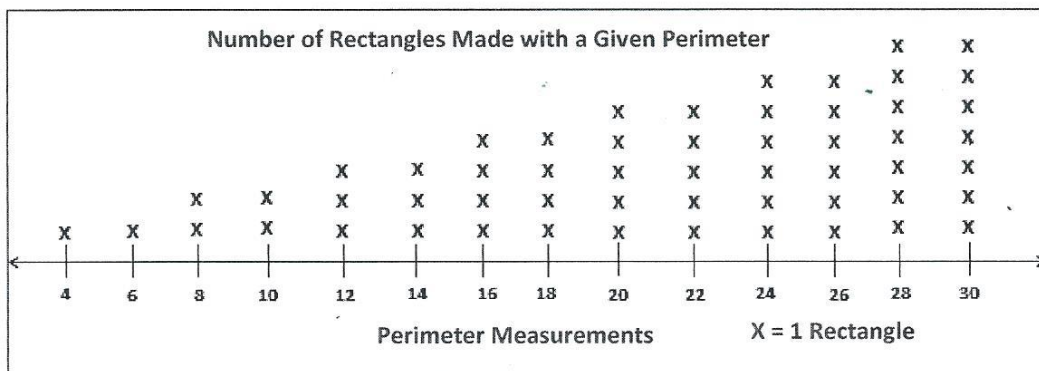
Objective: Use a line plot to record the number of rectangles constructed in Lessons 20 and 21.

Homework Key (22)

- Explanations will vary; no
 - Explanations will vary; whole number side lengths
 - 8; explanations will vary.
- No; explanations will vary.
- Explanations will vary.

Homework Sample

- The following line plot shows the number of rectangles a student made using square unit tiles. Use the line plot to answer the questions below.



- Why are all of the perimeter measurements even? Do all rectangles have even perimeters?

The perimeters are all even because we used whole number side lengths, and when you double the sum of a whole number, you get an even number.

- Explain the pattern in the line plot. What types of side lengths make this pattern possible?

All rectangles don't have even perimeters because some side lengths may have fractional sides.

The pattern has 1 for 4 & 6 then 2 for 8 & 10, 3 for 14 & 16, and keeps going up by 1 more every two. Whole number side lengths make this possible.

- How many X's would you draw for a perimeter of 32? Explain how you know.

I would draw 8 X's because the pattern in the rectangles goes up by 1 every two measurements.

Grade 3 Module 7 Topic E

Problem Solving with Perimeter and Area

Focus Standards:

- 3.MD.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.
- 3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

Instructional Days Recommended: 8

In Topic E, students solve problems with perimeter and area. Lesson 23 focuses on solving a variety of word problems involving perimeter. This provides students an opportunity to use multiplication and division strategies to solve problems about perimeter.

Students use rectangles and circles to create robots and environments for the robots using specified perimeter measurements in Lessons 24 through 27. They reason about the different whole number side lengths that may be produced for a given perimeter. For example, when given the requirement that the perimeter of the arms of the robot must be 14 inches, students experiment and draw different possibilities for rectangles to determine which ones they prefer for the robot's arms. Students cut out and assemble the parts of the robot from grid or construction paper and compare their robots with those of their peers. This comparison leads to a discussion about the different areas that are generated for their classmates' robot bodies, despite the fact that they have the same given perimeter. The final lesson in this sequence provides an opportunity for peer review and critique.

Students return to problem solving in Lessons 28 and 29, this time working with a variety of word problems involving both area and perimeter. For example, if students are given both the length and the width of a rectangular football field, they should be able to determine both the perimeter and the area of the field. In these lessons, students explore and develop strategies for solving a sequence of increasingly complex problems. In Lesson 30, students further develop analyzing and critiquing skills. They initially discuss anonymous student work samples before sharing their own work and receiving feedback in small groups.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 23

Objective: Solve a variety of word problems with perimeter.

