4th Grade Mathematics

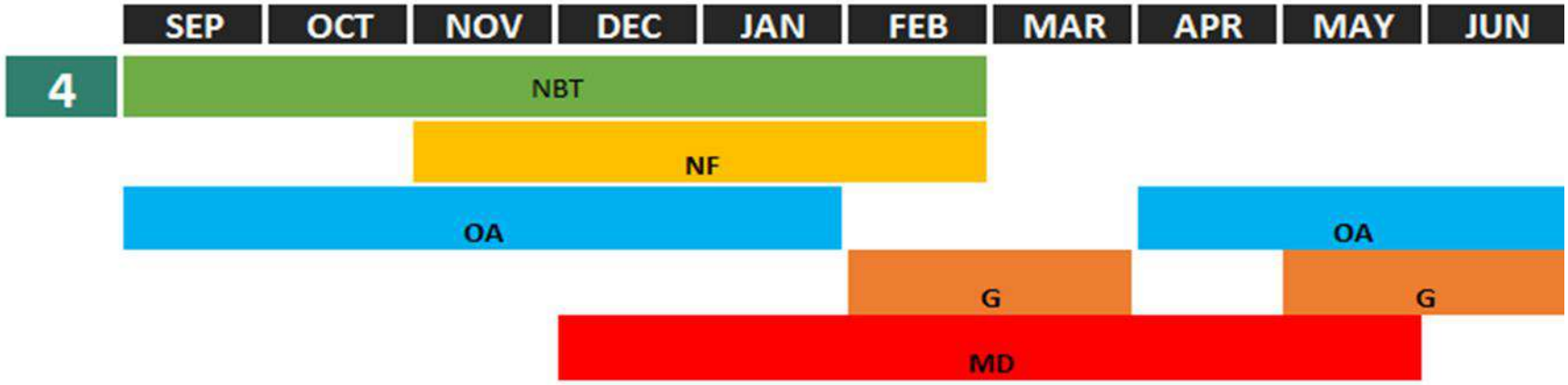
Unit 3 Curriculum Map: January 25 - April 12, 2018

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

A STORY OF UNITS



Numbers Base Ten: Generalize place value understanding for multi-digit whole numbers and use place value understanding and properties of operations to perform multi-digit arithmetic

Numbers and Operations-Fractions: Extend understanding of fraction equivalence and ordering, build fractions from unit fractions, and understand decimal notation for fractions, and compare decimal fractions

Operations and Algebraic Thinking: Use the four operations with whole numbers to solve problems, gain familiarity with factors and multiples, and generate and analyze patterns

Geometry: Draw and identify lines and angles, and classify shapes by properties of their lines and angles

Measurment and Data: Solve problems involving measurement and conversion of measurements, represent and interpret data, and understand concepts of angle and measure angles

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Unit Overview

Unit 3: Chapters 9-12
In this Unit Students will be:
• Measure and draw angles and solve problems involving angle measures. • Identify and draw perpendicular and parallel line segments as well as horizontal and vertical lines. • Identify squares and rectangles based on their properties, and find unknown angle measures and side lengths of figures. • Measure time to the minute, second, and hour • Use metric units of length, mass, and volume to solve real-world measurement problems. • Use customary units of length, weight, and capacity to solve- real world measurement problem.
Essential Questions
➢ What geometric terms describe types of angles? ➢ How do you find the measure of an angle using equivalent fractions? ➢ How are angles measured? ➢ How can you draw an angle? ➢ How can you add and subtract to find unknown angle measurements? ➢ What are some important geometric names for lines? ➢ How can you identify polygons? ➢ How can you classify triangles? ➢ How can you classify quadrilateral? ➢ How can perimeter and area formulas be used to solve problems? ➢ How can you measure and find the area of a rectangle by multiplying? ➢ How can you measure and find the area of a rectangle by using a formula? ➢ How do you estimate and measure length? ➢ How do you measure capacity with customary units? ➢ How do you measure weight? ➢ How do you change customary units? ➢ How do you estimate and measure length using metric units? ➢ How do you measure capacity with metric units? ➢ How do you measure mass? ➢ How do you change metric units? ➢ How do you compare units of time? ➢ How can you work backward to solve a problem?

Enduring Understandings

- Chapter 9: Angles
  - ✓ Estimate and measure angles
  - ✓ Use a protractor to measure angels
  - ✓ Identify acute, obtuse and right angles
  - ✓ Find unknown angle measurements
  - ✓ Solve real-world problems by finding unknown angles measures

- Chapter 10: Perpendicular and Parallel Line Segments
  - ✓ Draw perpendicular line segments
  - ✓ Draw parallel line segments
  - ✓ Identify horizontal and vertical lines

- Chapter 11: Squares and Rectangles
  - ✓ Apply properties of squares and rectangles
  - ✓ Find angle measures, side lengths of squares and rectangles
  - ✓ Identify patterns and relationships

- Chapter 12: Conversion of Measurements
  - ✓ Understand relative sizes of measurement units
  - ✓ Convert metric units of length, mass, and volume
  - ✓ Convert customary units of length, weight, and volume
  - ✓ Convert units of time
  - ✓ Use four operations to solve word 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.

Example 2:

Your class is collecting bottled water for a service project. The goal is to collect 300 bottles of water. On the first day, Max brings in 3 packs with 6 bottles in each container. Sarah wheels in 6 packs with 6 bottles in each container. About how many bottles of water still need to be collected?

Student 1

First, I multiplied 3 and 6 which equals 18. Then I multiplied 6 and 6 which is 36. I know 18 plus 36 is about 50. I'm trying to get to 300. 50 plus another 50 is 100. Then I need 2 more hundreds. So we still need 250 bottles.

Student 2

First, I multiplied 3 and 6 which equals 18. Then I multiplied 6 and 6 which is 36. I know 18 is about 20 and 36 is about 40. 40+20=60. 300-60 = 240, so we need about 240 more bottles.

This standard references interpreting remainders. Remainders should be put into context for interpretation.

ways to address remainders:

- Remain as a left over
- Partitioned into fractions or decimals
- Discarded leaving only the whole number answer
- Increase the whole number answer up one

• Round to the nearest whole number for an approximate result

Example:

Write different word problems involving 44 ÷ 6 = ? where the answers are best represented as:

Problem A: 7
Problem B: 7 r 2
Problem C: 8
Problem D: 7 or 8
Problem E: 7r2

Possible solutions:

Problem A: 7. Mary had 44 pencils. Six pencils fit into each of her pencil pouches. How many pouches did she fill? 44 ÷ 6 = p; p = 7 r 2. Mary can fill 7 pouches completely.

Problem B: 7 r 2. Mary had 44 pencils. Six pencils fit into each of her pencil pouches. How many pouches could she fill and how many pencils would she have left? 44 ÷ 6 = p; p = 7 r 2; Mary can fill 7 pouches and have 2 left over.

Problem C: 8. Mary had 44 pencils. Six pencils fit into each of her pencil pouches. What would the fewest number of pouches she would need in order to hold all of her pencils? 44 ÷ 6 = p; p = 7 r 2; Mary can needs 8 pouches to hold all of the pencils.

Problem D: 7 or 8. Mary had 44 pencils. She divided them equally among her friends before giving one of the leftovers to each of her friends. How many pencils could her friends have received? 44 ÷ 6 = p; p = 7 r 2; Some of her friends received 7 pencils. Two friends received 8 pencils.

Problem E: 762 . Mary had 44 pencils and put six pencils in each pouch. What fraction represents thenumber of pouches that Mary filled? 44 ÷ 6 = p; p = 7r2

Example:

There are 128 students going on a field trip. If each bus held 30 students, how many buses are needed? (128 ÷ 30 = b; b = 4 R 8; They will need 5 buses because 4 busses would not hold all of the students).Students need to realize in problems, such as the example above, that an extra bus is needed for the 8 students that are left over. 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:

• front-end estimation with adjusting (using the highest place value and estimating from the front end, making adjustments to the estimate by taking into account the remaining amounts),

• 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),

4.MD.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.

The units of measure that have not been addressed in prior years are cups, pints, quarts, gallons, pounds, ounces, kilometers, millimeter, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass (metric and customary systems), liquid volume (metric only), and elapsed time. Students did not convert measurements.

Students develop benchmarks and mental images about a meter (e.g., about the height of a tall chair) and a kilometer (e.g., the length of 10 football fields including the end zones, or the distance a person might walk in about 12 minutes), and they also understand that "kilo" means a thousand, so 3000 m is equivalent to 3 km. Expressing larger measurements in smaller units within the metric system is an opportunity to reinforce notions of place value. There are prefixes for multiples of the basic unit (meter or gram), although only a few (kilo-, centi-, and milli-) are in common use. Tables such as the one below are an opportunity to develop or reinforce place value concepts and skills in measurement activities. Relating units within the metric system is another opportunity to think about place value. For example, students might make a table that shows measurements of the same lengths in centimeters and meters. Relating units within the traditional system provides an opportunity to engage in mathematical practices, especially "look for and make use of structure" and "look for and express regularity in repeated reasoning" For example, students might make a table that shows measurements of the same lengths in feet and inches.

Students need ample opportunities to become familiar with these new units of measure and explore the patterns and relationships in the conversion tables that they create.

Students may use a two-column chart to convert from larger to smaller units and record equivalent measurements. They make statements such as, if one foot is 12 inches, then 3 feet has to be 36 inches because there are 3 groups of 12.

Example:

Customary length conversion table:

Yards	Feet
1	3
2	6
3	9
n	***n*** x 3

Foundational understandings to help with measure concepts:
Understand that larger units can be subdivided into equivalent units (partition).

Understand that the same unit can be repeated to determine the measure (iteration).
Understand the relationship between the size of a unit and the number of units needed (compensatory principal).

These Standards do not differentiate between weight and mass. Technically, mass is the amount of matter in an object. Weight is the force exerted on the body by gravity. On the earth's surface, the distinction is not important (on the moon, an object would have the same mass, would weigh less due to the lower gravity).

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

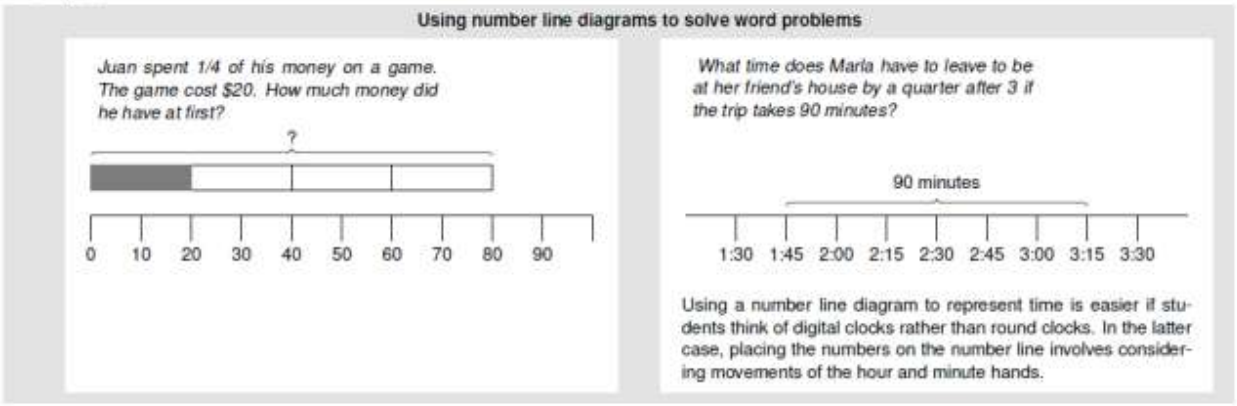
If Charlie purchased 3 quarts (6 pints) of milk there would be enough for everyone at his party to have at least one glass of milk. If each person drank 1 glass then he would have 1- 8 oz glass or 1 cup of milk left over.

