4th Grade Mathematics

Unit 4 Curriculum Map:

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

Table of Contents

Unit Overview

Unit 4: Chapters 13,14, 4, 5

In this Unit Students will be:

Chapter 13

In this chapter, students learn to find the area and perimeter of figures using formulas. Area is the amount of surface covered by a figure. It is measured in square units. It is measured by counting the number of same sized units of area that cover the shape without gaps or overlaps. Perimeter is the distance around a figure. Using the formula area=length x width, students connected this model to the area model for multiplication. They will also apply what they have learned to find the perimeter of a composite figure. In addition, they will find one side of a rectangle or square given its perimeter or area.

Chapter 14

In this chapter, students learn to identify lines of symmetry of figures and to make symmetric shapes and patterns. Students apply knowledge in this chapter to solve problems involving congruence and symmetry. Students experiment to make symmetric figures with by cutting out patterns or folding paper.

Chapter 4 & 5

In these combined chapters, students will explore tables and graphing using line plots. Data that is tabulated or plotted on graphs can be retrieved easily, and visually elicit patterns and trends. Comparing, analyzing, and classifying are just some of the thinking skills students will apply as they look for patterns and trends.

Essential Questions

- How is perimeter used?
- What is the difference between perimeter and area of a two dimensional figure?
- How is the perimeter of a rectangle determined?
- How is the area of a rectangle determined?
- How can information be gathered, recorded, and organized
- How does the type of data influence the choice of display?
- What aspects of a graph help people understand and interpret the data easily?
- What kinds of questions can and cannot be answered from a graph?

Enduring Understandings

- Finding the area and perimeter of a figure by counting squares
- Students find the area of a rectangle using the formula A=length x width
- Students solve real-world problems involving area and perimeter of figures
- Students identify lines of symmetry in figures
- Students learn to collect and organize data, as well as present data in a form(line plot) that is easy to

read.

- Students use the four operations of whole numbers when they analyze data presented in graphs and tables to solve problems

Common Core State Standards

4.OA.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.

The focus in this standard is to have students use and discuss various strategies. It refers to estimation strategies, including using compatible numbers (numbers that sum to 10 or 100) or rounding. Problems should be structured so that all acceptable estimation strategies will arrive at a reasonable answer. Students need many opportunities solving multistep story problems using all four operations.

Example: On a vacation, your family travels 267 miles on the first day, 194 miles on the second day and 34 miles on the third day. How many miles did they travel total? Some typical estimation strategies for this problem:

- ✓ Student 1- I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500.
- ✓ Student 2 -I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100. When I add that hundred to the 4 hundreds that I already had, I end up with 500.
- ✓ Student 3- I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200 and 30, I know my answer will be about 530.

The assessment of estimation strategies should only have one reasonable answer (500 or 530), or a range (between 500 and 550). Problems will be structured so that all acceptable estimation strategies will arrive at a reasonable answer.

Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies include, but are not limited to:

• clustering around an average (when the values are close together an average value is selected and multiplied by the number of values to determine an estimate),

• rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values),

• using friendly or compatible numbers such as factors (students seek to fit numbers together - e.g., rounding to factors and grouping numbers together that have round sums like 100 or 1000),

• using benchmark numbers that are easy to compute (students select close whole numbers for fractions or

decimals to determine an estimate).	
4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

This standard includes multi-step word problems related to expressing measurements from a larger unit in terms of a smaller unit (e.g., feet to inches, meters to centimeter, and dollars to cents). Students should have ample opportunities to use number line diagrams to solve word problems.

Example: Charlie and 10 friends are planning for a pizza party. They purchased 3 quarts of milk. If each glass holds 8oz will everyone get at least one glass of milk? possible solution:

Charlie plus 10 friends = 11 total people 11 people x 8 ounces (glass of milk) = 88 total ounces 1 quart = 2 pints = 4 cups = 32 ounces Therefore 1 quart = 2 pints = 4 cups = 32 ounces 2 quarts = 4 pints = 8 cups = 64 ounces 3 quarts = 6 pints = 12 cups = 96 ounces

If Charlie purchased 3 quarts (6 pints) of milk there would be enough for everyone at his party to have at least one glass of milk. If each person drank 1 glass then he would have 1- 8 oz glass or 1 cup of milk left over. Additional Examples with various operations:

Division/fractions: Susan has 2 feet of ribbon. She wants to give her ribbon to her 3 best friends so each friend gets the same amount. How much ribbon will each friend get? Students may record their solutions using fractions or inches. (The answer would be 2/3 of a foot or 8 inches. Students are able to express the answer in inches because they understand that 1/3 of a foot is 4 inches and 2/3 of a foot is 2 groups of 1/3.)

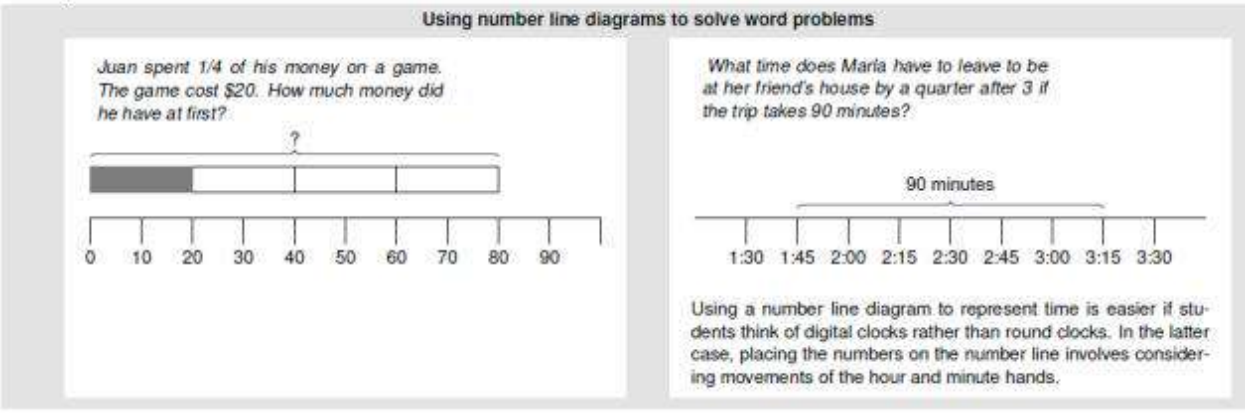
Addition: Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran?

Subtraction: A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back?

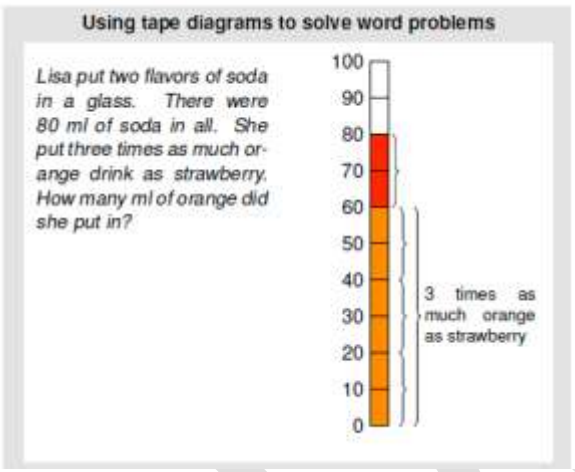
Multiplication: Mario and his 2 brothers are selling lemonade. Mario brought one and a half liters, Javier brought 2 liters, and Ernesto brought 450 milliliters. How many total milliliters of lemonade did the boys have? Number line diagrams that feature a measurement scale can represent measurement quantities.

Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure on the side of a container.

Example:



Students also combine competencies from different domains as they solve measurement problems using all four arithmetic operations, addition, subtraction, multiplication, and division. Example: "How many liters of juice does the class need to have at least 35 cups if each cup takes 225 ml?" Students may use tape or number line diagrams for solving such problems.



4.MD.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.

Based on work in third grade students learn to consider perimeter and area of rectangles. Fourth graders multiplication, spatially structuring arrays, and area, they abstract the formula for the area of a rectangle A = l x

w.

The formula is a generalization of the understanding, that, given a unit of length, a rectangle whose sides have length w units and l units, can be partitioned into w rows of unit squares with l squares in each row. The product l x w gives the number of unit squares in the partition, thus the area measurement is l x w square units. These square units are derived from the length unit. Students generate and discuss advantages and disadvantages of various formulas for the perimeter length of a rectangle that is l units by w units.