Homework Key

- | | |
|-----------|----------|
| 1. 9 in | 4. 99 in |
| 2. 144 in | 5. 24 in |
| 3. 250 ft | 6. 76 in |

Homework Sample

1. Rosie draws a square with a perimeter of 36 inches. What are the side lengths of the square?



$$36 \div 4 = 9$$

The side lengths of the square are 9 inches

Lesson 24 - 27

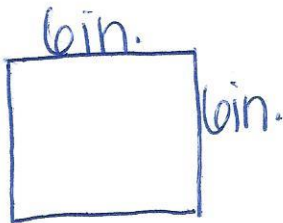
Objective: Use rectangles to draw a robot with specified perimeter measurements, and reason about the different areas that may be produced.

Homework Key (24)

1. 6 in
2. a. 8 cm by 1 cm
7 cm by 2 cm
6 cm by 3 cm
5 cm by 4 cm
b. 4 rectangles
c. Explanations will vary.
3. a. 1 cm by 2 cm
1 cm by 4 cm or 2 cm by 3 cm
1 cm by 6 cm, 2 cm by 5 cm, or 3 cm by 4 cm
b. 1 cm by 5 cm, 2 cm by 4 cm, or 3 cm by 3 cm
P = 20 cm; 1 cm by 9 cm, 2 cm by 8 cm, 3 cm by 7 cm, 4 cm by 6 cm, or 5 cm by 5 cm
P = 28 cm; 1 cm by 13 cm, 2 cm by 12 cm, 3 cm by 11 cm, 4 cm by 10 cm, 5 cm by 9 cm, 6 cm by 8 cm, or 7 cm by 7 cm

Homework Sample

1. Brian draws a square with a perimeter of 24 inches. What is the width and length of the square?



$$P = 24 \text{ inches}$$

The sides of the square are each 6 inches.

Lesson 25

Homework Key

- A. Answer provided
- B. $P = 4 \times 2 \text{ cm}$, or $P = 2 \text{ cm} + 2 \text{ cm} + 2 \text{ cm} + 2 \text{ cm}$
 $P = 8 \text{ cm}$
- C. $P = 8 \text{ cm} + 6 \text{ cm} + 8 \text{ cm} + 6 \text{ cm}$
 $P = 28 \text{ cm}$
- D. $P = 2 \text{ cm} + 5 \text{ cm} + 2 \text{ cm} + 5 \text{ cm}$
 $P = 14 \text{ cm}$
- E. $P = 2 \text{ cm} + 5 \text{ cm} + 2 \text{ cm} + 5 \text{ cm}$
 $P = 14 \text{ cm}$
- F. $P = 7 \text{ cm} + 2 \text{ cm} + 7 \text{ cm} + 2 \text{ cm}$
 $P = 18 \text{ cm}$
- G. $P = 7 \text{ cm} + 2 \text{ cm} + 7 \text{ cm} + 2 \text{ cm}$
 $P = 18 \text{ cm}$

Homework Sample

Rectangle	Perimeter
A	$P = 4 \times 4 \text{ cm}$ $P = 16 \text{ cm}$
B	$P = 4 \times 2 \text{ cm}$ $= 8 \text{ cm}$
C	$P = (2 \times 6 \text{ cm}) + (2 \times 8 \text{ cm})$ $= 12 + 16$ $= 28 \text{ cm}$
D	$P = (2 \times 2 \text{ cm}) + (2 \times 5 \text{ cm})$ $= 4 \text{ cm} + 10 \text{ cm}$ $= 14 \text{ cm}$

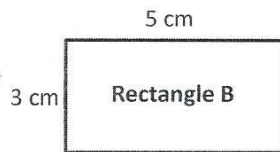
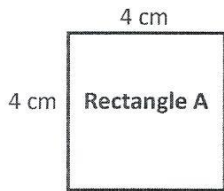
Lesson 26

Homework Key

- 16 cm
 - 16 cm
 - 16 sq cm
 - 15 sq cm
 - Explanations will vary.
- Answers will vary.
 - Yes; explanations will vary.
 - 4 cm by 10 cm

Homework Sample

- Use Rectangles A and B to answer the questions below.