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?

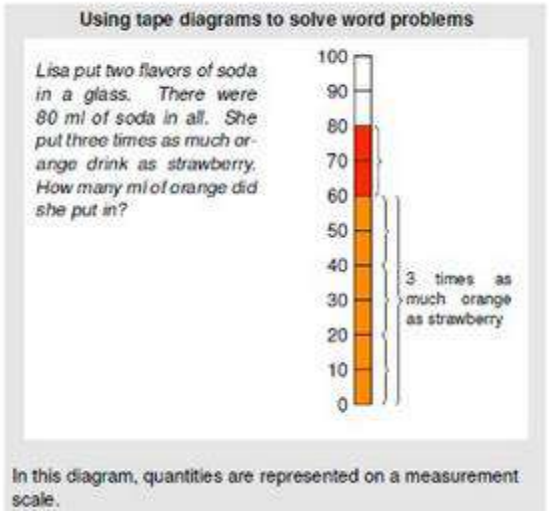
Subtraction: A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back?

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.

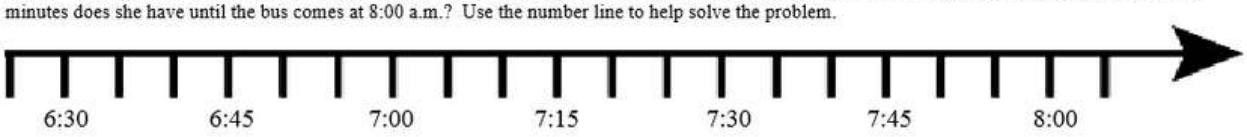


Students also combine competencies from different domains as they solve measurement problems using all four arithmetic operations, addition, subtraction, multiplication, and division. Example: "How many liters of juice does the class need to have at least 35 cups if each cup takes 225 ml?" Students may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

Example:



Example:
At 7:00 a.m. Candace wakes up to go to school. It takes her 8 minutes to shower, 9 minutes to get dressed and 17 minutes to eat breakfast. How many minutes does she have until the bus comes at 8:00 a.m.? Use the number line to help solve the problem.



4.MD.5	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured withreference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through ***n*** one-degree angles is said to have an angle measure of n degrees.

This standard brings up a connection between angles and circular measurement (360 degrees). Angle measure is a "turning point" in the study of geometry. Students often find angles and angle measure to be difficult concepts to learn, but that learning allows them to engage in interesting and important mathematics. An angle is the union of two rays, **a** and **b**, with the same initial point P. The rays can be made to coincide by rotating one to the other about P; this rotation determines the size of the angle between **a** and **b**. The rays are sometimes called the sides of the angles.

Another way of saying this is that each ray determines a direction and the angle size measures the change from one direction to the other. Angles are measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and degrees are the unit used to measure angles in elementary school. A full rotation is thus 360º

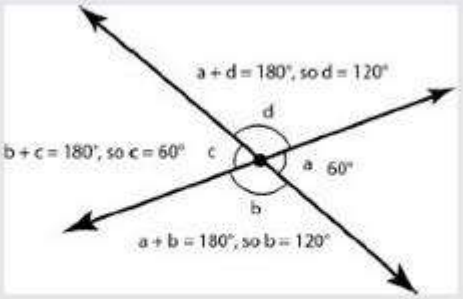
Two angles are called complementary if their measurements have the sum of 90º. Two angles are called supplementary if their measurements have the sum of 180º. Two angles with the same vertex that overlap only at a boundary (i.e., share a side) are called adjacent angles. These terms may come up in classroom discussion, they will not be tested. This concept is developed thoroughly in middle school (7th grade).

Like length, area, and volume, angle measure is additive: The sum of the measurements of adjacent angles is the measurement of the angle formed by their union. This leads to other important properties. If a right angle is decomposed into two adjacent angles, the sum is 90º, thus they are complementary. Two adjacent angles that compose a "straight angle" of 180º must be supplementary.

An angle

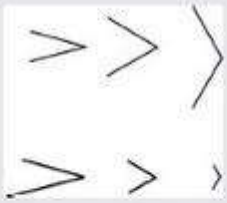
name	measurement
right angle	90°
straight angle	180°
acute angle	between 0 and 90°
obtuse angle	between 90° and 180°
reflex angle	between 180° and 360°

Angles created by the intersection of two lines



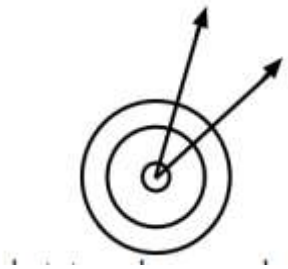
When two lines intersect, they form four angles. If the measurement of one is known (e.g., angle a is 60°), the measurement of the other three can be determined.

Two representations of three angles



Initially, some students may correctly compare angle sizes only if all the line segments are the same length (as shown in the top row). If the lengths of the line segments are different (as shown in the bottom row), these students base their judgments on the lengths of the segments, the distances between their endpoints, or even the area of the triangles determined by the drawn arms. They believe that the angles in the bottom row decrease in size from left to right, although they have, respectively, the same angle measurements as those in the top row.

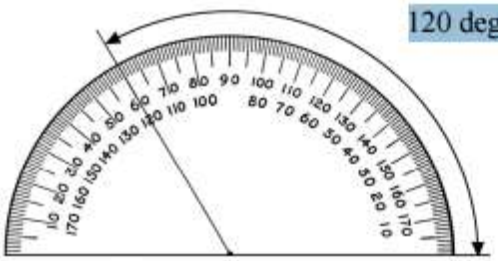
The diagram below will help students understand that an angle measurement is not related to an area since the area between the 2 rays is different for both circles yet the angle measure is the same.

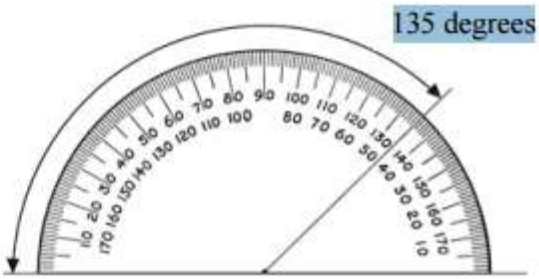


This standard calls for students to explore an angle as a series of "one-degree turns." A water sprinkler rotates one-degree at each interval. If the sprinkler rotates a total of 100º, how many one-degree turns has the sprinkler made?

4.MD.6	Measure angles in whole-number degrees using a protractor.Sketch angles of specified measure.

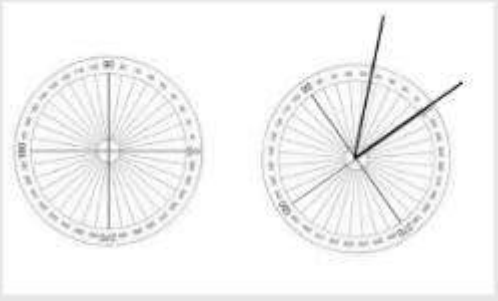
Before students begin measuring angles with protractors, they need to have some experiences with benchmark angles. They transfer their understanding that a 360º rotation about a point makes a complete circle to recognize and sketch angles that measure approximately 90º and 180º. They extend this understanding and recognize and sketch angles that measure approximately 45º and 30º. They use appropriate terminology (acute, right, and obtuse) to describe angles and rays (perpendicular). Students should measure angles and sketch angles.





As with all measureable attributes, students must first recognize the attribute of angle measure, and distinguish it from other attributes! As with other concepts students need varied examples and explicit discussions to avoid learning limited ideas about measuring angles (e.g., misconceptions that a right angle is an angle that points to the right, or two right angles represented with different orientations are not equal in measure). If examples and tasks are not varied, students can develop incomplete and inaccurate notions. For example, some come to associate all slanted lines with 45º measures and horizontal and vertical lines with measures of 90º. Others believe angles can be "read off" a protractor in "standard" position, that is, a base is horizontal, even if neither ray of the angle is horizontal. Measuring and then sketching many angles with no horizontal or vertical ray perhaps initially using circular 360º protractors can help students avoid such limited conceptions.

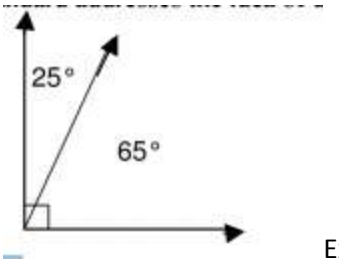
A 360° protractor and its use



The figure on the right shows a protractor being used to measure a 45° angle. The protractor is placed so that one side of the angle lies on the line corresponding to 0° on the protractor and the other side of the angle is located by a clockwise rotation from that line.

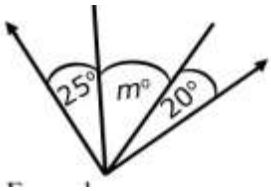
4.MD.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems,e.g., by using an equation with a symbol for the unknown angle measure.

This standard addresses the idea of decomposing (breaking apart) an angle into smaller parts.



Example: A lawn water sprinkler rotates 65 degrees and then pauses. It then rotates an additional 25 degrees. What is the total degree of the water sprinkler rotation? To cover a full 360 degrees how many times will the water sprinkler need to be moved? If the water sprinkler rotates a total of 25 degrees then pauses. How many 25 degree cycles will it go through for the rotation to reach at least 90 degrees?

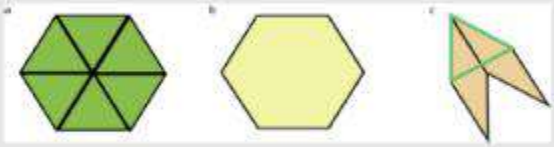
Example: If the two rays are perpendicular, what is the value of m?



Example: Joey knows that when a clock's hands are exactly on 12 and 1, the angle formed by the clock's hands measures 30º. What is the measure of the angle formed when a clock's hands are exactly on the 12 and 4?

Students can develop more accurate and useful angle and angle measure concepts if presented with angles in a variety of situations. They learn to find the common features of superficially different situations such as turns in navigation, slopes, bends, corners, and openings. With guidance, they learn to represent an angle in any of these contexts as two rays, even when both rays are not explicitly represented in the context; for example, the horizontal or vertical in situations that involve slope (e.g., roads or ramps), or the angle determined by looking up from the horizon to a tree or mountain-top. Eventually they abstract the common attributes of the situations as angles (which are represented with rays and a vertex,) and angle measurements.