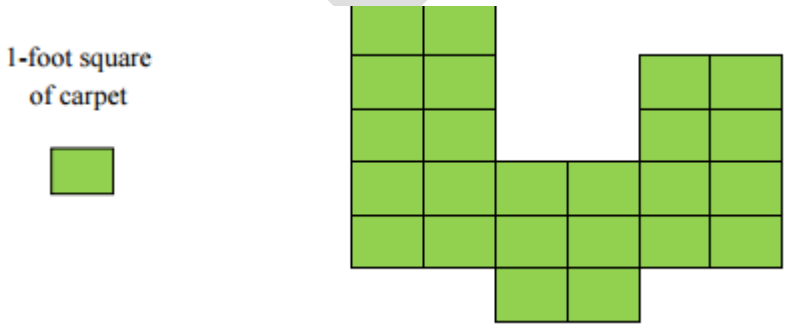
For example, P = 2l + 2w has two multiplications and one addition, but P = 2(l + w), which has one addition and one multiplication, involves fewer calculations. The latter formula is also useful when generating all possible rectangles with a given perimeter. The length and width vary across all possible pairs whose sum is half of the perimeter (e.g., for a perimeter of 20, the length and width are all of the pairs of numbers with sum 10).

Giving verbal summaries of these formulas is also helpful. For example, a verbal summary of the basic formula, A = l + w + l + w, is “add the lengths of all four sides.” Specific numerical instances of other formulas or mental calculations for the perimeter of a rectangle can be seen as examples of the properties of operations, e.g., 2l + 2w = 2(l + w) illustrates the distributive property.

Perimeter problems often give only one length and one width, thus remembering the basic formula can help to prevent the usual error of only adding one length and one width. The formula P = 2 (l x w) emphasizes the step of multiplying the total of the given lengths by 2. Students can make a transition from showing all length units along the sides of a rectangle or all area units within by drawing a rectangle showing just parts of these as a reminder of which kind of unit is being used. Writing all of the lengths around a rectangle can also be useful. Discussions of formulas such as P = 2l + 2w, can note that unlike area formulas, perimeter formulas combine length measurements to yield a length measurement.

Such abstraction and use of formulas underscores the importance of distinguishing between area and perimeter in Grade 3 and maintaining the distinction in Grade 4 and later grades, where rectangle perimeter and area problems may get more complex and problem solving can benefit from knowing or being able to rapidly remind oneself of how to find an area or perimeter. By repeatedly reasoning about how to calculate areas and perimeters of rectangles, students can come to see area and perimeter formulas as summaries of all such calculations.

Mr. Rutherford is covering the miniature golf course with an artificial grass. How many 1-foot squares of carpet will he need to cover the entire course?



Students learn to apply these understandings and formulas to the solution of real-world and mathematical

problems. Example: A rectangular garden has as an area of 80 square feet. It is 5 feet wide. How long is the garden? Here, specifying the area and the width creates an unknown factor problem. Similarly, students could solve perimeter problems that give the perimeter and the length of one side and ask the length of the adjacent side.

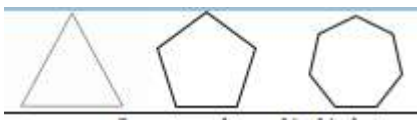
Students should be challenged to solve multistep problems. Example: A plan for a house includes rectangular room with an area of 60 square meters and a perimeter of 32 meters. What are the length and the width of the room? In fourth grade and beyond, the mental visual images for perimeter and area from third grade can support students in problem solving with these concepts. When engaging in the mathematical practice of reasoning abstractly and quantitatively in work with area and perimeter, students think of the situation and perhaps make a drawing. Then they recreate the "formula" with specific numbers and one unknown number as a situation equation for this particular numerical situation. "Apply the formula" does not mean write down a memorized formula and put in known values because in fourth grade students do not evaluate expressions (they begin this type of work in Grade 6). In fourth grade, working with perimeter and area of rectangles is still grounded in specific visualizations and numbers. These numbers can now be any of the numbers used in fourth grade (for addition and subtraction for perimeter and for multiplication and division for area). By repeatedly reasoning about constructing situation equations for perimeter and area involving specific numbers and an unknown number, students will build a foundation for applying area, perimeter, and other formulas by substituting specific values for the variables in later grades.

4.G.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Students need experiences with figures which are symmetrical and non-symmetrical. Figures include both regular and non-regular polygons. Folding cut-out figures will help students determine whether a figure has one or more lines of symmetry.

This standard only includes line symmetry not rotational symmetry.

Example: For each figure, draw all of the lines of symmetry. What pattern do you notice? How many lines of symmetry do you think there would be for regular polygons with 9 and 11 sides. Sketch each figure and check your predictions. Polygons with an odd number of sides have lines of symmetry that go from a midpoint of a side through a vertex.



M : Major Content S: Supporting Content A : Additional Content

MIF Lesson Structure

	LESSON STRUCTURE	RESOURCES	COMMENTS
PRE TEST	**Chapter Opener** Assessing Prior Knowledge *The Pre Test serves as a diagnostic test of readiness of the upcoming chapter*	**Teacher Materials** Quick Check PreTest (Assessm't Bk) Recall Prior Knowledge **Student Materials** Student Book (Quick Check); Copy of the Pre Test; Recall prior Knowledge	Recall Prior Knowledge (RPK) can take place just before the pre-tests are given and can take 1-2 days to front load prerequisite understanding Quick Check can be done in concert with the RPK and used to repair student misunderstandings and vocabulary prior to the pre-test ; Students write Quick Check answers on a separate sheet of paper Quick Check and the Pre Test can be done in the same block *(See Anecdotal Checklist; Transition Guide)* Recall Prior Knowledge – Quick Check – Pre Test
DIRECT ENGAGEMENT	**Direct Involvement/Engagement** Teach/Learn *Students are directly involved in making sense, themselves, of the concepts – by interacting the tools, manipulatives, each other, and the questions*	**Teacher Edition** 5-minute warm up Teach; Anchor Task **Technology** Digi **Other** Fluency Practice	• The Warm Up activates prior knowledge for each new lesson • Student Books are CLOSED; Big Book is used in Gr. K • Teacher led; Whole group • Students use concrete manipulatives to explore concepts • A few select parts of the task are explicitly shown, but the majority is addressed through the hands-on, constructivist approach and questioning • Teacher facilitates; Students find the solution
GUIDED LEARNING	**Guided Learning and Practice** Guided Learning	**Teacher Edition** Learn **Technology** Digi **Student Book** Guided Learning Pages Hands-on Activity	Students-already in pairs /small, homogenous ability groups; Teacher circulates between groups; Teacher, anecdotally, captures student thinking **Small Group w/Teacher circulating among groups** Revisit Concrete and Model Drawing; Reteach Teacher spends majority of time with struggling learners; some time with on level, and less time with advanced groups Games and Activities can be done at this time

INDEPENDENT PRACTICE	**Independent Practice** *A formal formative assessment*	**Teacher Edition** Let's Practice **Student Book** Let's Practice **Differentiation Options** All: Workbook Extra Support: Reteach On Level: Extra Practice Advanced: Enrichment	**Let's Practice** determines readiness for Workbook and small group work and is used as formative assessment; Students not ready for the Workbook will use Reteach. The Workbook is continued as Independent Practice. Manipulatives **CAN** be used as a communications tool as needed. Completely Independent On level/advance learners should finish all workbook pages.
ADDITIONAL PRACTICE	**Extending the Lesson**	Math Journal Problem of the Lesson Interactivities Games	
	Lesson Wrap Up	Problem of the Lesson Homework (Workbook , Reteach, or Extra Practice)	Workbook or Extra Practice Homework is only assigned when students fully understand the concepts (as additional practice) Reteach Homework (issued to struggling learners) should be checked the next day
POST TEST	**End of Chapter Wrap Up and Post Test**	**Teacher Edition** Chapter Review/Test Put on Your Thinking Cap **Student Workbook** Put on Your Thinking Cap **Assessment Book** Test Prep	Use Chapter Review/Test as "review" for the End of Chapter Test Prep. Put on your Thinking Cap prepares students for novel questions on the Test Prep; Test Prep is graded/scored. The Chapter Review/Test can be completed • Individually (e.g. for homework) then reviewed in class • As a 'mock test' done in class and doesn't count • As a formal, in class review where teacher walks students through the questions Test Prep is completely independent; scored/graded Put on Your Thinking Cap (green border) serve as a capstone problem and are done just before the Test Prep and should be treated as Direct Engagement. By February, students should be doing the Put on Your Thinking Cap problems on their own.