- What is the perimeter of Rectangle A?

$$P = 4 \times 4 \text{ cm} \\ = 16 \text{ cm}$$

- What is the perimeter of Rectangle B?

$$P = (2 \times 5 \text{ cm}) + (2 \times 3 \text{ cm}) \\ = 10 \text{ cm} + 6 \text{ cm} = 16 \text{ cm}$$

- What is the area of Rectangle A?

$$A = 4 \text{ cm} \times 4 \text{ cm} \\ = 16 \text{ sq. cm}$$

- What is the area of Rectangle B?

$$A = 5 \text{ cm} \times 3 \text{ cm} \\ = 15 \text{ sq. cm}$$

- Use your answers to Parts (a–d) to help you explain the relationship between area and perimeter.

Area + perimeter are separate measures. There is no connection between them because you can have different areas for the same perimeter.

Lesson 27

Homework Key

- Rectangle A: 6, 6; 24 cm; 36 sq cm
Rectangle B: 4, 8; 24 cm; 32 sq cm
Rectangle C: 11, 1; 24 cm; 11 sq cm
Rectangle D: 5, 5; 20 cm; 25 sq cm
Rectangle E: 2, 8; 20 cm; 16 sq cm
Rectangle F: 4, 6; 20 cm; 24 sq cm
- Answers will vary.
- Answers will vary.
- A, D; A

Homework Sample

- Find the area and perimeter of each rectangle.

Rectangle	Width and Length	Perimeter	Area
A	<u>6</u> cm by <u>6</u> cm	$P = 4 \times 6 \text{ cm}$ $= 24 \text{ cm}$	$A = 6 \text{ cm} \times 6 \text{ cm}$ $= 36 \text{ sq. cm}$
B	<u>4</u> cm by <u>8</u> cm	$P = (2 \times 4 \text{ cm}) + (2 \times 8 \text{ cm})$ $= 8 \text{ cm} + 16 \text{ cm}$ $= 24 \text{ cm}$	$A = 4 \text{ cm} \times 8 \text{ cm}$ $= 32 \text{ sq. cm}$

Lesson 28 – 29

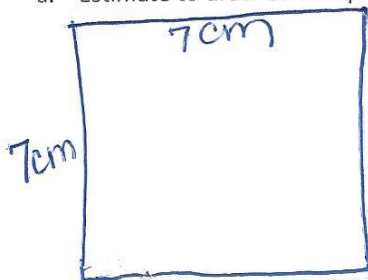
Objective: Solve a variety of word problem involving area and perimeter using all four operations.

Homework Key (28)

- 7 cm by 7 cm square drawn and labeled correctly
 - 49 sq cm
 - 28 cm
 - 42 cm
- Drawings will vary.
 - 6 ft
 - 18 sq ft
 - 54 sq ft

Homework Sample

- Carl draws a square that has side lengths of 7 centimeters.
 - Estimate to draw Carl's square, and label the side lengths.



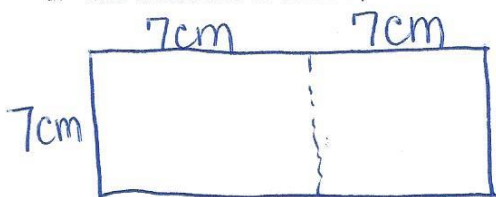
- What is the area of Carl's square?

$$\begin{aligned} A &= 7\text{cm} \times 7\text{cm} \\ &= 49 \text{ sq. cm} \end{aligned}$$

- What is the perimeter of Carl's square?

$$\begin{aligned} P &= 4 \times 7\text{cm} \\ &= 28\text{cm} \end{aligned}$$

- Carl draws two of these squares to make one long rectangle. What is the perimeter of this rectangle?



