



Grade 4 - Unit F - Measurement and Geometry

Unit Focus

The unit begins developing an understanding of units of measurement for length, capacity and mass in both the customary and metric systems. Students also explore converting units of measurement within the same system primarily using ratio tables. They also solve elapsed time problems and expanded their knowledge of time to the second level. Determining measurements such as perimeter, area, and angle measurement are introduced. After exploring measurement units, students are given opportunities to compare, analyze, classify, and measure polygons and angles. They develop understanding of numerous properties of shapes, including symmetry, congruence, parallel and perpendicular sides. The purpose of this unit is to deepen their thinking from visualization and analysis stages to that of informal deduction, or "if-then" reasoning.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Standards - Common Core - Mathematics: 4 - Solve problems involving measurement and conversion of measurements. - 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), ... (CCSS.MATH.CONTENT.4.MD.A.1) - 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. (CCSS.MATH.CONTENT.4.MD.A.2) - Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor. (CCSS.MATH.CONTENT.4.MD.A.3) - Represent and interpret data. - Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. (CCSS.MATH.CONTENT.4.MD.B.4)	<i>Students will be able to independently use their learning to...</i> T1 Construct viable arguments using clear and appropriate mathematical language and critique the reasoning of others. T2 Apply models to solve problems. T3 Choose appropriate tools to make reaching solutions more efficient, accessible and accurate.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Mathematicians construct viable arguments to explain problems, solutions, and mathematical representations. U2 Mathematicians create or use models to generalize, represent, and solve problems. U3 Mathematicians strategically use different tools to build conceptual knowledge or solve problems.	<i>Students will keep considering...</i> Q1 What model best represents this problem? Q2 What tool is most effective and efficient? Q3 Have I sufficiently supported my answer and shown my work? Q4 How can I strengthen my argument and reasoning? Q5 Why do we classify geometric shapes and objects?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 the relative size of measurement units within customary or metric system	<i>Students will be skilled at...</i> S1 convert units of measurement within customary or metric system using a ratio table.

Stage 1: Desired Results - Key Understandings

- Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: *(CCSS.MATH.CONTENT.4.MD.C.5)*
- An angle is 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 $\frac{1}{360}$ of a circle is called a one-degree angle, and can be used to measure angles. *(CCSS.MATH.CONTENT.4.MD.C.5A)*
- An angle that turns through n one-degree angles is said to have an angle measure of n degrees. *(CCSS.MATH.CONTENT.4.MD.C.5B)*
- Geometric measurement: understand concepts of angle and measure angles.
- Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. *(CCSS.MATH.CONTENT.4.MD.C.6)*
- 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. *(CCSS.MATH.CONTENT.4.MD.C.7)*
- Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
- Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. *(CCSS.MATH.CONTENT.4.GA.1)*
- 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. *(CCSS.MATH.CONTENT.4.GA.2)*
- Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. *(CCSS.MATH.CONTENT.4.GA.3)*
- Mathematical Practices
- Construct viable arguments and critique the reasoning of others. *(CCSS.MATH.MP.3)*
- Model with mathematics. *(CCSS.MATH.MP.4)*
- Use appropriate tools strategically. *(CCSS.MATH.MP.5)*

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- Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. *(POG.1.2)*
- Product Creation: Effectively use a medium to communicate important information. *(POG.3.2)*

K2 strategies for converting within a system of measurement (ratio table, number line)

K3 formulas can be used to calculate area and perimeter

K4 line plots can represent measurement data

K5 protractors are used to measure angles

K6 angles can be classified by their measurement.

K7 shapes can be classified based on defining attributes

K8 Vocabulary: centimeter, meter, kilometer, gram, kilogram, liter, milliliter, inch, foot, yard, mile, ounce, pound, quart, pint, gallon, cup, second, minute, area, perimeter, line plot, parallel, perpendicular, angle, right angle, acute angle, obtuse angle, straight angle, equilateral triangle, scalene triangle, isosceles triangle, rhombus, symmetry, parallelogram, polygon, line segment, quadrilateral, trapezoid, square, congruent, vertex, protractor, ray, zero angle, interior angle, straight angle, ray, area, dimension, perimeter

S2 solving elapsed time problems including situations with minutes to seconds

S3 calculating area and perimeter

S4 using a line plot to solve questions involving fractional measurements

S5 identifying, drawing, comparing, analyzing and classifying angles

S6 measuring and sketching angles with a protractor

S7 finding the unknown angle in a diagram using addition and subtraction

S8 identify and draw perpendicular and parallel lines

S9 identifying polygons based on properties