TRANSITION LESSON STRUCTURE (No more than 2 days)

- **Driven by Pre-test results, Transition Guide**
- **Looks different from the typical daily lesson**

Transition Lesson – Day 1 **Objective:**	
CPA Strategy/Materials	**Ability Groupings/Pairs (by Name)**
Task(s)/Text Resources	**Activity/Description**

MIF Pacing Guide

Activity	Common Core Standards	Estimated Time (# of block)	Lesson Notes
Pre Test 13	4.MD.2, 4.MD.3	¼ Block	
Area and Perimeter Chapter 13 – Intro	4.MD.2, 4.MD.3	1 Block	Intro the Big Idea
Area of a Rectangle 13.1 Day 1	4.MD.2, 4.MD.3	2 Blocks	You may want to teach this lesson in two mini lessons. 1) One lesson – counting grid squares to find area. 2) Second Lesson – use formula to find area.
Area of a Rectangle 13.1 Day 2	4.MD.2, 4.MD.3	1 Block	Provide students with key for shaded regions.
Area of a Rectangle 13.1 Day 3	4.MD.2, 4.MD.3	1 Block	Remind students of the array model when calculating the squares.
Rectangles and Squares 13.2 Day 1	4.MD.2, 4.MD.3	1 Block	Have students determine the order of operation to solve the problem
Rectangles and Squares 13.2 Day 2	4.MD.2, 4.MD.3	1 Block	
Portfolio Assessment-Perimeter/Area	4.MD.3	30 mins	
Composite Figures 13.3 Day 1	4.MD.3, 4.OA.3	1 Block	Show students how to make squares and rectangles with composite figures.
Composite Figures 13.3 Day 2	4.MD.3, 4.OA.3	1 Block	Have students shade dimensions not identified.
POYTC pg. 157-158	4.MD.3, 4.OA.3	½ Block	
Using Formulas for Area and Perimeter 13.4 Day 1	4.MD.3, 4.OA.3	1 Block	Try to have students use the formula to find area.
POYTC pg. 159-161	4.MD.3, 4.OA.3	1 Block	Monitor how students are separating figures to find the total area of the composite figure.
Area and Perimeter Chapter 13 Wrap Up/Review		1 Block	Reinforce and consolidate chapter skills and concepts
Test Prep 13	4.MD.3, 4.OA.3	½ Block	
Geometry Town Project (rubric)	4.MD.3	Home Project	Students will receive project information before Spring Recess to allow students time to

			work with parent/guardian on Geometry town Idea
Pre Test 14		½ Block	
Identifying Lines of Symmetry 14.1 Day 1	4.G.3	2 Block	Have students cut out the object/figure and fold it to see symmetry. Day one on letters, day two on figures.
Making Symmetric Shapes and Patterns 14.3 Day 1	4.G.3, 4.OA.5	1 Block	
POYTC, pg. 171 #1 & 2	4.G.3	½ Block	
Mini Assessment #12	4.G.3	¼ Block	
Review		2 blocks	Review/Reteach concepts that need to be readdressed
Making and Interpreting a Table 4.1 Day 1	n/a	1 Block	Students should know how to interpret data from 3grade, however, use this lesson as a refresher to introduce line plotting with median, mode, and range.
Making and Interpreting a Table 4.1 Day 2	n/a	1 Block	Have students create their own table using bar graph to ensure data understanding. Make sure students understand tick marks on the graph divide the scale into intervals of 10.
Using a Table 4.2 Day 1	n/a	1 Block	Use index cards to align data in table.
Median, Mode, and Range 5.2 Day 1	n/a	2 Blocks	Day 1 – Explain Range and Mode Day 2 – Explain Median
Median, Mode, and Range 5.2 Day 2	n/a	2 Blocks	Demonstrate the use of the X's orally with students with common topic like birthdays.
Chapter Review 4,5,14	4.G.3, 4.OA.5	1 Block	Select questions from Let's Practice to create a mini review for Test Prep
Test Prep 4, 5, 14	4.G.3, 4.OA.5	½ Block	Only certain questions from each test, complied into one test. Chapter 4 and 5 are not CCC related, however, line plots are a 4^{th} grade standard.
Mini Assessment #13	4.MD.4	½ Block	

Pacing Calendar

April						
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
					1	**2**
3	**4**	**5**	**6**	**7**	**8** **Explain Geometry Town Project**	**9**
10	**11** **School Closed**	**12** **School Closed**	***13*** **School Closed**	**14** **School Closed**	***15*** **School Closed**	**16**
17	***18*** ***Chapter 13 Pre Test***	**19**	**20**	**21**	***22***	**23**
24	**25**	**26**	**27** **Geometry Project Due**	**28** **Portfolio Assessment**	**29**	**30**

May

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	**2**	**3** **Mini Assessment**	***4***	**5**	**6**	**7**
8	**9**	**10** **Ch.13- Test Prep**	**11** **Ch. 14 Pre Test**	***12***	**13**	**14**
15	**16**	**17** **Mini Assessment**	**18**	**19**	**20**	**21**
22	**23**	**24**	**25 ½ day**	**26**	**27**	**28**
29	**30** **School Closed**	**31**				

June

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	**2**	**3**	**4**
5	**6**	**7**	**8**	***9*** ***Test Prep 4,5, 14 combined Final Test.***	**10**	**11**
12	**13**	**14**	**15**	**16**	**17**	**18**
19	**20**	**21 ½ day**	**22 ½ day**	**23 ½ day**	**24**	**25**
26	**27**	**28**	**29**	**30**		

Unit 4 Math Background

Transition Guide References:

Chapter : 13				
Transition Topic: Area and Perimeter				
Grade 4 Chapter Pre Test Items	**Grade 4 Chapter Pre-Test Item Objective**	**Additional Support for the Objective: Grade 4 Reteach**	**Additional Support for the Objective: Grade 4 Extra Practice**	**Grade 4 Teacher Edition Support**
Items 2,3,5,7,8,9	Find the area of a figure	pp. 145-152	pp. 93-98	pp. 200-210
Item 4	Identify square inch	pp. 169-172	pp. 109-112	pp. 224-236
Item 1,10,11	Find the perimeter of a figure	pp. 163-168	pp. 105-108	pp. 218-223

Chapter : 14				
Transition Topic: Symmetry				
Grade 4 Chapter Pre Test Items	**Grade 4 Chapter Pre Test Item Objective**	**Additional Support for the Objective: Grade 4 Reteach**	**Additional Support for the Objective: Grade 4 Extra Practice**	**Grade 4 Teacher Edition Support**
Item 3, 6	Identify line of symmetry	pp. 173-176	pp. 115-118	Pp. 249-250

PARCC Assessment Evidence/Clarification Statements

CCSS	Evidence Statement	Clarification	Math Practices
4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, in problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	i) Situations involve whole number measurements and require expressing measurements given in a larger unit in terms of a smaller unit. ii) Tasks may present number line diagrams featuring a measurement scale. iii) Tasks may include measuring distances to the nearest cm or mm. iv) Units of mass are limited to grams and kilograms.	MP.4,MP.5
4.MD.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.	None	MP.2, MP.5
4.OA.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which Remainders must be interpreted. 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	i) Assessing reasonableness of answer is not assessed here. ii) Tasks involve interpreting remainders.	MP .1, MP2, MP.4, MP.7
4.OA.5	Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way	i) Tasks do not require students to determine a rule; the rule is given. ii) 75% of patterns should be number patterns.	MP.8
4.G.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	i) A trapezoid is defined as "A quadrilateral with at least one pair of parallel sides." ii) Tasks may include terminology: equilateral, isosceles, scalene, acute, right, and obtuse.	MP.7

4.G.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	None	
4.NF.1	Use the principle a/b = (nxa)/(nxb) to recognize and generate equivalent fractions.	i) The explanation aspect of 4.NF.1 is not assessed here. ii) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 iii) Tasks may include fractions that equal whole numbers. Fractions equivalent to whole numbers are limited to 0 through 5.	MP.7

Connections to the Mathematical Practices

1	**Make sense of problems and persevere in solving them**
	Mathematically proficient students in grade 4 know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
2	**Reason abstractly and quantitatively**
	Mathematically proficient fourth graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts.
3	**Construct viable arguments and critique the reasoning of others**
	In fourth grade mathematically proficient students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
4	**Model with mathematics**
	Mathematically proficient fourth grade students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
5	**Use appropriate tools strategically**
	Mathematically proficient fourth graders consider the available tools(including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.
6	**Attend to precision**
	As fourth graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot.
7	**Look for and make use of structure**
	In fourth grade mathematically proficient students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial products model). They relate representations of counting problems such as tree diagrams and arrays to the

	multiplication principal of counting. They generate number or shape patterns that follow a given rule.
8	**Look for and express regularity in repeated reasoning**
	Students in fourth grade should notice repetitive actions in computation to make generalizations Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions.

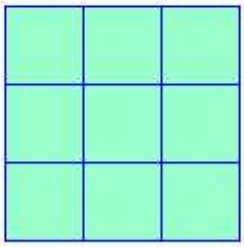
Visual Vocabulary

Visual Definition
The terms below are for teacher reference only and are not to be memorized by students.
Teachers should first present these concepts to students with models and real life examples. Students should understand the concepts involved and be able to recognize and/or use them with words, models, pictures, or numbers.

area

The number of square units needed to cover a surface

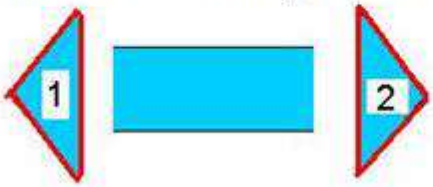
Example:



area = 9 square units

Composite Figure

The given figure is made of two triangles and one rectangle as shown below.