$$\begin{aligned} P &= (2 \times 7\text{cm}) + (2 \times 14\text{cm}) \\ &= 14\text{cm} + 28\text{cm} \\ &= 42\text{cm} \end{aligned}$$

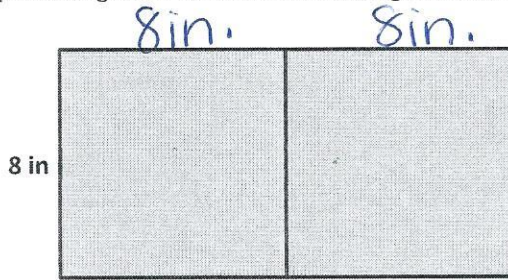
Lesson 29

Homework Key

- 1. a. 48 in
- 2. a. 36 cm
- b. 128 sq in
- b. 72 sq cm
- c. 256 sq in
- 3. 800 yd

Homework Sample

1. Katherine puts two squares together to make the rectangle below. The side lengths of the squares measure 8 inches.



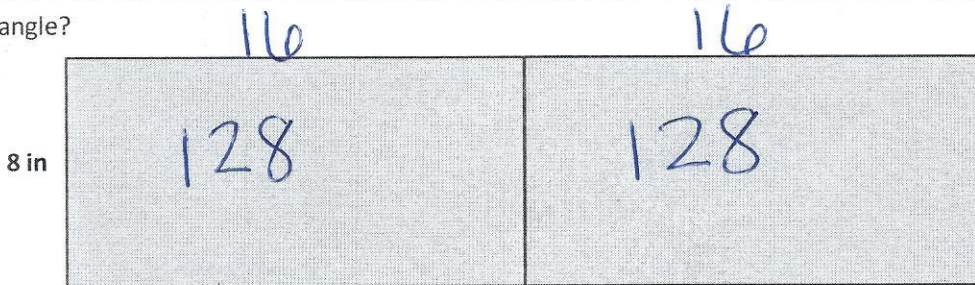
- a. What is the perimeter of the rectangle Katherine made with her 2 squares?

$$\begin{aligned} P &= (2 \times 8 \text{ in.}) + (2 \times 16 \text{ in.}) \\ &= 16 \text{ in.} + 32 \text{ in.} \\ &= 48 \text{ in.} \end{aligned}$$

- b. What is the area of Katherine's rectangle?

$$\begin{aligned} A &= 16 \text{ in.} \times 8 \text{ in.} \\ &= 64 \text{ sq. in.} + 64 \text{ sq. in.} \\ &= 128 \text{ sq. in.} \end{aligned}$$
$$\begin{array}{r} 64 \\ +64 \\ \hline 128 \end{array}$$

- c. Katherine decides to draw another rectangle of the same size. What is the area of the new, larger rectangle?



$$\begin{aligned} A &= 32 \text{ in} \times 8 \text{ in} \\ &= 128 \text{ sq. in.} + 128 \text{ sq. in.} \\ &= 256 \text{ sq. in.} \end{aligned}$$
$$\begin{array}{r} 128 \\ +128 \\ \hline 256 \end{array}$$

Lesson 30

Objective: Share and critique peer strategies for problem solving.

Homework Key

Answers will vary.

Homework Sample

Use this form to critique Student A's problem-solving work on the next page.

Answers Vary

Student:	Student A	Problem number:	1
Strategies Student A used:	<ul style="list-style-type: none">• Drew the rectangles and labeled• Used the diagram to find perimeter & area.• Used addition & multiplication correctly to find answers.		
Things Student A did well:	<ul style="list-style-type: none">• Used R, D, W process• Used area model to find area• drew picture & labeled with side lengths.• Used information from part b to help solve part c		
Suggestions for improvement:	For Part C, remember to label all parts of the diagram. For Part B, include the unit in all steps.		
Strategies I would like to try based on Student A's work:	Using the area model like Student A did in Part B. I like how my classmate used place value to break apart 16.		