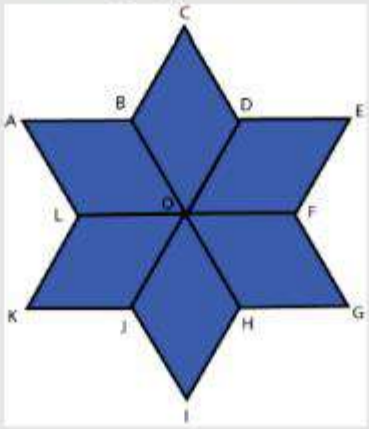
Determining angles in pattern blocks



Students might determine all the angles in the common "pattern block" shape set based on equilateral triangles. Placing six equilateral triangles so that they share a common vertex (as shown in part a), students can figure out that because the sum of the angles at this vertex is 360°, each angle which shares this vertex must have measure 60°. Because they are congruent, all the angles of the equilateral triangles must have measure 60° (again, to ensure they develop a firm foundation, students can verify these for themselves with a protractor). Because each angle of the regular hexagon (part b) is composed of two angles from equilateral triangles, the hexagon's angles each measure 120°. Similarly, in a pattern block set, two of the smaller angles from tan rhombi compose an equilateral triangle's angle, so each of the smaller rhombus angles has measure 30°.

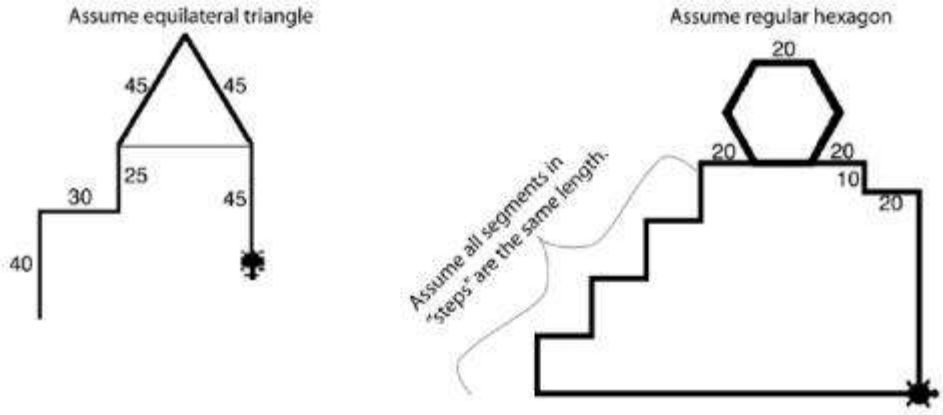
Students with an accurate conception of angle can recognize that angle measure is additive. As with length, area, and volume, when an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Students can then solve interesting and challenging addition and subtraction problems to find the measurements of unknown angles on a diagram in real world and mathematical problems. For example, they can find the measurements of angles formed a pair of intersecting lines, as illustrated above, or given a diagram showing the measurement of one angle, find the measurement of its complement. They can use a protractor to check, not to check their reasoning, but to ensure that they develop full understanding of the mathematics and mental images for important benchmark angles (e.g., 30º, 45º, 60º, and 90º).

Determining angle measurements



Students might be asked to determine the measurements of the following angles:
∠BOD
∠BOF
∠ODE
∠CDE
∠CDJ
∠BHG

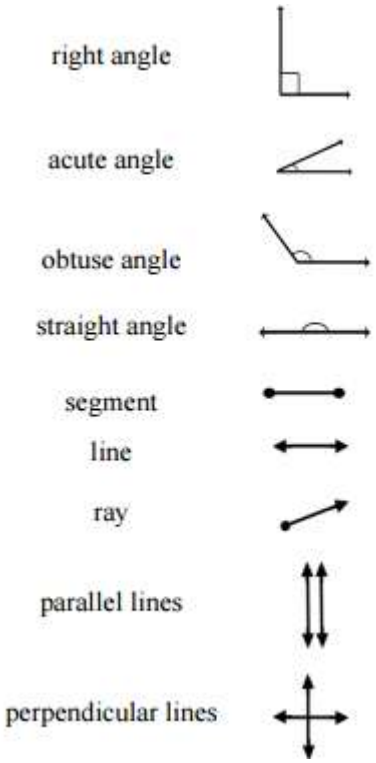
(*Progressions for the CCSSM, Geometric Measurement*, CCSS Writing Team, June 2012, page 24)



(*Progressions for the CCSSM, Geometric Measurement*, CCSS Writing Team, June 2012, page 25)

4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

This standard asks students to draw two-dimensional geometric objects and to also identify them in two dimensional figures. This is the first time that students are exposed to rays, angles, and perpendicular and parallel lines. Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. Students may not easily identify lines and rays because they are more abstract.



Student should be able to use side length to classify triangles as equilateral, equiangular, isosceles, or scalene; and can use angle size to classify them as acute, right, or obtuse. They then learn to cross-classify, for example, naming a shape as a right isosceles triangle. Thus, students develop explicit awareness of and vocabulary for many concepts they have been developing, including points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Such mathematical terms are useful in communicating geometric ideas, but more important is that constructing examples of these concepts, such as drawing angles and triangles right angle acute angle obtuse angle straight angle segment line ray parallel lines perpendicular lines that are acute, obtuse, and right, help students form richer concept images connected to verbal definitions. That is, students have more complete and accurate mental images and associated vocabulary for geometric ideas (e.g., they understand that angles can be larger than 90 and their concept images for angles include many images of such obtuse angles). Similarly, students see points and lines as abstract objects: Lines are infinite in extent and points have location but no dimension. Grids are made of points and lines and do not end at the edge of the paper.

Students also learn to apply these concepts in varied contexts. For example, they learn to represent angles that occur in various contexts as two rays, explicitly including the reference line, e.g., a horizontal or vertical line

when considering slope or a "line of sight" in turn contexts. They understand the size of the angle as a rotation of a ray on the reference line to a line depicting slope or as the "line of sight" in computer environments.

Analyzing the shapes in order to construct them requires students to explicitly formulate their ideas about the shapes. For instance, what series of commands would produce a square? How many degrees are the angles? What is the measure of the resulting angle? What would be the commands for an equilateral triangle? How many degrees are the angles? What is the measure of the resulting angle? Such experiences help students connect what are often initially isolated ideas about the concept of angle.

Example: Draw two different types of quadrilaterals that have two pairs of parallel sides? Is it possible to have an acute right triangle? Justify your reasoning using pictures and words.

Example: How many acute, obtuse and right angles are in this shape? Draw and list the properties of a parallelogram. Draw and list the properties of a rectangle. How are your drawings and lists alike? How are they different? Be ready to share your thinking with the class.

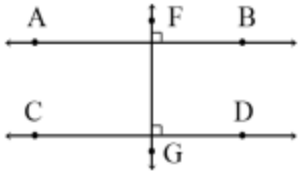
4.G.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

Two-dimensional figures may be classified using different characteristics such as, parallel or perpendicular lines or by angle measurement.

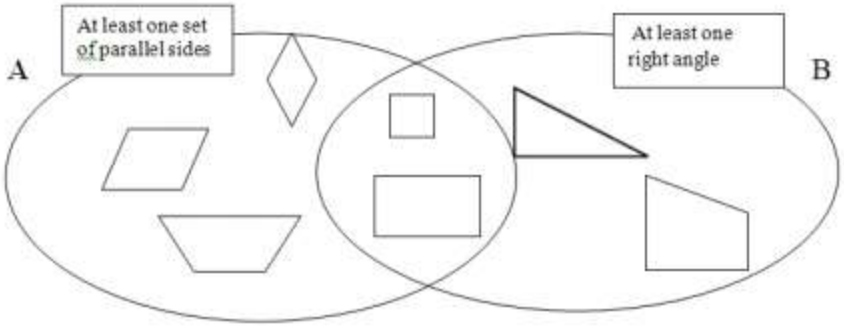
Parallel or Perpendicular Lines:

Students should become familiar with the concept of parallel and perpendicular lines. Two lines are parallel if they never intersect and are always equidistant. Two lines are perpendicular if they intersect in right angles (90º).

Students may use transparencies with lines to arrange two lines in different ways to determine that the 2 lines might intersect in one point or may never intersect. Further investigations may be initiated using geometry software. These types of explorations may lead to a discussion on angles. A kite is a quadrilateral whose four sides can be grouped into two pairs of equal-length sides that are beside (adjacent to) each other. Parallel and perpendicular lines are shown below:



This standard calls for students to sort objects based on parallelism, perpendicularity and angle types. Example: Which figure in the Venn diagram below is in the wrong place, explain how do you know?



Do you agree with the label on each of the circles in the Venn diagram above? Describe why some shapes fall in the overlapping sections of the circles. Example: Draw and name a figure that has two parallel sides and exactly 2 right angles.

Example: For each of the following, sketch an example if it is possible. If it is impossible, say so, and explain why or show a counter example.

• A parallelogram with exactly one right angle.

• An isosceles right triangle.

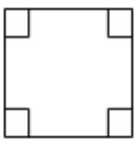
• A rectangle that is not a parallelogram. (impossible)

• Every square is a quadrilateral.

• Every trapezoid is a parallelogram.

Example: Identify which of these shapes have perpendicular or parallel sides and justify your selection.

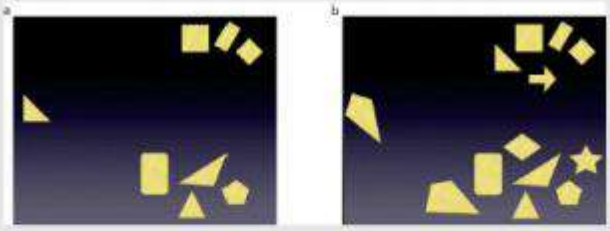
A possible justification that students might give is: The square has perpendicular lines because the sides meet at a corner, forming right angles



Angle Measurement: This expectation is closely connected to 4.MD.5, 4.MD.6, and 4.G.1. Students' experiences with drawing and identifying right, acute, and obtuse angles support them in classifying two-dimensional figures

based on specified angle measurements. They use the benchmark angles of 90°, 180°, and 360° to approximate the measurement of angles. Right triangles can be a category for classification. A right triangle has one right angle. There are different types of right triangles. An isosceles right triangle has two or more congruent sides and a scalene right triangle has no congruent sides.

Guess My Rule



Students can be shown the two groups of shapes in part a and asked "Where does the shape on the left belong?" They might surmise that it belongs with the other triangles at the bottom. When the teacher moves it to the top, students must search for a different rule that fits all the cases.

Later (part b), students may induce the rule: "Shapes with at least one right angle are at the top." Students with rich visual images of right angles and good visualization skills would conclude that the shape at the left (even though it looks vaguely like another one already at the bottom) has one right angle, thus belongs at the top.

The notion of congruence ("same size and same shape") may be part of classroom conversation but the concepts of congruence and similarity do not appear until middle school. TEACHER NOTE: In the U.S., the term "trapezoid" may have two different meanings. Research identifies these as inclusive and exclusive definitions. The inclusive definition states: A trapezoid is a quadrilateral with at least one pair of parallel sides. The exclusive definition states: A trapezoid is a quadrilateral with exactly one pair of parallel sides. With this definition, a parallelogram is not a trapezoid. North Carolina has adopted the exclusive definition.