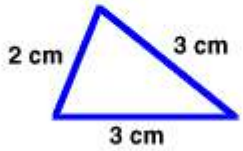


So, the given figure is a composite figure.

perimeter

The distance around a figure

Example:

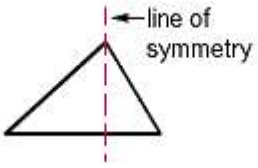


2 cm + 3 cm + 3 cm = 8 cm
The perimeter of this figure is 8 centimeters.

line symmetry

What a figure has if it can be folded about a line so that its two parts match exactly

Example:

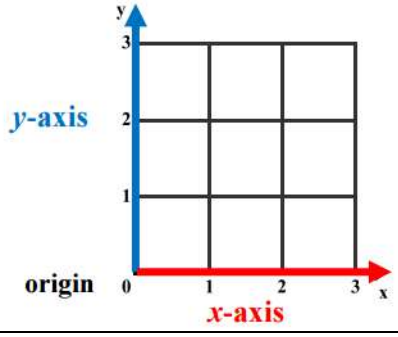


rotation (turn)

A movement of a figure to a new position by rotating the figure around a point

Example:

axis



A reference line from which distances or angles are measured in a coordinate grid. (plural - axes)

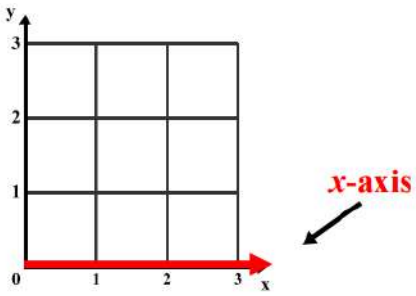
data

Number of School Carnival Tickets Sold	
Kindergarten	22
1st Grade	15
2nd Grade	34
3rd Grade	9
4th Grade	16
5th Grade	29
6th Grade	11

Information, especially numerical information. Usually organized for analysis.

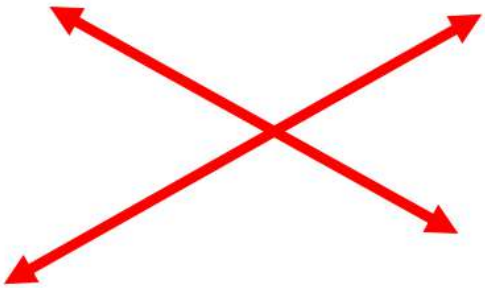
Horizontal Axis

x-axis



The horizontal axis in a coordinate plane.

intersect

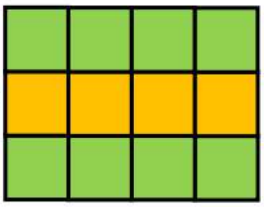


line graph

A graph used to show how data changes over time with points connected by line segments.

row

Rows go from left to right.



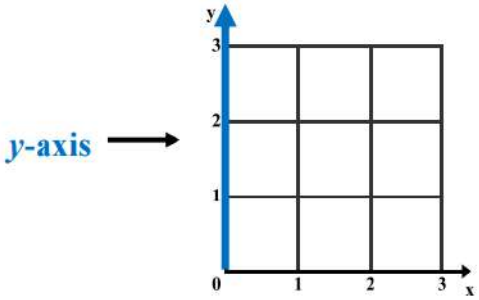
A horizontal arrangement of numbers or information in an array or table.

tally table

Favorite Fruit	
Orange	𝍸
Apple	𝍸 II
Pear	III

A table that uses tally marks to record data.

y-axis



The vertical axis in a coordinate plane.

Vertical Axis

mean

Data Set: 14, 21, 27, 33, 45, 46, 52

Step 1:

$14 + 21 + 27 + 33 + 45 + 46 + 52 = 238$

Step 2:

$238 \div 7 = 34$ ← **mean**

Mean and Average are synomyns

The sum of a set of numbers divided by the number of elements in the set; a type of average.

Potential Student Misconceptions

Chapter 13

- When finding the area some students may add the lengths of the sides instead of multiplying them. Remind students of the array model of multiplication. This may help them remember to multiply when finding the area.
- Some students may forget to determine the dimensions not identified. Suggest that students copy the figure on paper and then write all of the dimensions in the appropriate place.
- Students may have trouble estimating irregular figures. They may not know how to count ½ square units. Refer students to the chart on page 206, and encourage them to make a similar chart of their own.

Chapter 14

- Some students may have trouble recognizing symmetric figures. Have students trace the figures and dotted lines. Have them cut out each figure and fold it along the dotted line. If both parts match, that line is a line of symmetry.
- Some students may have difficulty recognizing rotational symmetry. Have students trace the figures on a piece of paper, cut them out, and use the tip of a pencil to fix the center of rotation.
- Some students may not copy the figure correctly on the grid paper. After students have copied the figure, have them place the grid paper over the page to confirm that they have copied the figure correctly.

Chapter 4

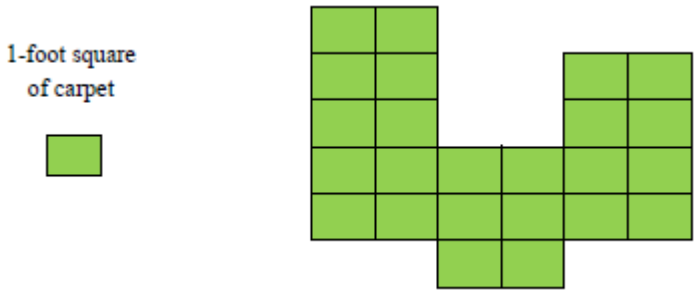
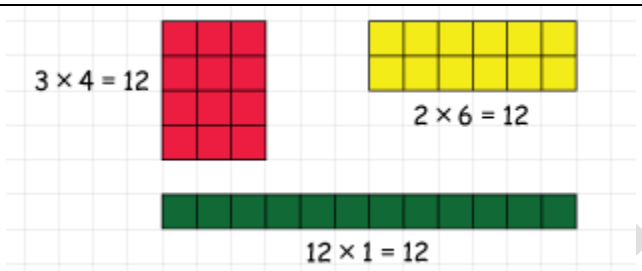
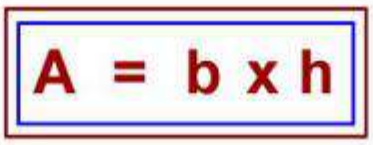
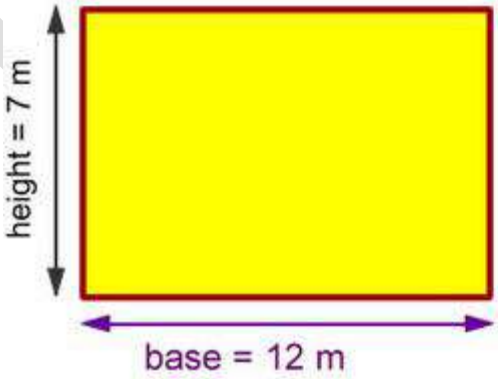
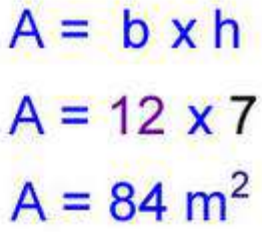
- Students may not know that the tick marks on the graph divide the scale into intervals of 10. Have them use an index card to keep track of each tick mark as they count together from 0 through 100 by tens. Repeat for 100 through 200, 200 through 300, and so on through 600.
- Some students may not understand how to fill in missing numbers in a table. Have students write an equation for each row. Then solve the equation to complete that row.
- Some students may misinterpret a problem because they do not understand the term *interval*. Explain that interval means the time that passes from one hour to the next. Have students restate the question in their own words to be sure they understand what they need to find.

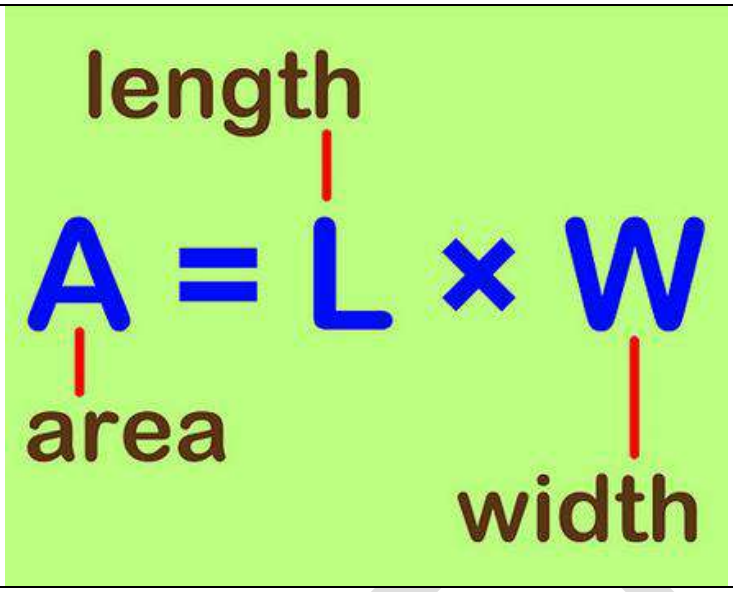
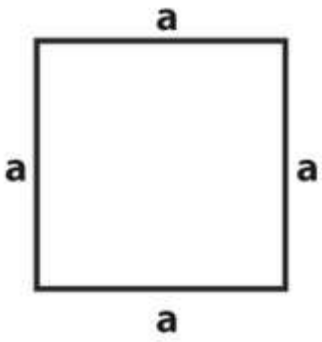
Chapter 5