Grade 3 Module 7 Topic F

Year In Review

Instructional Days Recommended: 4

In this final topic of Grade 3, students review fundamental skills and prepare resources to maintain their learning during the summer break.

Students create and analyze unusual representations of one-half in Lessons 31 and 32. They analyze the representations created by their peers and discuss whether or not they agree with each representation, finding ways to adjust some representations to accurately reflect one-half. Students' creations can be joined together to create a class paper quilt to display the one-half representations.



Lesson 33 gives students the opportunity to play fluency games related to a range of Grade 3 skills, including fractions, rounding, multiplication, and division. The lesson includes a variety of fluency activities from which to choose when considering student needs. Students discover fluency games they enjoy playing and decide which ones they would like to continue to play during the summer recess. In Lesson 34, students fold a simple origami booklet to record directions for their favorite fluency games. This booklet becomes a resource for students at home for summer practice.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 31 - 32

Objective: Explore and create unconventional representations of one-half.

Homework Key (31)

- a. 18 square units
b. 9 square units
c. Half of the rectangle shaded
d. Answers will vary.
- Explanations will vary.
- Answers will vary.

Homework Sample

- Use the rectangle below to answer Problem 1(a-d).



- What is the area of the rectangle in square units?

$$A = 3 \text{ units} \times 6 \text{ units} \\ = 18 \text{ sq. units}$$

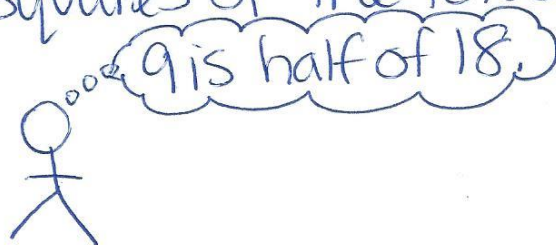
- What is the area of half of the rectangle in square units?

$$18 \text{ sq. units} \div 2 = 9 \text{ sq. units}$$

- Shade in half of the rectangle above. Be creative with your shading!

- Explain how you know you shaded in half of the rectangle.

I know I shaded half of the rectangle because it's 9 squares of the total rectangle.



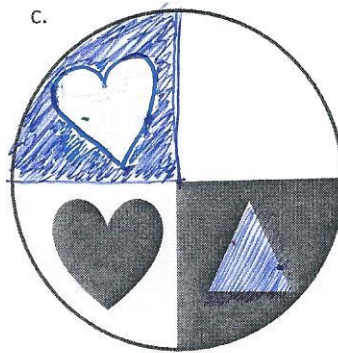
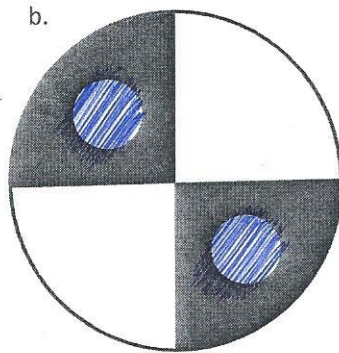
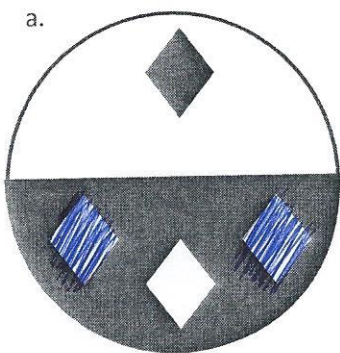
Lesson 32

Homework Key

1. Circles shaded correctly
2. Answers will vary.
3. No; explanations will vary.
4. a. Marissa; explanations will vary.
b. Explanations will vary.
5. Circle shaded

Homework Sample

1. Estimate to finish shading the circles below so that each circle is about one-half shaded.



Lesson 33

Objective: Solidify fluency with Grade 3 skills.

Homework Key

Answers will vary.

Homework Sample

Answers will vary for each family.

Lesson 34

Objective: Create resource booklets to support fluency with Grade 3 skills.

No Homework Key

Calendar has been provided for summer math review