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

21st Century Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

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
Pretest 9		½ Block	
Introduction to Chapter 9	4.G.1, 4.M.D.5, 4.M.D.6	½ Block	
9.1 Understanding Measuring Angles Day 1	4.G.1, 4.M.D.5, 4.M.D.6	1 Block	Focus on the vertex for protractor alignment
9.1 Understanding Measuring Angles Day 2	4.G.1, 4.M.D.5, 4.M.D.6	1 Block	Extended Time: Express Outer Scale one day, Inner Scale next day
9.2 Drawing angles to 180^{o} Day 1	4.G.1, 4.M.D.6	1 Block	
9.2 Drawing angles to 180^{o} Day 2	4.G.1, 4.M.D.6	1 Block	
9.3 Turns and angle Measures	4.M.D.5, 4.M.D.7	1 Block	Relate turns to the clock. Each quarter is ¼ turn.
Chapter 9 Wrap Up/Review	4.G.1, 4.M.D.5, 4.M.D.6	1 Block	Reinforce and consolidate chapter skills and concepts
Chapter Test/Review 9	4.G.1, 4.M.D.5, 4.M.D.6, 4.M.D.7	½ Block	
Mini Assessment #9	4.MD.5-7	½ Block	
Pretest 10		½ Block	
Introduction to Chapter 10		½ Block	
10.1 Drawing Perpendicular Line Segments Day 1	4.G.1, 4.G.2	1 Block	Use a protractor to assist with drawing perpendicular lines
10.1 Drawing Perpendicular Line Segments Day 2	4.G.1, 4.G.2	1 Block	
10.2 Drawing Parallel Line Segments Day 1	4.G.1, 4.G.2	1 Block	
10.2 Drawing Parallel	4.G.1, 4.G.2	1 Block	Practice drawing parallel line

Line Segments Day 2			segments through a given point.
10.3 Drawing Horizontal and Vertical Day 1	4.G.1	1 Block	Use the sun setting on the horizon to help students the difference between horizontal and vertical.
Authentic Assessment #7	4.G.1	1/2 Block	
Chapter 10 Wrap Up/Review	4.G.1, 4.G.2	1 Block	Reinforce and consolidate chapter skills and concepts
Chapter Test/Review 10	4.G.1, 4.G.2	1/2 Block	
Mini Assessment #10	4.G.1, 4.G.2	1/2 Block	
Pretest 11		½ Block	
Introduction to Chapter 11			
11.1 Squares and Rectangles Day 2	4.G.2, 4.MD.1, 4.MD.2	1 Block	
11.2 Properties of Squares and Rectangles Day 2	4.OA.3, 4.MD.1, 4.MD.2, 4.MD.7	1 Block	
Quadrilateral Lesson	3.G.A.1	1 Blocks	Please use lesson from: http://dnet01.ode.state.oh.us/ims.itemdetails/lessondetail.aspx?id=0907f84c8053226b, to complete quadrilateral understanding.
Authentic Assessment #8	4.M.D.1	¼ Block	
Chapter 11 Wrap Up/Review	4.G.2, 4.OA.3, 4.MD.1, 4.MD.2, 4.MD.7	1 Block	Reinforce and consolidate chapter skills and concepts
Chapter Test/Review 11		½ Block	
Pretest 12/Introduction		½ Block	
Introduction of Chapter 12		1 Block	
12.1 Length Day 1	4.MD.1	1 Block	
12.1 Length Day 2	4.MD.1	1 Block	
12.1 Length Day 3	4.MD.1	1 Block	Use smaller numbers to convert

			w/division
12.2 Mass, Weight, Volume Day 1	4.MD. 1	1 Block	Use each block to discuss and use manipulatives to express metric & customary units
12.2 Mass, Weight, Volume Day 2	4.MD. 1	1 Block	
12.2 Mass, Weight, Volume Day 3	4.MD. 1	1 Block	Complete Let's Practice in 2 day due to conversions
**12.3 Time	4.MD.2	2 Blocks	
**Authentic Assessment #9	4.MD.6, 4.MD.7, 4.G.1	½ Block	
**12.4 Real Life Word Problems Day 1	4. MD. 1	1 Block	
**12.4 Real Life Word Problems Day 2	4. MD. 1	1 Block	
**Chapter 12 Wrap Up/Review		½ Block	Reinforce and consolidate chapter skills and concepts
**Chapter Test/Review 12	4.MD. 1	½ Block	
**Mini Assessment #11	4.MD.1-3	½ Block	
PARCC Review		5 days	
PARCC		4 days	

**Depending on PARCC schedule may have to occur in Unit 4.

Resources for Special Needs and ELL's

Chapter 9

Additional Support

For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words, such as having students

- add terms, definitions, and examples to the Word Wall
- make a three-column chart to show turns and right angles: the fraction of a turn, the measure of the angle, and a picture of the angle
- create a poster that displays a protractor with its parts labeled
- discuss the Chapter Wrap Up, encouraging students to use the chapter vocabulary

For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- draw an angle and name it
- move bendable straws into various angles
- make angle strips
- use craft sticks to create angles

See also page 89–90.

If necessary, review Grade 3 Chapter 17 (Angles and Lines).

For Advanced Learners

See suggestions on page 96.

Chapter 10

Additional Support

For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words, such as having students

- add terms, definitions, and examples to the Word Wall
- label lines in the room with the words *horizontal* and *vertical*
- cut out pictures from magazines and create a two-sided poster to illustrate parallel and perpendicular lines
- discuss the Chapter Wrap Up, encouraging students to use the chapter vocabulary

For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- draw vertical lines
- identify parallel streets on a map
- place craft sticks parallel
- use chalk to draw perpendicular and parallel line segments

If necessary, review:

- Grade 2 Chapter 18 (Lines and Surfaces)
- Grade 3 Chapter 17 (Angles and Lines)

For Advanced Learners

See suggestions on page 122.

Chapter 11

Additional Support

For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words, such as having students

- add terms, definitions, and examples to the Word Wall
- label objects in the room with the words *square* or *rectangle* or both
- cut out pictures from magazines and create a two-sided poster to illustrate squares and rectangles
- discuss the Chapter Wrap Up, encouraging students to use the chapter vocabulary

For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- make a square on a geoboard and then change the square to a rectangle that is not a square
- cut squares and rectangles that are not squares
- sort squares and rectangles that are not square attribute pieces
- create squares and rectangles that are not squares with craft sticks

See also pages 137–138 and 141.

If necessary, review:

- Grade 3 Chapter 18 (Two-Dimensional Shapes)
- Grade 2 Chapter 19 (Shapes and Patterns)

For Advanced Learners

See suggestions on page 142–143.

Chapter 12

Additional Support

For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words, such as having students

- add vocabulary words to the student-made dictionary that includes terms, definitions, and examples organized by chapter
- create an ongoing list of the units, abbreviations, and tools that they learn in each lesson
- create tables of equivalencies as they learn how to convert units
- discuss the Chapter Wrap Up, encouraging students to use the chapter vocabulary

For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- asure classroom objects with a 12-inch ruler or 1-yard measuring tape
- weigh objects on a scale that shows ounces and pounds
- estimate length, capacity, and weight of objects using referents such as a button, a stamp, and a foot
- remind students to express the measurements that they make using the required units

If necessary, review Grade 3 Chapter 15 (Customary Length, Weight, and Capacity)

For Advanced Learners

See suggestions on pages 177–178, 181, and 191.

Math Background

During their elementary mathematics education, students were exposed to the following:

- A point, line, and line segment
- Estimated size of angles by comparing them to right angles
- Draw perpendicular lines using a square grid
- Recognize perpendicular and parallel lines
- Use protractor to draw triangles, perpendicular line segments
- Describe two-dimensional shapes by their sides and angles
- Measure length, mass, or weight, and volume in metric units
- Read and tell time to the minute

Transition Guide References:

Chapter 9:				
Transition Topic: Angles				
Grade 4 **Chapter 9** **Pre Test Items**	**Grade 4** **Chapter 9** **Pre-Test Item Objective**	**Additional Support for the Objective:** **Grade 4 Reteach**	**Additional Support for the Objective:** **Grade 4** **Extra Practice**	**Grade 3** **Teacher Edition Support**
4.G.1 Items 1-3, 7	Estimate and measure angles with a protractor Use a protractor to draw acute and obtuse angles	2B pp 113-114 4B Pg 98-101 Pg 106	2B Lesson 16.1 4B Pg 37 4B Pg 41	2B Lesson 16.3 4B Pg 87-88 4B Pg 94-95
4.MD.5 Items 4-6, 8,9	Estimate whether the measure of an angle is less than or greater than a right angle Find unknown angle measures using addition and subtraction	Pg 95-96 Pg 102-103	Pg 39 Pg 49	Pg 89-90 Pg 102-105

Chapter 10:				
Transition Topic: Perpendicular and Parallel Line Segments				
Grade 4 Chapter 10 Pre Test Items	**Grade 4 Chapter 10 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**
4.G.1 Item 4b,	Draw perpendicular line segments	Pg 109-114	Pg 53-54	Pg 117-118
4.G.1	Draw parallel line segments	Pg 115-118	Pg 55-56	Pg 121-122
4.G.1	Identify horizontal and vertical lines	Pg 119-120	Pg 57-58	Pg 125-127

Chapter 11:				
Transition Topic: Squares and Rectangles				
Grade 4 Chapters 11 Pre-Test Items	**Grade 4 Chapters 11 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**
4.G.1 Item 10-14	Apply properties of squares and rectangles	Pg 63-70	Pg 121-124	Pg 135-138, 145-147

Chapter 12:				
Transition Topic: Conversion of Measurements				
Grade 4 Chapters 12 Pre-Test Items	**Grade 4 Chapters 12 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**
4MD1 Item 1-17	Convert metric and customary units of length	2A pp.173-188 Pg 125-142	2A 8.5 , 9.3 Pg 81-87	Pg 157-163, 167-171, 179-181

PARCC Assessment Evidence/Clarification Statements

NJSLS	Evidence Statement	Clarification	Math Practices
4.MD.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g, lb, oz, l, ml, hr, min, sec. Within a single system of measurement, express measurements in a larger unit terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1,12), (2, 24)..	None	MP.5, MP.8
4.MD.2.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, in problems involving simple fractions. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	• Situations involve wholenumber measurements and require expressing measurements given in a larger unit in terms of a smaller unit. • Tasks may present numberline diagram featuring a measurement scale. • Tasks may includemeasuring distances to the nearest cm or mm. • 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 ex. 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.MD.5	Recognize angles as a geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of anglemeasurement. a) An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fractionof the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a “one-degree angle,” and can be used to measure angles.	None	MP.2

	b) An angle that turns through n one-degree angles is said to have an angle measure of n degrees.		
4.MD.6	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	none	MP.2, MP.5
4.G.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.		MP.5
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

Connections to the Mathematical Practices

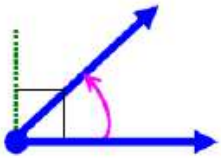
1	**Make sense of problems and persevere in solving them**
	Mathematically proficient students in grade 4 know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may 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.

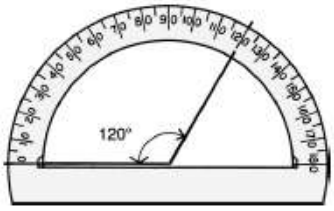
Chapter 9

acute angle



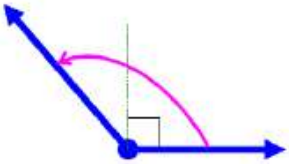
An angle with a measure less than 90°.

degree (angle measure)



A unit for measuring angles. Based on dividing one complete circle into 360 equal parts.

obtuse angle

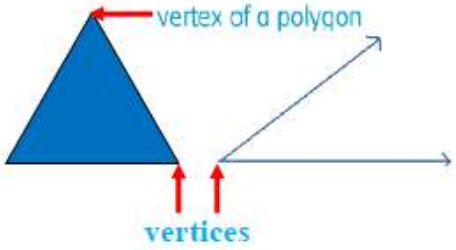
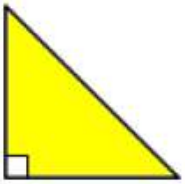
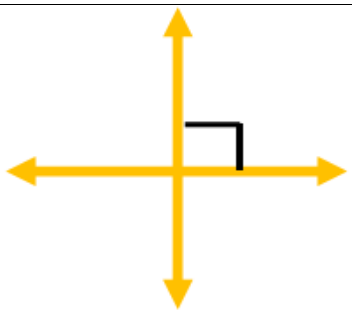


An angle with a measure greater than 90° but less than 180°.

protractor

A tool used to measure and draw angles.