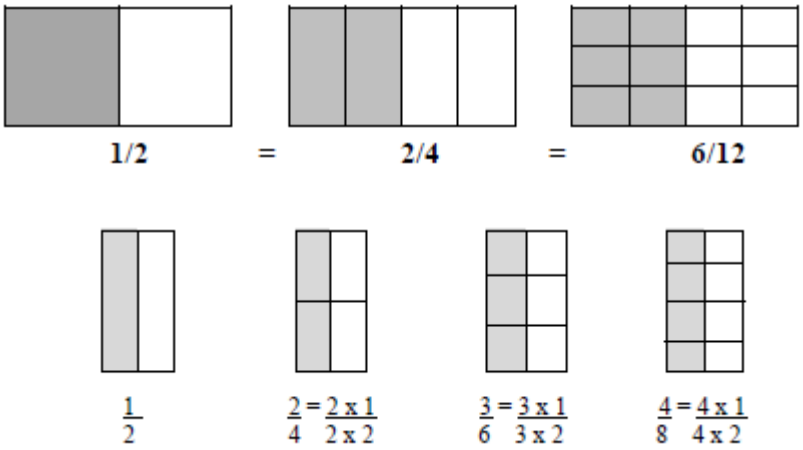
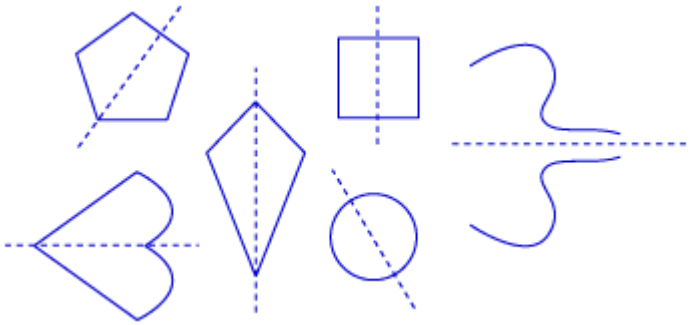
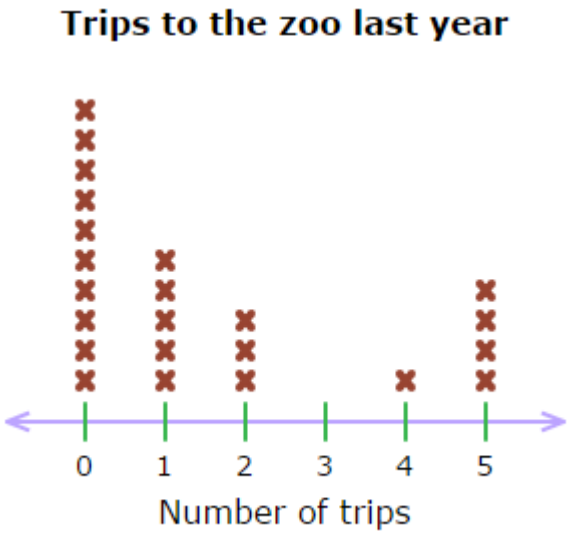
- Students may count the total as part of the set of data. Then divide by the wrong number to find the average. Have students count and record the number of data before they add and divide to find the average or mean.
- Some students may forget to arrange the data in numerical order before finding the median. Have students order the data and circle the two numbers they will use to find the median before they calculate the median in each data set.
- Students may not distinguish between an outcome being *equally likely* and *more likely*. Point out that for outcomes to be equally likely there must always be an equal, or the same, number of possible outcomes.
- Some students may not understand how to find the total given the average. Remind students that they need to multiply the average or mean by the number of items to find the total.

Teaching Multiple Representations

Multiple Representations Framework

Area By Counting	
Area	 If each side of a tile is 1 unit in length… How many different rectangles can you build with an area of 12 square units?
Area of a Rectangle Formula	   The area of a rectangle equals the base times the height.

Area of a Rectangle Formula	
Perimeter of a square	 Since it is a square all sides are equal in length. P=a + a + a + a Or P=a2
Perimeter of a rectangle	 Perimeter = 2L + 2W Same as: L + L + W +W **Example:**  Perimeter = 2L +2W Perimeter = 2(9 in) +2(4 in) Perimeter = 18 in + 8 in Perimeter = 26 in

Equivalent Fractions	
Lines of Symmetry	
Line Plots	

Stem and Leaf

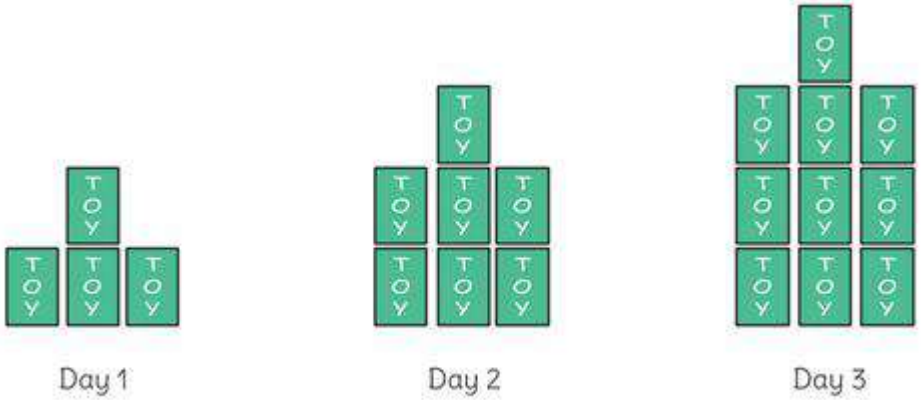
Quiz show scores

Stem	Leaf
1	0 0 6 7 8
2	0 3 4 8
3	6 6 9
4	6 7
5	1 4 9
6	1 3 5 7
7	3 9
8	1

In a stem-and-leaf plot, the stem tells the first part of the number and the leaf tells the last digit of the number.

Patterns:

- Shapes
- Charts



Day	Number of Toys Collected That Day	Total Amount of Toys
1	4	4
2	7	11
3	10	21
4	13	34
5	16	50
6	19	69
7	22	91
8	25	116

Recognize patterns and continue them by following a rule.

Assessment Framework

Unit 4 Assessment / Authentic Assessment Framework				
Assessment	**CCSS**	**Estimated Time**	**Format**	**Graded**
Pre Test 13	4.MD.3	30 minutes	Individual	Y
Quick Check 13	4.MD.3	30 minutes	Individual	Y
Portfolio Authentic Assessment-Perimeter and Area (3 Options)	4.MD.3	30 minutes	Individual	Y
Test Prep. 13	4.MD.3	1 Block	Individual	Y
Geometry Town Project	4.G.1-3	Home Project Optional	Individual	Optional
Pre Test 14	4.G.3,	30 minutes	Individual	Y
Quick Check 14	4.G.3	30 minutes	Individual	Y
Portfolio Authentic Assessment	4.G.3	30 minutes	Individual	Y
Test Prep. 14	4.G.3	1Block	Individual	Y
Mini Assessment #12	4.G.3	30 minutes	Individual	Y
Geometry Robot	4.G.1-3		Optional	Y
Pre Test 4	4.MD.2	30 minutes	Individual	Y
Quick Check 4	4.MD.2	30 minutes	Individual	Y
Test Prep 4	4.MD.2	1Block	Individual	Y
Pre Test 5	4.MD.4	30 minutes	Individual	Y
Quick Check 5	4.MD.4	30 minutes	Individual	Y
Test Prep 5	4.MD.4	1 Block	Individual	Y
Mini Assessment #13	4.MD.4	30 minutes	Individual	Y

	PLD	Genesis Conversion
Rubric Scoring	PLD 5	100
	PLD 4	89
	PLD 3	79
	PLD 2	69
	PLD 1	59

Performance Tasks – Authentic Assessments

4th Grade Authentic Assessment # 4.MD.3

Name: _____ Date: _____

Use the rectangle to solve the problem.

28 cm.

The area of the rectangle is 420 square centimeters.

What is the perimeter, in centimeters of the rectangle?

Teacher notes:

The authentic Smarter Balanced task is an online task. The task has buttons with numerals for the students to click on to type the answer.

4. MD.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.

•To complete this task, students need to find the missing dimension. Students need to recognize that 28 x n = 420. Once they have determined that the missing dimension is 15, students need to find the perimeter.

• Students earn 3, 4 or 5 points for full accomplishment, by finding the perimeter of 86 cm. Students do not need to label the missing dimensions to demonstrate full accomplishment.

• Students earn 1or 2 points, partial accomplishment, if they write the missing dimension of 15 instead of the perimeter.

• If the student's answer is incorrect due to a computation error (mistake made while dividing to find the missing dimension), but the overall work shows that he or she understands how to use area to find perimeter, he or she can still be rated as having "got" the target concept.

• If a particular student is struggling from the very start and seems like he or she will not be able to show *any* understanding of area and perimeter, you may suggest that they think about how to find the missing dimensions (420 ÷ 28). You can then indicate on the completed task that the student received teacher assistance.

Not yet: Student shows evidence of misunderstanding, incorrect concept or procedure		**Got It:** Student essentially understands the target concept.		**More than Got it.** Student completely understands the target concept, and has no errors.
1 Unsatisfactory: **Little Accomplishment** The task is attempted and some	**2 Marginal:** **Partial Accomplishment** Part of the task is accomplished, but there is lack of	**3 Proficient:** **Substantial Accomplishment** Student could work to full accomplishment	**4 Very Good:** **Full Accomplishment** Strategy and execution meet the content,	**5 Excellent** **Full Accomplishment** Strategy and execution meet the content, process, and qualitative

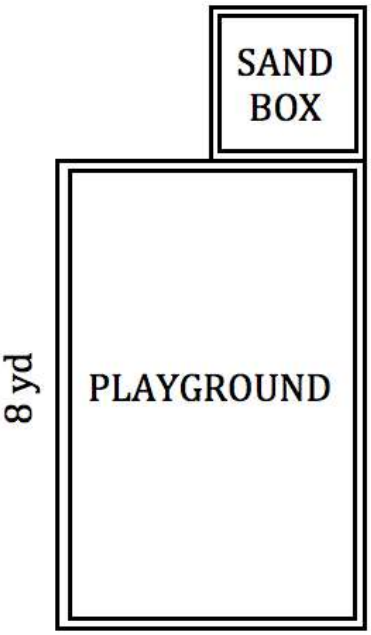
mathematical effort is made. There may be fragments of accomplishment but little or no success. Further teaching is required.	evidence of understanding or evidence of not understanding. Further teaching is required.	with minimal feedback from teacher. Errors are minor. Teacher is confident that understanding is adequate to accomplish the objective with minimal assistance.	process, and qualitative demands of the task or concept. Student can communicate ideas. May have minor errors that do not impact the mathematics.	demands of the task or concept. Student can communicate ideas. Student have no mathematical errors.

Performance Tasks-Authentic Assessments

4th Grade Portfolio Assessment – Perimeter/Area 4.MD.3

Name: _____ Date: _____

The park in Alyssa's neighborhood had new equipment and play areas added. The picture to the right shows part of the new park.



The new playground space has a length of 8 yards and an area of 48 square yards. Attached to the playground is a square sandbox. The width of the sandbox is half the width of the playrgound.

Alyssa was wondering about the area of the sandbox. Use the space below to show the steps that Alyssa could follow to find the area of the sandbox. Fill in the blank at the bottom of the page with the correct area.

The area of the sandbox is _____ square yards.

Teacher notes:

• Students are directed show their thinking in space provided on the paper. Some students may require more space than the paper provides or may need lined paper to better structure their work. You may choose to give those students, or all students, extra paper on which they can do their work.

• For this particular task, it is very important that students show their thinking as fully as possible. If they end up with the wrong answer, the only way to adequately distinguish between varied levels of proficiency, the students need to show their work so the scorer can have some sense of how close they came to the right answer.

• The area of the sand box is 9 square yards. Since this task requires several steps to arrive at the correct answer **and** the directions specify that students need to show the steps that Alyssa could follow to find the area, students need to show some degree of work in order to be rated as showing "full accomplishment". Since the numbers in this task are small and lend themselves to mental calculations, some students may be able to figure out the correct answer entirely in their head, without doing any pencil and paper work. If a student simply writes an answer and does not show any work, you may choose to direct them to go back and show their thinking as indicated in the task.

• As indicated in the rubric, students may make minor errors that do not relate to the target concept (i.e., failing to label numbers with units), but if their work shows a complete understanding of the relationship between side length and area, they can still be rated as showing "full accomplishment".

Not yet: Student shows evidence of misunderstanding, incorrect concept or procedure.		**Got It:** Student essentially understands the target concept.		
1 Unsatisfactory: **Little Accomplishment** The task is attempted and some mathematical effort is made. There may be fragments of accomplishment but little or no success. Further teaching is required.	**2 Marginal:** **Partial Accomplishment** Part of the task is accomplished, but there is lack of evidence of understanding or evidence of not understanding. Further teaching is required.	**3 Proficient:** Student could work to full accomplishment with minimal feedback from teacher. Errors are minor. Teacher is confident that understanding is adequate to accomplish the objective with minimal assistance.	**4 Very Good:** **Full Accomplishment** Strategy and execution meet the content, process, and qualitative demands of the task or concept. Student can communicate ideas. May have minor errors that do not impact the mathematics.	**5 Excellent** Strategy and execution meet the content, process, and qualitative demands of the task or concept. Student can communicate ideas. No errors

Performance Task Authentic Assessment

4th Grade Portfolio Assessment – Perimeter/Area 4.MD.3

Name_____ Date_____

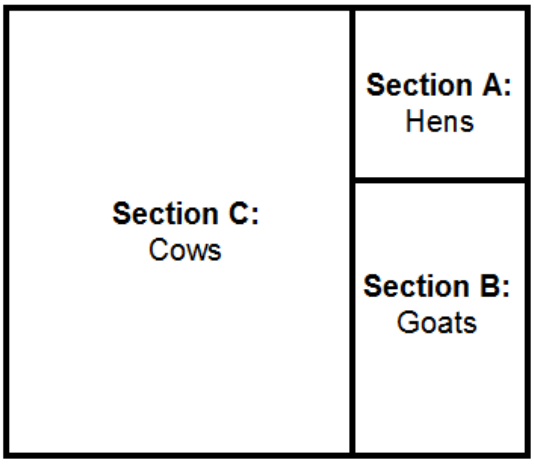
Jackson is helping his father set up and build a new pen for the hens, cows, and goats on their farm. The pen will be rectangular and divided into three sections. He has given Jackson a list describing the three sections of the pen and a drawing to show how the pen will be divided.

Jackson's dad asked him to go to the store and buy enough fencing for the perimeter of the cow section. Help Jackson figure out how much fencing to buy. Use the space below to show Jackson the steps he should follow to find the amount of fencing for the perimeter of the cow section.

Hen Section:
- Square
- Perimeter of 20 yards

Goat Section:
- Rectangle
- Area of 40 square yards

Cow Section:
- Rectangle
- Length is 3 feet less than width



Jackson needs to buy _____ yards of fencing.

Teacher notes:

• Students are directed to show their thinking in space provided. Some students may require more space than the paper provides or may need lined paper to better structure their work. You may choose to give those students, or all students, extra paper on which they can do their work.

• For this particular task, it is very important that students show their thinking as fully as possible. If they end up with the wrong answer, the only way to adequately distinguish between varied levels of proficiency, the students need to show their work so the scorer can have some sense of how close they came to the right answer.

• The cow section has a perimeter of 46 yards. Since this task requires several steps to arrive at the correct answer **and** the directions specify that students need to show the steps that Jackson could follow to find the perimeter, students need to show some degree of work in order to be rated as showing "full accomplishment". Since the numbers in this task are small and lend themselves to mental calculations, some students may be able to figure out the correct answer entirely in their head, without doing any pencil and paper work. If a student simply writes an answer and does not show any work, you may choose to direct them to go back and show their thinking as indicated in the task.

• As indicated in the rubric, students may make minor errors that do not relate to the target concept (i.e., failing to label #s), but if the work shows full understanding of the relationship between side length, area, & perimeter, they can still be considered to show "full accomplishment".

• If a particular student is struggling from the very start and seems like he or she will not be able to show *any* understanding of area and perimeter, you may suggest that they think about the clues for the hen section and label the diagram with possible side lengths. You can then indicate on the completed task that the student received teacher assistance.

Not yet: Student shows evidence of misunderstanding, incorrect concept or procedure.	**Got It:** Student essentially understands the target concept.

Unit 4 Marking Period : April 19 – June 21

1 Unsatisfactory:	2 Marginal:	3 Proficient:	4 Very Good:	5 Excellent
Little Accomplishment The task is attempted and some mathematical effort is made. There may be fragments of accomplishment but little or no success. Further teaching is required.	**Partial Accomplishment** Part of the task is accomplished, but there is lack of evidence of understanding or evidence of not understanding. Further teaching is required.	**Substantial Accomplishment** Student could work to full accomplishment with minimal feedback from teacher. Errors are minor. Teacher is confident that understanding is adequate to accomplish the objective with minimal assistance.	**Full Accomplishment** Strategy and execution meet the content, process, and qualitative demands of the task or concept. Student can communicate ideas. May have minor errors that do not impact the mathematics.	Strategy and execution meet the content, process, and qualitative demands of the task or concept. Student can communicate ideas. Has no errors.