Chapter 10

ray		A part of a line that has one endpoint and goes on forever in one direction.
vertex		The point at which two line segments, lines, or rays meet to form an angle.
right triangle		A triangle that has one 90° angle.
perpendicular lines		Two intersecting lines that form right angles.
parallel lines		Lines that are always the same distance apart. They do not intersect.

Chapter 11

Rectangle 

A parallelogram with opposite sides that are equal, or congruent with four right angles.

Square 

A parallelogram with 4 equal, or congruent, sides and 4 right angles.

Chapter 12

kilometer (km)

A kilometer (km) is about the length of 4 city blocks.

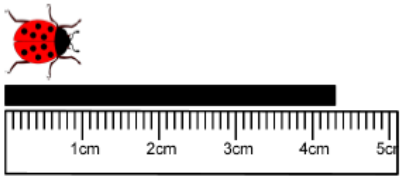
A metric unit of length equal to 1000 meters.

gram (g)

The mass of a paperclip is about 1 gram.

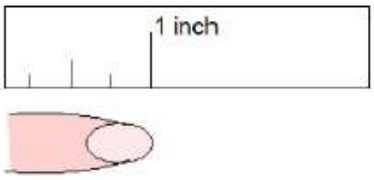
The standard unit of mass in the metric system. 1,000 grams = 1 kilogram

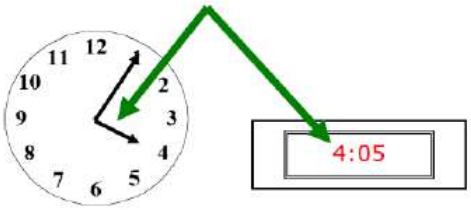
centimeter (cm)



A metric unit of length equal to 0.01 of a meter.

pound (lb)	 A loaf of bread weighs *about* 1 pound.	A customary unit of weight. 1 pound = 16 ounces.
ounce (oz)	 A strawberry weighs *about* 1 ounce.	A customary unit of weight equal to one sixteenth of a pound. 16 ounces = 1 pound.
mile	 Two times around the average roller coaster is *about* 1 mile.	A customary unit of length. 1 mile = 5,280 feet
meter (m)	 A baseball bat is *about* 1 meter long.	A standard unit of length in the metric system.
yard (yd)	 A door is *about* 1 yard wide.	A customary unit of length. 1 yard = 3 feet or 36 inches.

foot (ft)	12 inches = 1 foot 	A customary unit of length. 1 foot = 12 inches.
gram (g)	**The mass of a paperclip is about 1 gram.** 	The standard unit of mass in the metric system. 1,000 grams = 1 kilogram
kilogram (kg)	 Math book **About 2 ½ pounds**	A metric unit of mass equal to 1000 grams.
liter (L)	large bottle of soda or bottle of water  1,000 mL = 1 L	The basic unit of capacity in the metric system. 1 liter = 1,000 milliliters.
inch (in)		A customary unit of length. 12 inches = 1 foot.

minute (min)		One sixtieth of an hour or 60 seconds.
second (sec) (unit of time)	 **60 seconds = 1 minute**	One sixtieth of a minute. There are 60 seconds in a minute.
hour (hr)		A unit of time. 1 hour = 60 minutes. 24 hours = 1 day.

Potential Student Misconceptions

Chapter 9

- Students may struggle with naming angles. Draw an angle on the board and label it.
- Students are confused to which number to use when determining the measure of an angle using a protractor.
- Students should compare angles to the benchmark of 90 degrees or right angles.
- Students may not use their angle strips correctly.

Chapter 10

- Students may not find 90 degree on their protractor, so the line they draw will not be perpendicular.
- Students may have difficulty setting up their drawing triangle and straightedge. Remind the students to place the drawing triangle with the right angle on the line segment and the straightedge along the base of the drawing triangle.
- Students confuse the term horizontal and vertical. The sun setting is on the horizon to remember horizontal vs vertical.

Chapter 11

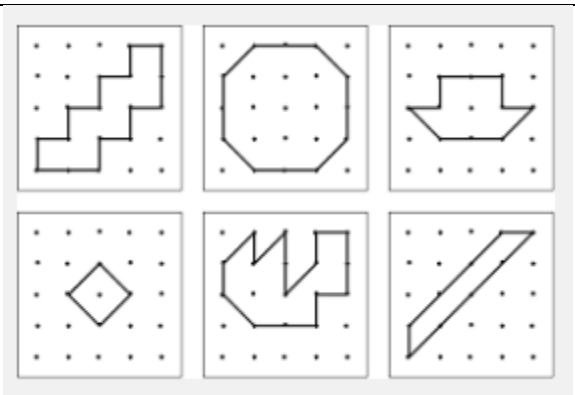
- Students may have difficulty deciding how to decompose figures into squares and rectangles that are not squares.
- Students may have difficulty subtracting. Encourage students to check subtraction with addition.

Chapter 12

- Students believe that larger units will give the larger measure.
- Students should be given multiple opportunities to measure the same object with different measuring units.
- Students should notice it takes fewer yard sticks to measure the room than rulers or tiles.
- Students have trouble converting from meters to centimeters, have them write steps.

Teaching Multiple Representations

Multiple Representations Framework

Geoboards	 Build polygons, quadrilaterals, rectangles, and squares
Exploragons	 Measure Angles

Assessment Framework

Unit 2 Assessment / Authentic Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded**
Pre Test 9		30 mins	Individual	N/G
Chapter Test/Review 9	4.M.D.5, 6, 7; 4.G.1	1 Block	Individual	Y/G
Mini Assessment #9	4. M.D. 5 - 7	½ Block	Individual	Y/G
Pre Test 10		30 mins	Individual	N/G
Authentic Assessment #7	4.G.1	½ block	Individual	Y/G
Chapter Test/Review *10*	4.G.1; 4.G.2	1 Block	Individual	Y/G
Rubric Project- Design a city	4.M.D. 5; 4.G.1, 2	2 Blocks	Pairs	Y/G
Mini Assessment #10	4.G.1-2	½ Block	Individual	Y/G
Pre Test 11		30 mins	Individual	N/G
Authentic Assessment #8	4.MD.1	½ Block	Individual	Y/G
Test Prep 11	4.O.A.3; 4.M.D.2.5,6,7	1 Block	Individual	Y/G
Pre Test 12		30 mins	Individual	N/G
Authentic Assessment #9	4.MD.6, 4.MD.7, 4.G.1	½ Block	Individual	Y/G
Test Prep 12	4.M.D.1,	1 Block	Individual	Y/G
Rubric Project	4.M.D.1	2 Blocks	Individual	Y/G
Mini Assessment #11	4.M.D. 1-3	½ Block	Individual	Y/G

Got It Evidence shows that the student essentially has the target concept or big math idea.		Not There Yet Student shows evidence of a major misunderstanding, incorrect concept or procedure, or a failure to engage in the task.		
PLD Level 5: 100% Distinguished Command	PLD Level 4: 89% Strong Command	PLD Level 3: 79% Moderate Command	PLD Level 2: 69% Partial Command	PLD Level 1: 59% Little Command
Clearly constructs and communicates a complete response based on explanations/reasoning using the: • **properties of operations** • **relationship between addition and subtraction** • **understanding of base ten system** • **grade appropriate strategies** • **precise use of math vocabulary** **Response includes an efficient and logical progression of mathematical reasoning and understanding.**	Clearly constructs and communicates a complete response based on explanations/reasoning using the: • properties of operations • relationship between addition and subtraction • understanding of base ten system • grade appropriate strategies • use of math vocabulary Response includes a logical progression of mathematical reasoning and understanding.	Constructs and communicates a complete response based on explanations/reasoning using the: • properties of operations • relationship between addition and subtraction • understanding of base ten system • grade appropriate strategies Response includes a logical but incomplete progression of mathematical reasoning and understanding. Contains minor errors.	Constructs and communicates an incomplete response based on student's attempts of explanations/reasoning using the: • properties of operations • relationship between addition and subtraction • understanding of base ten system • grade appropriate strategies Response includes an incomplete or Illogical progression of mathematical reasoning and understanding.	The student work shows little understanding of the mathematics. Student attempts to constructs and communicates an a response using the: • properties of operations • relationship between addition and subtraction • understanding of base ten system • grade appropriate strategies Response includes limited evidence of the progression of mathematical reasoning and understanding.
5 points	4 points	3points	2 points	1 point

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

Performance Tasks – Authentic Assessments #7

4th Grade Authentic Assessment # 8: The Geometry of Letters

Letters can be thought of as geometric figures.

a. How many line segments are needed to make the letter A? How many angles are there? Are they acute, obtuse, or right angles? Are any of the line segments perpendicular? Are any of the line segments parallel?

b. We can build all of these letters from line segments and arcs of circles. Build all of the capital letters with the smallest number of "pieces," where each piece is either a line segment or an arc of a circle.

c. Which letters have perpendicular line segments?

d. Which letters have parallel line segments?

e. Which letters have no line segments?

f. Do any letters contain both parallel and perpendicular lines?

g. What makes the lower case letters "i" and "j" different than all of the capital letters?

Authentic Assessment #8 Scoring Rubric: The Geometry of Letters

NJSLS.MATH.CONTENT.4.G.1

Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Mathematical Practices: 1 and 4

SOLUTION:

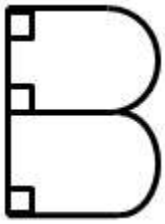
a. The letter A is composed of 3 line segments which meet in three places and form 5 angles less than 180 degrees. Three of these angles are acute, and two are obtuse. Note that students might also count angles that are greater than 180 degrees, so it is important for students to explicitly identify the angles they see. For example, a student might see an angle greater than 180 degrees at the top of the letter A. Alternatively, the a student might see the letter A as being composed of 5 line segments and see two straight-angles on the sides of the letter A where the horizontal segment meets them. Of course, this isn't the smallest number of pieces needed to build the letter A, but it is a correct decomposition and analysis of it. None of the line segments are perpendicular or parallel.

b. The hardest ones are the ones composed of both segments and curves. B can be made from 4 segments and two semi-circles, for example:

c. These letters have perpendicular line segments:B, D, E, F, H, L, P, R, T

For example, Here is an analysis of the letter B which is composed of 4 line segments (three of

which are parallel to each other and are all perpendicular to the fourth) and two arcs of a circle:



d. These letters have parallel line segments: B, D, E, F, H, M, N, R, U, Z

e. These letters have no line segments: C, O, S. Depending on the font (or your handwriting), Q might or might not contain a line segment.

f. These letters have both parallel and perpendicular line segments: B, D, E, F, H, R

g. The lower case letters "i" and "j" are different than all of the capital letters because they are disconnected. That is, they are made out of pieces that don't touch.