Unit 4 Marking Period : April 19 – June 21

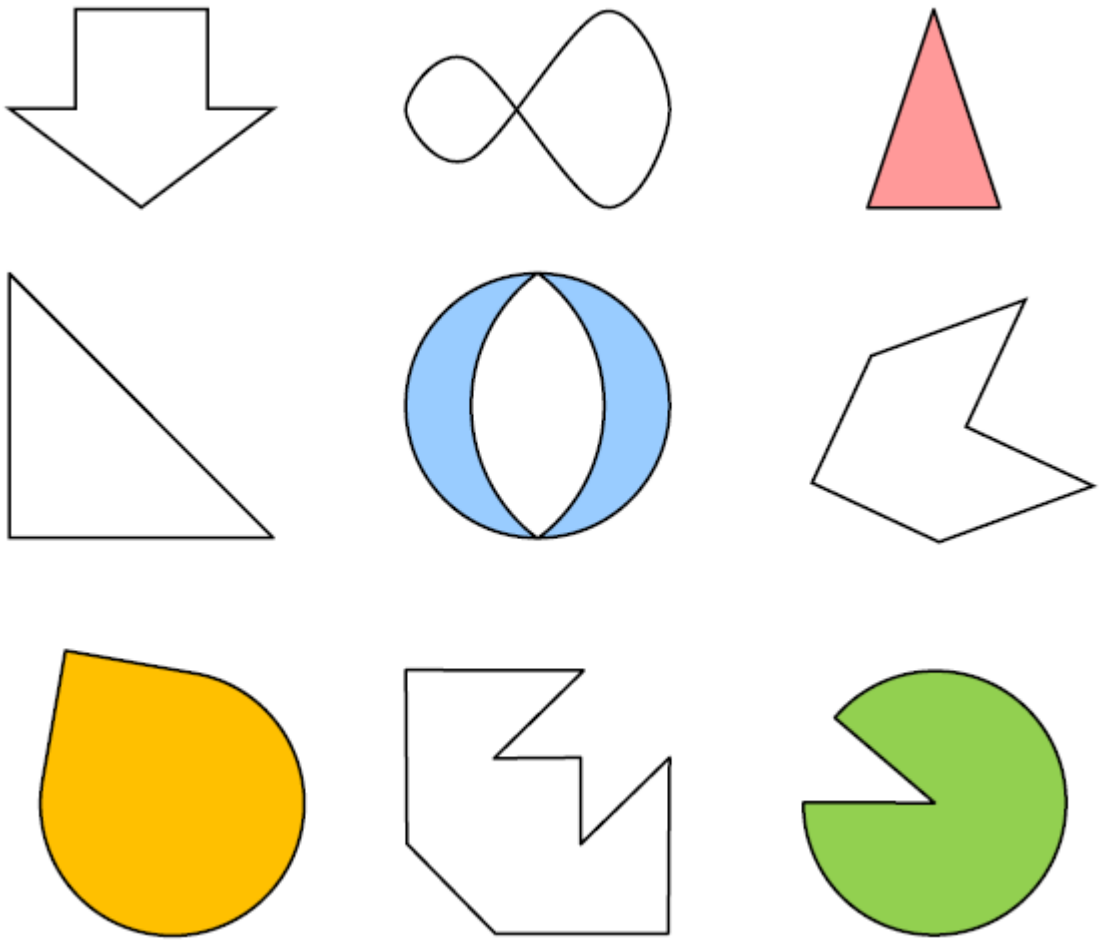
Performance Task Authentic Assessent

4th Grade Portfolio Assessment – Symmetry 4.G.3

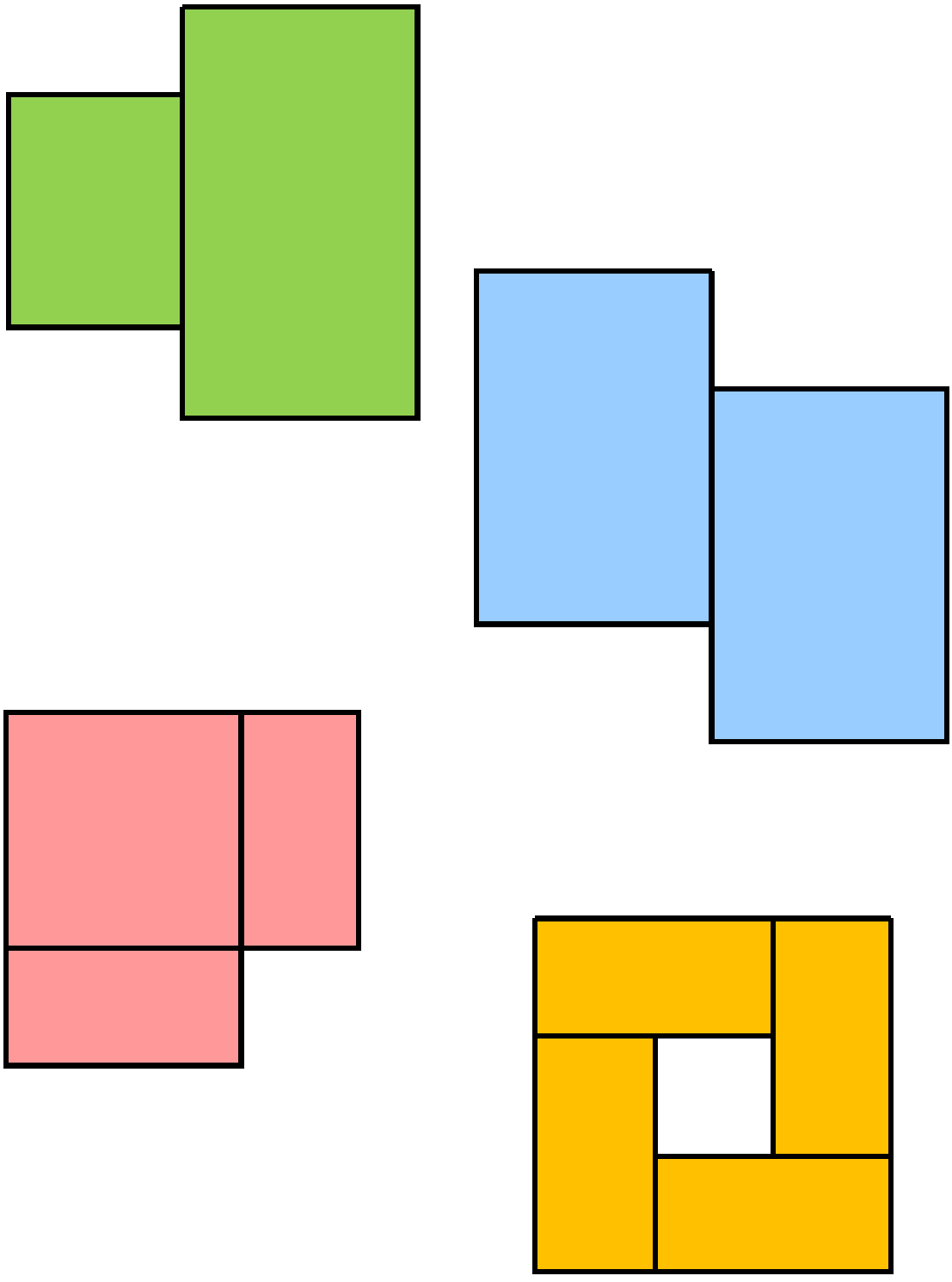
Name_____ Date_____

Finding Lines of Symmetry

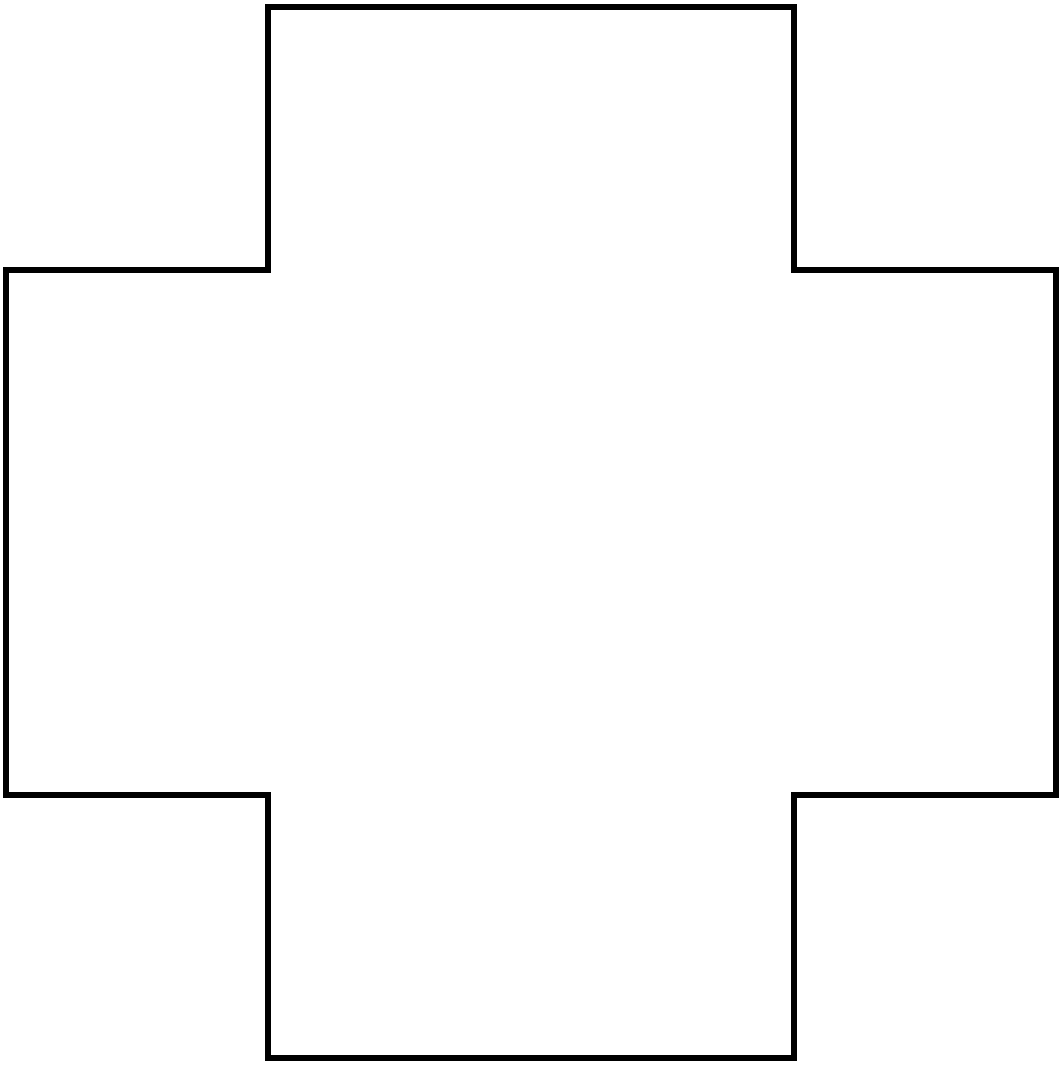
a. Each shape below has a line of symmetry. Draw a line of symmetry for each shape.



b. Not every shape has a line of symmetry. Which of the four shapes below have a line of symmetry? Draw a line of symmetry on them.



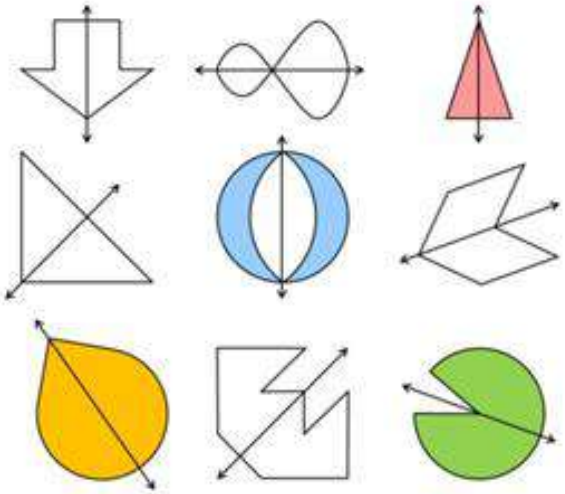
c. Some shapes have many lines of symmetry. Draw all the lines of symmetry you can on the shape below. How many are there?



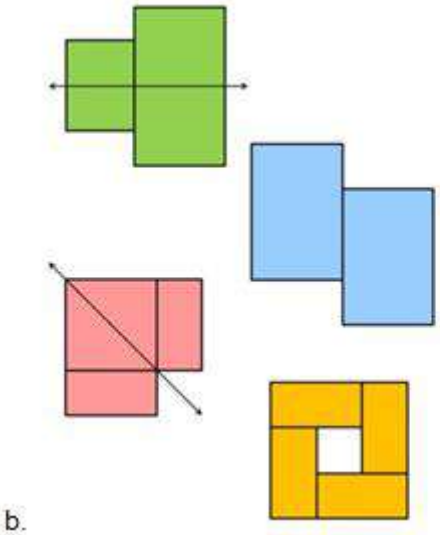
Authentic Assessment 4.G.3

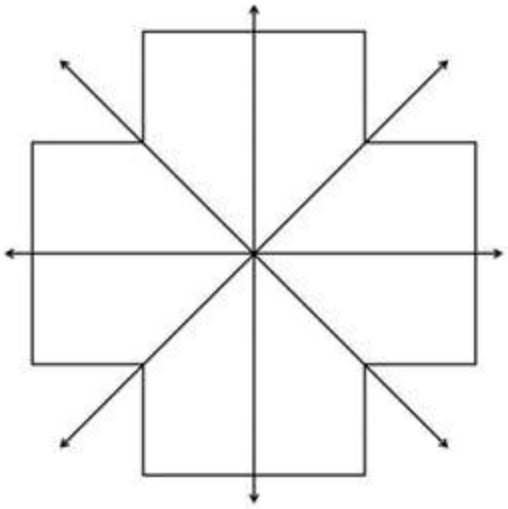
Solution

a.



b.





There are 4 lines of symmetry.

c.

Not yet: Student shows evidence of misunderstanding, incorrect concept or procedure.		**Got It:** Student essentially understands the target concept.		
1 Unsatisfactory: **Little Accomplishment** The task is attempted and some mathematical effort is made. There may be fragments of accomplishment but little or no success. Further teaching is required.	**2 Marginal:** **Partial Accomplishment** Part of the task is accomplished, but there is lack of evidence of understanding or evidence of not understanding. Further teaching is required.	**3 Proficient:** **Substantial Accomplishment** Student could work to full accomplishment with minimal feedback from teacher. Errors are minor. Teacher is confident that understanding is adequate to accomplish the objective with minimal assistance.	**4 Very Good:** **Full Accomplishment** Strategy and execution meet the content, process, and qualitative demands of the task or concept. Student can communicate ideas. May have minor errors that do not impact the mathematics.	**5 Excellent**

Additional Assessment Resources

Illustrative Math: http://illustrativemathematics.org/

PARCC: http://www.parcconline.org/samples/item-task-prototypes

NJDOE: http://www.state.nj.us/education/modelcurriculum/math/ (username: model; password: curriculum)

DANA: http://www.ccsstoolbox.com/parcc/PARCCPrototype_main.html