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Student correctly answers all parts and clearly constructs and communicates a complete response based on explanations/reasoning using : • Points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes an **efficient** and logical progression of steps.	Student correctly answers 5-6 parts and clearly constructs and communicates a complete response based on explanations/reasoning using: • Points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes a **logical** progression of steps	Student correctly answers 3-4 parts and constructs and communicates a complete response based on explanations/reasoning using: • Points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Student correctly answers 1-2 parts and constructs and communicates an incomplete response based on explanations/reasoning using: • Points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification or correctly answers less than one part.

Performance Tasks – Authentic Assessments #8

4th Grade Authentic Assessment # 9: Who is the tallest?

Mr. Liu asked the students in his fourth grade class to measure their heights. Here are some of the heights they recorded:

Student	Height
Sarah	50 inches
Jake	$4\frac{1}{4}$ feet
Andy	$1\frac{1}{2}$ yards
Emily	4 feet and 4 inches

List the four students from tallest to shortest.

Authentic Assessment #8 Scoring Rubric: Who is the tallest?

NJSLS.MATH.CONTENT.4.MD.1

Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

Mathematical Practices: 1 and 2

SOLUTION:

To compare the measurements we convert them to inches. For this we need to know that there are 12 inches in a foot and 3 feet in a yard. So there are $3\times12=36$ inches in a yard.

Sarah's height is already in inches. Jake's height is $4\frac{1}{4}$ feet. This is the same as $4+\frac{1}{4}$ feet.

Since there are 12 inches in a foot, there are $4\times12=48$ inches in 4 feet, and 3 inches in a a $\frac{1}{4}$ foot. So Jake's height in inches is $48+3=51$ inches.

For Andy we have seen that there are 36 inches in a yard, so there are 18 inches in half a yard, so in inches Andy's height is $36+18=54$.

Finally Emily is 4 feet and 4 inches tall. There are $4\times12=48$ inches in 4 feet, so Emily is $48+4=52$ inches tall.

The table shows all the heights in inches, in decreasing order.

Student	**Height in Inches**
Andy	54
Emily	52
Jake	51

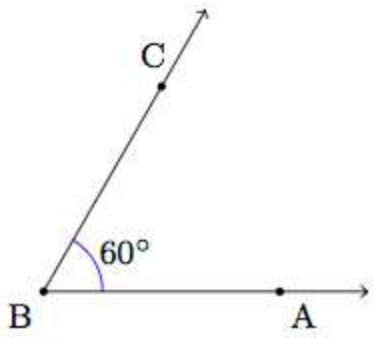
Sarah	50

Level 5: Distinguished Command	Level 4: Strong Command	Level 3: Moderate Command	Level 2: Partial Command	Level 1: No Command
Student correctly answers all parts and clearly constructs and communicates a complete response based on explanations/reasoning using : • Relative sizes of measurement units within one system of units Response includes an **efficient** and logical progression of steps.	Student correctly answers all parts with minor calculation errors and clearly constructs and communicates a complete response based on explanations/reasoning using: • Relative sizes of measurement units within one system of units Response includes a **logical** progression of steps	Student has one or two mistakes in ordering which was a result of a calculation error and communicates a complete response based on explanations/reasoning using: • Relative sizes of measurement units within one system of units Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	Student has more than two or more mistakes in ordering which was a result of a conceptual error and communicates an incomplete response based on explanations/reasoning using: • Relative sizes of measurement units within one system of units Response includes an **incomplete or Illogical** progression of steps.	The student shows no work or justification.

Performance Tasks – Authentic Assessments

4th Grade Authentic Assessment # 9: Measuring Angles

A. Draw an angle that measures 60 degrees like the one shown here:



B. Draw another angle that measures 25 degrees. It should have the same vertex and share side $\overrightarrow{BA}$.

C. How many angles are there in the figure you drew? What are their measures?

D. Make a copy of your 60 degree angle. Draw a different angle that measures 25 degrees and has the same vertex and also shares side $\overrightarrow{BA}$.

E. How many angles are there in the figure you drew? What are their measures?

Authentic Assessment #9 Scoring Rubric: Measuring Angles

NJSLS.MATH.CONTENT.4.MD.6

Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

NJSLS.MATH.CONTENT.4.MD.7

Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

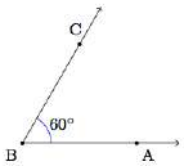
NJSLS.MATH.CONTENT.4.G.1

Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

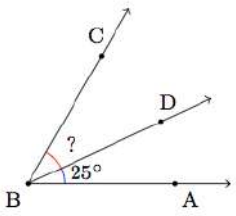
Mathematical Practices: 1 and 5

SOLUTION:

a. Here is an angle, labelled $\angle ABC$, whose measure is 60°:



b.Here is a picture of an angle, labelled $\angle ABD$, measuring 25° and sharing ray BA with $\angle ABC$:



c.The picture above has three angles. There is the original $\angle ABC$which measures 60°. There

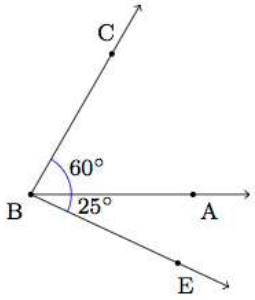
is $\angle ABD$ which we added and it measures $25\circ$. The third angle, $\angle CBD$, makes up $\angle ABC$ together with $\angle ABD$. This means that

$$\angle CBD+\angle ABD=\angle ABC.$$

e know that $\angle ABD=25\circ$ and $\angle ABC=60\circ$ so

$$\angle CBD=60\circ-25\circ=35\circ.$$

d.We can also make a $25\circ$ angle with ray BA as pictured below (we labelled the fourth point E to distinguish it from the point D in the previous picture):



e.In this picture we again have $\angle ABC$ whose measure is $60\circ$. We have $\angle ABE$ whose measure is $25\circ$. Finally, there is $\angle CBE$ which is made up of $\angle ABE$ and $\angle ABC$ so

$$\angle CBE=25\circ+60\circ=85\circ.$$

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Student correctly answers all parts and clearly constructs and communicates a complete response based on explanations/reasoning using : • Angle measures, the additive nature of angle measures, points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes an	Student correctly answers four parts with minor errors and clearly constructs and communicates a complete response based on explanations/reasoning using: • Angle measures, the additive nature of angle measures, points, lines, line segments,	Student has two mistakes and communicates a complete response based on explanations/reasoning using: • Angle measures, the additive nature of angle measures, points, lines, line segments, rays, angles (right, acute,	Student has more than two which was a result of a conceptual error and communicates an incomplete response based on explanations/reasoning using: • Angle measures, the additive nature of angle measures, points, lines, line segments,	The student shows no work or justification.

efficient and logical progression of steps.	rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes a **logical** progression of steps	obtuse), and perpendicular and parallel lines Response includes a **logical but incomplete** progression of steps. Minor calculation errors.	rays, angles (right, acute, obtuse), and perpendicular and parallel lines Response includes an **incomplete or Illogical** progression of steps.	

Supplemental Material: 4.MD.3

Task:

Karl's rectangular vegetable garden is 20 feet by 45 feet, and Makenna's is 25 feet by 40 feet. Whose garden is larger in area?

Solution: 1

We multiply the length and the width to find the area of each rectangular garden. Since

$$20 \times 45 = 900$$

we have that Karl's garden is 900 square feet.

We also know that

$$25 \times 40 = 1,000$$

so Makenna's garden is 1,000 square feet.

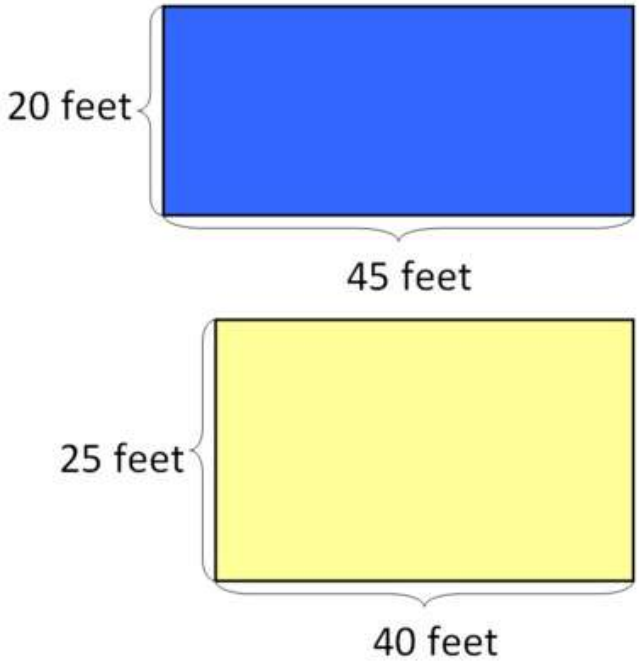
Finally, we can find the difference of the two areas

$$1,000 - 900 = 100$$

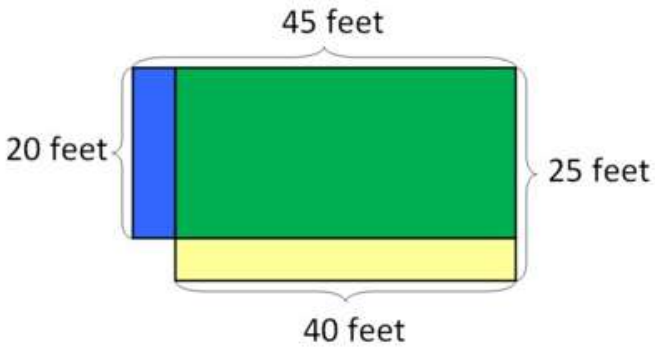
and we see that Makenna's garden is larger by 100 square feet.

Solution: With pictures

If we draw pictures to scale, we can see this difference visually. First, draw the two rectangles to represent the two gardens; the blue rectangle represents Karl's garden and the yellow rectangle represents Makenna's garden:



Now, draw them overlapping. In the picture below, the green region shows where the rectangles overlap, the blue strip on the left shows the part of the blue rectangle that is not overlapped by the yellow rectangle, and the yellow strip on the bottom shows the part of the yellow rectangle that is not overlapped by the blue rectangle:



Note that the blue strip is 20 feet by 5 feet and has an area of 100 square feet. The yellow strip is 40 feet by 5 feet and has an area of 200 square feet. Since

$$200 - 100 = 100$$

we have that Makenna's garden is 100 square feet larger than Karl's garden.

If students happen to display the misconception mentioned in the commentary, then these pictures could be used to help them understand why the areas are not equal.

Quadrilateral Lesson

Lesson Summary:

In this lesson, students learn to compare and analyze the attributes of quadrilaterals. Students use attributes to sort and identify specific classes and hierarchy of quadrilaterals. Graphic organizers assist students in categorizing and comparing quadrilaterals. Working with partners, students have opportunities to discuss concepts and use mathematical vocabulary to communicate understanding.

Commentary:

Students typically enter fourth grade able to identify several shapes. Identifying shapes, however, does not provide sufficient foundations for the higher levels of reasoning required in later grades. Instruction in identifying specific classes of quadrilaterals and in understanding the hierarchy of quadrilaterals does help students move to a higher level of reasoning about two-dimensional figures (NRC, 2001).

There are two viewpoints for how a trapezoid is defined. The commonly accepted definition is "a quadrilateral with exactly one set of parallel lines." The alternative definition is "a quadrilateral with at least one set of parallel lines." This lesson uses the commonly accepted definition of a trapezoid. If using the alternative definition, make appropriate adjustments throughout the lesson.

Scoring Guidelines:

Informally assess the students' responses. Possible responses include:

- names of quadrilaterals (square, rectangle, rhombus, parallelogram and trapezoid) and if they know
- quantitative descriptions such as the number of sides and vertices
- qualitative descriptions such as types of angles (acute, right, obtuse) and line relationships (**parallel or perpendicular**)

Post-Assessment:

Use Attachment A, *QuadrilateralPost-Assessment.* Given aword bank of quadrilaterals, students select two figures to compare and contrast in a Venn diagram. Students then select two different quadrilaterals to compare and contrast in a table.

Scoring Guidelines:

Assess the diagram and chart for accuracy. Responses should indicate relationships among the quadrilaterals using attributes and recognizing hierarchy. For example, if the student chooses to compare the square and the rhombus with a Venn diagram, all attributes of the square should be contained in the intersection of the two squares. Attributes of squares should not be written outside of the intersection, because a square is a rhombus with four right angles.

Instructional Procedures:

Part One

1. Distribute *Attributes of Quadrilaterals*, Attachment B and *Quadrilateral Cards*, Attachment C to pairs of students and have students cut out the twelve cards.
2. Use the information about quadrilaterals in the pre-assessment and observations students make using the cards to complete the first column, Quadrilaterals, on *Attributes of Quadrilaterals*, Attachment B. Depending on depth of prior knowledge, as revealed in pre-assessment, choose to have partners complete the column or complete the column as a class.
3. Have students sort the cards by the shapes at the top of *Attributes of Quadrilaterals*, Attachment B. Observe students as they sort the cards and provide assistance as needed.
4. Have students complete the chart together, using what they know about the shapes and the cards.
5. Complete a class chart on the overhead and allow students to make changes to their own charts. An example of a completed chart is provided on page two of *Attributes of Quadrilaterals*, Attachment B.
6. Have partners sort the shapes using different attributes. They may choose to use the attributes listed on *Attributes of Quadrilaterals*, Attachment B. Then, select students to share the attribute they used to sort the shapes and present the sorting to the class.
7. Have students store their shape cards in re-sealable bags for the next lesson.

Part Two

8. Have students take out the shape cards and *Attributes of Quadrilaterals*, Attachment B.
9. Have the students use the chart to compare the quadrilaterals. Have them create a list of attributes shapes share. For example: All sides of the square and rhombus are congruent.
10. Select students to share their comparison statements with the class.

11. Explain to students that by sorting shapes additional comparisons can be made and relationships among the shapes can be revealed.

12. Have the class sort the shapes into two categories, shapes with parallel sides and shapes without parallel sides.

13. Observe students as they sort the shapes and assist as necessary. Reinforce the concept of parallel lines.

14. Select students to present the sorting and allow other students to provide feedback.

15. Direct the students to the pile of shapes with parallel sides. Have pairs sort the shapes into two piles, shapes with one set of parallel sides and shapes with two sets of parallel sides. Observe students as they sort and provide assistance as necessary.

16. Select students to present the sorted shapes. Have students identify the names of the shapes in each pile.

17. Explain to the students that trapezoids have at least one set of parallel sides and that parallelograms have two sets of parallel sides. Ask students to identify the shapes in the parallelogram pile. Tell students that squares, rectangles and rhombi are special parallelograms.

18. Have partners sort the parallelograms by angle measure, shapes with right angles and shapes without right angles. Observe how pairs sort the shapes and provide assistance as needed.

19. Have students identify the shapes in each pile. Ask students questions about the relationships.

    - What do squares and rectangles have in common? (four right angles)
    - How are the rectangles and squares on the cards different? (lengths of sides)
    - Can a square be described as a rectangle? Why? (A square is a special rectangle with four congruent sides.)

20. Have students compare a rhombus and a square. Ask questions and allow pairs to discuss before selecting students to respond. Questions for discussion include:

    - How are the square and rhombus alike?
    - How are the rhombi and squares on the cards different?
    - Can a square be described as a rhombus? Why? (A square is a special rhombus with four right angles.)

21. Summarize the relationships visually using a graphic organizer. *Quadrilateral Relationships*, Attachment D is an example of an appropriate organizer. Distribute to the students and complete the organizer together. Encourage students to use the shape cards to re-sort the shapes with the attributes used during the lesson.

Instructional Tips:

- In the following days, have students share the graphic organizer and write comparisons of the quadrilaterals.
- For morning work or problem of the day, present prompts for students to respond, about quadrilateral relationships. Prompts may include:
  1. All squares are rectangles, but not all rectangles are squares. Why?
  2. All squares are rhombi, but not all rhombi are squares. Why?
  3. Squares, rectangles and rhombi are parallelograms. Why?

Differentiated Instructional Support:

Instruction is differentiated according to learner needs, to help all learners either meet the intent of the specified indicator(s) or, if the indicator is already met, to advance beyond the specified indicator(s).

- Use two-dimensional manipulatives or geo-boards to investigate the properties, make conjectures and draw conclusions on quadrilaterals.
- Provide students with a dichotomous key to use as a guide in classifying the shapes.
- Have students create a game board using the two-dimensional shapes with game cards asking questions identifying the shapes, and stating questions with answers on their similarities and differences. Such questions may be: How is a square similar to a rectangle? How is a rhombus like a parallelogram? Why does a trapezoid not fit in with the parallelogram, rectangle, rhombus, and square?

Extensions:

- Make a class dictionary on the quadrilaterals and the vocabulary terms studied.
- Provide students with shapes that include polygons other than quadrilaterals such as pentagons, hexagons and different kinds of triangles. Place shapes in an envelope. Have students sort them into 2 groups and explain why some shapes fit in one group and why others are left out of that group. Have students sort two to three times.

Home Connections:

- Assign an interdisciplinary activity. Assign homework where the student will draw a design or creature with the shapes: trapezoid, parallelogram, rectangle, rhombus, and a square. When the student returns his creative quadrilateral creature, provide them with an overhead transparency to draw a habitat for the creature. Place the overhead transparency over top of the creature or animal and share during Science class.
- Have the students communicate with their families the similarities and differences of quadrilaterals: trapezoid, parallelogram, rectangle, the rhombus and square.
- Have students build models of quadrilaterals out of household materials such as toothpicks, cotton swabs, spaghetti, and pieces of yarn or string. Include a writing portion of the assignment in which students describe the quadrilateral.

Materials and Resources:

*For the teacher:*chart paper, markers, and overhead transparencies

*For the student:*re-sealable plastic bags

Vocabulary:

- parallel lines
- parallelogram
- quadrilateral
- rhombus
- trapezoid

Attachment A

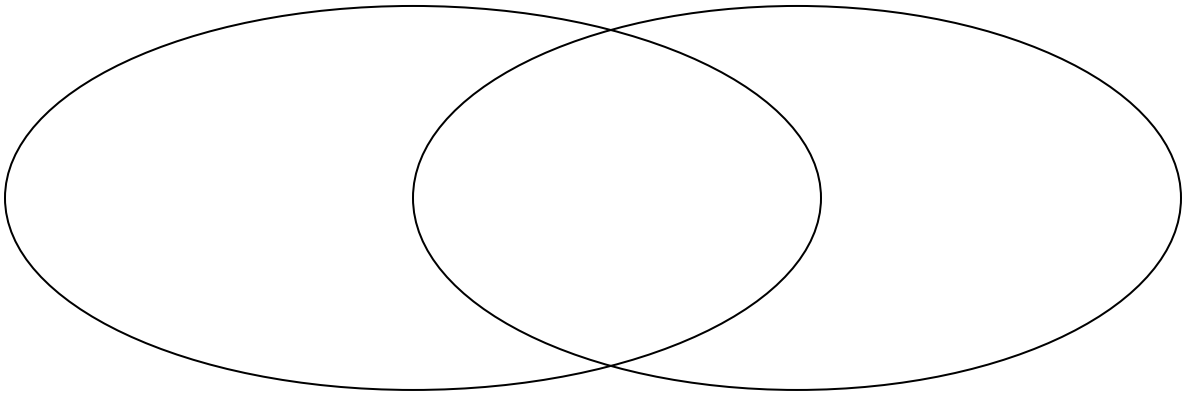
Quadrilateral Post-Assessment

Name _____Date_____

Word Bank
Parallelogram Rectangle Rhombus Square Trapezoid

Directions: From the list of quadrilaterals, select two. Use the Venn Diagram to compare and contrast them. List at least two similarities and two differences for each.

Name of Quadrilateral 1_____ Name of Quadrilateral 2_____



Directions: Complete this activity again using two different quadrilaterals. Use the table to compare and contrast them. List at least two similarities and two differences for each.

Name of Quadrilateral 3_____ Name of Quadrilateral 4_____

Common Characteristics	Different Characteristics

Attachment B

Attributes of Quadrilaterals

Attributes of Shapes	**Quadrilateral**	**Square**	**Rectangle**	**Rhombus**	**Trapezoid**	**Parallelogram**
Number of sides						
Number of angles						
Congruent sides						
Congruent angles						
Right angles						

Parallel sides						
Symmetry						
Congruent angles						

Attachment B (continued)