New York: http://www.p12.nysed.gov/assessment/common-core-sample-questions/

Delaware: http://www.doe.k12.de.us/assessment/CCSS-comparison-docs.shtml

Perimeter Games:
http://www.indiana.edu/~atmat/units/area_perimeter/rectex1.htm
Online Geo-boards:
http://nlvm.usu.edu/en/nav/frames_asid_172_g_2_t_3.html?open=activities&from=category_g_2_t_3.html
Exploring Area:
http://www.shodor.org/interactivate/activities/AreaExplorer/

Literature:
Spaghetti and Meatballs for All! Marilyn Burns (Great for perimeter and area activities.)
"*Using Representations to Explore Perimeter and Area*." This article is based on, Spaghetti and Meatballs for All!
http://www.math.ccsu.edu/mitchell/math409tcmusingrepresentationperimeterarea.pdf

Extensions and Sources

Think Central
https://www-k6.thinkcentral.com/ePC/start.do

Common Core Tools
http://commoncoretools.me/
http://www.ccsstoolbox.com/
http://www.achievethecore.org/steal-these-tools

Achieve the Core
http://achievethecore.org/dashboard/300/search/6/1/0/1/2/3/4/5/6/7/8/9/10/11/12

Manipulatives

http://nlvm.usu.edu/en/nav/vlibrary.html
http://www.explorelearning.com/index.cfm?method=cResource.dspBrowseCorrelations&v=s&id=USA-000

Problem Solving Resources

Illustrative Math Project
http://illustrativemathematics.org/standards/k8

The site contains sets of tasks that illustrate the expectations of various CCSS in grades K–8 grade and high school. More tasks will be appearing over the coming weeks. Eventually the sets of tasks will include elaborated teaching tasks with detailed information about using them for instructional purposes, rubrics, and student work.

Inside Mathematics
http://www.insidemathematics.org/index.php/tools-for-teachers
Inside Mathematics showcases multiple ways for educators to begin to transform their teaching practices. On this site, educators can find materials and tasks developed by grade level and content area.

Engage NY

http://www.engageny.org/video-library?f[0]=im_field_subject%3A19

IXL
http://www.ixl.com/

Georgia Department of Education
https://www.georgiastandards.org/Common-Core/Pages/Math-K-5.aspx
Georgia State Educator have created common core aligned units of study to support schools as they implement the Common Core State Standards.