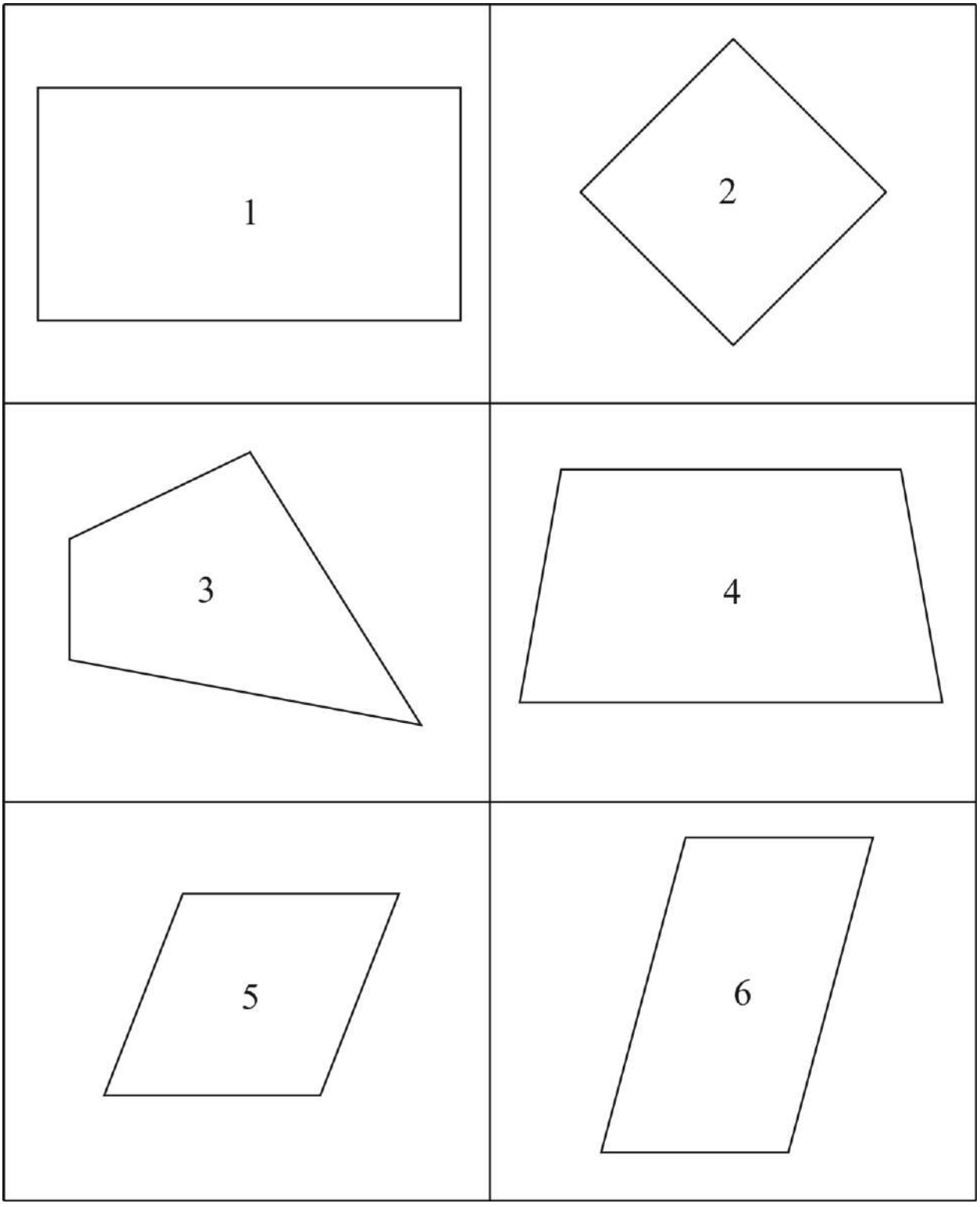
Attributes of Quadrilaterals

Attributes of Shapes	**Quadrilateral**	**Square**	**Rectangle**	**Rhombus**	**Trapezoid**	**Parallelogram**
Number of sides	4	4	4	4	4	4
Number of angles	4	4	4	4	4	4
Congruent sides	Does not have to have congruent sides	All sides are congruent	Opposite sides are congruent	All sides are congruent	Does not have to have congruent sides	Opposite sides are congruent
Congruent angles	Does not have to have congruent angles	All angles are congruent	All angles are congruent	Opposite angles are congruent	Does not have to have congruent angles	Opposite angles are congruent
Right angles	Does not have to have a right angle	All angles are right angles	All angles are right angles	Does not have to have right angles	Does not have to have right angles	Does not have to have right angles

Parallel sides	Does not have to have parallel sides	Opposite sides are parallel	Opposite sides are parallel	Opposite sides are parallel	At least one set of opposite sides are parallel	Opposite sides are parallel
Symmetry	Does not have to have symmetry	Has four lines of symmetry	Has at least two lines of symmetry	Has at least two lines of symmetry	Does not have to have a line of symmetry	Does not have to have symmetry
Congruent angles	Does not have to have congruent angles	All angles are congruent	All angles are congruent	Opposite angles are congruent	Does not have to have congruent angles	Opposite angles are congruent

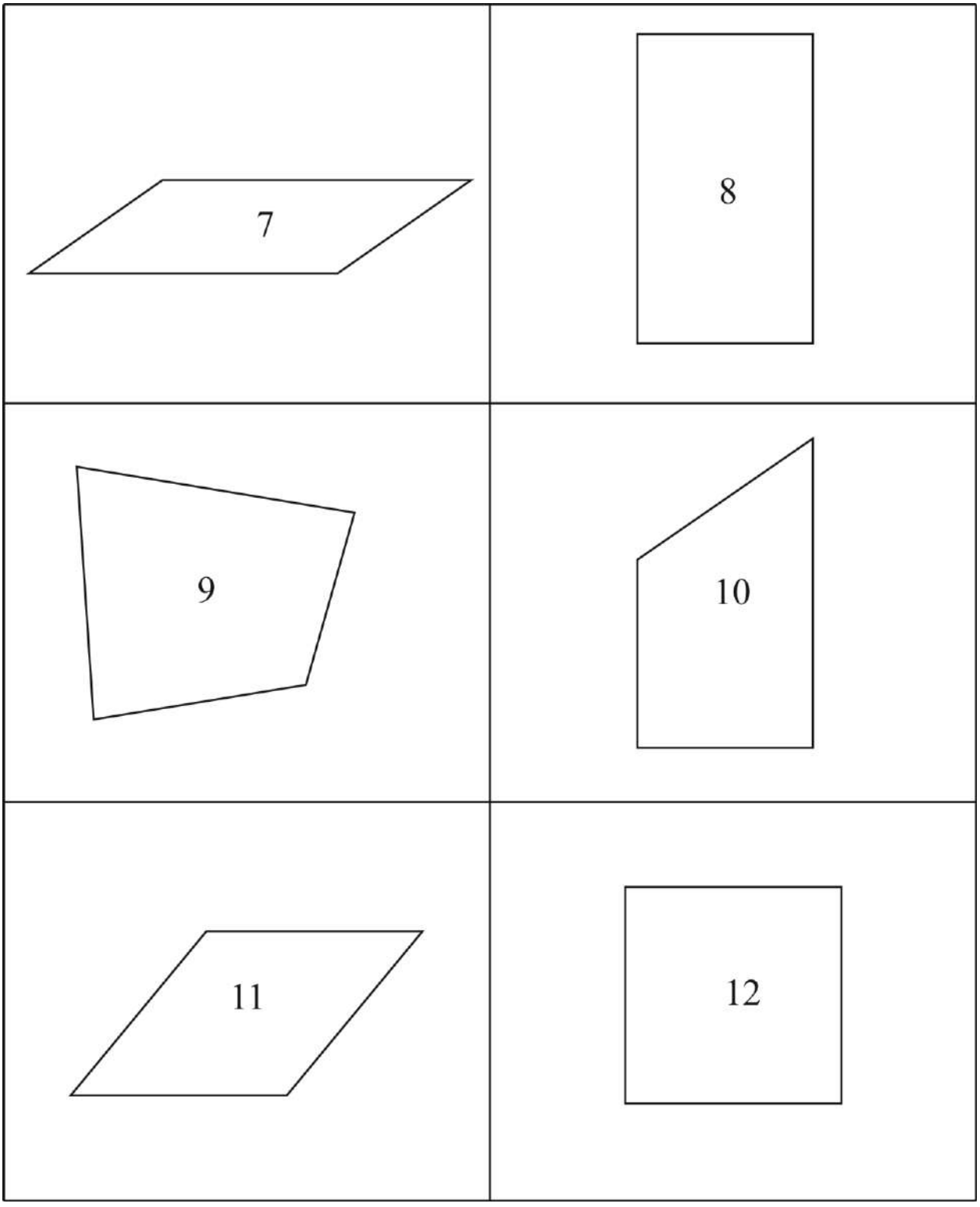
Attachment C

Quadrilateral Shapes



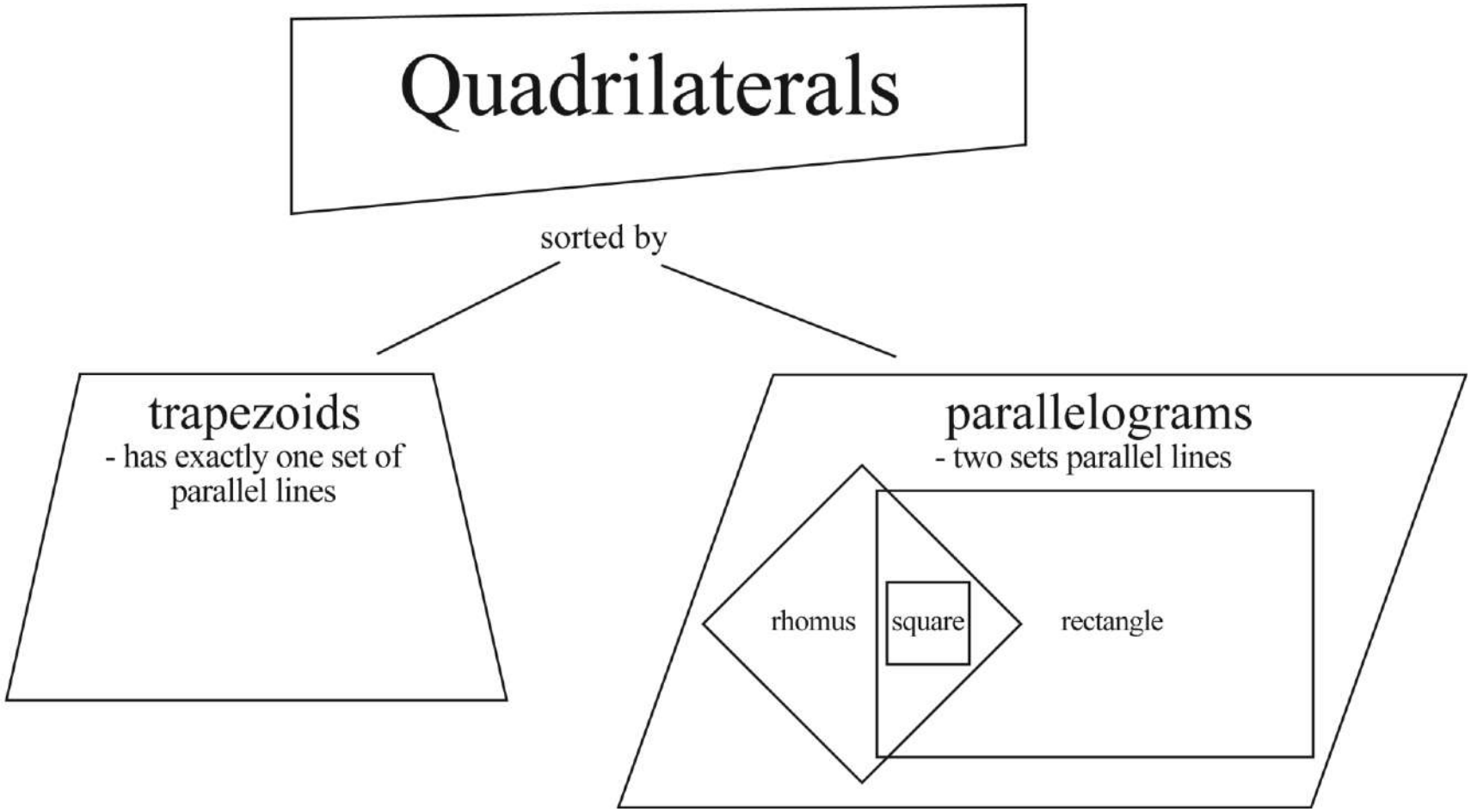
Attachment C (continued)

Quadrilateral Cards

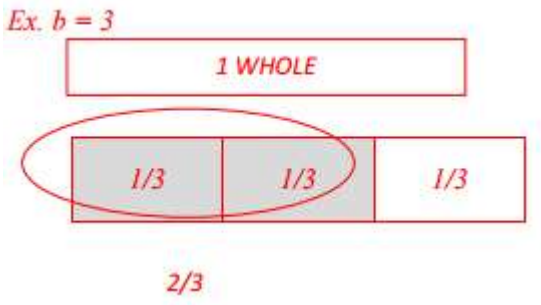


Attachment D

Quadrilateral Relationships



Unit 3: Marking Period 3: January 29 – April 8

Grade level	Standard	Revised Standard
3	3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.	3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as 5 × 7.
3	3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.	3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.
3	3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b	3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. 
3	3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by	3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and

	defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. *Ex. $a = 4$; $b = 7$* 
3	3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).
4	4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two - column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),	4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...
5	5.MD.5b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems	5.MD.5b Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems
5	5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.