

Grade 4 Math Unit 5-Measurement and Data

UNIT OVERVIEW

In Grade 4, instructional time should focus on three critical areas. This unit addresses work in **Critical Focus Areas #1, Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends and #2, Developing an understanding of fractions equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.**

This unit will address work in the following clusters:

- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit
- Represent and interpret data

STANDARDS

CC_Common Core State Standards - Mathematics (2010) - Grade 4

Domain 4.MD Measurement and Data

Cluster Statement: Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

Standard 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.

Standard 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.

Standard 4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Cluster Statement: Represent and interpret data.

Standard 4.MD.4 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.

CONTENT ELABORATIONS

The units of measure that have not been addressed in prior years are pounds, ounces, kilometers, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass, liquid volume, and elapsed time. Students did not convert measurements. Students need ample opportunities to become familiar with these new units of measure.

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.

4.MD.1

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).

MP.2, MP.5, MP.6 should be emphasized.

4.MD.2	<p>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 centimeters, dollars to cents).</p> <p>Students should have ample opportunities to use number line diagrams to solve word problems. MP.1, MP.2, MP.4, MP.5, MP.6 should be emphasized.</p>
4.MD.3	<p>Students developed understanding of area and perimeter in 3rd grade by using visual models. While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work. The formula for area is $l \times w$ or $2(l + w)$ and the answer will be in linear units.</p> <p>This standard calls for students to generalize their understanding of area and perimeter by connecting the concepts to mathematical formulas. These formulas should be developed through experience not just memorization. MP.2, MP.4, MP.5, MP.6, MP.7 should be emphasized.</p>
4.MD.4	<p>This standard provides context for students to work with fractions by measuring objects to an eighth of an inch. Students are making a line plot of this data and then adding and subtracting fractions based on data in the line plot.</p> <p><i>Example:</i> Students measured objects in their desk to the nearest $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ inch. They displayed their data collected on a line plot. How many objects measured $\frac{1}{4}$ inch? $\frac{1}{2}$ inch? If you put all the objects together end to end what would be the total length of all the objects? MP.2, MP.4, MP.5, MP.6, MP.7 should be emphasized.</p>

UNIT VOCABULARY

customary system foot (ft.) yard (yd.) convert mile capacity cup (c) fluid ounce (fl oz) gallon (gal) pint (pt) quart (qt)	ounce (oz) pound (lb) ton (T) weight seconds line plot centimeter (cm) kilometer (km) meter (m) metric system	millimeter (mm) liter (L) milliliter (mL) gram kilogram mass perimeter unit square square unit area
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BIG IDEAS

ENDURING UNDERSTANDINGS

ESSENTIALS QUESTIONS

Choose a few questions based on the needs of your students

- To measure something according to a particular attribute means you compare the object to a unit and determine how many units are needed to have the same amount as the object.
- Measurements are estimates.
- When reporting a measurement, you must always indicate the unit you are using.
- The larger the unit, the smaller the number you obtain as you measure.
- Data can be measured and represented on line plots in units of whole numbers or fractions.
- Use collected data to solve problems involving addition or subtraction of fractions.
- Why do we convert measurements?
- How can conversions of measurements help me solve real-world problems?
- Why is it important to measure perimeter and area?

CONNECTIONS

The unit is connected to work in:

3.MD.4, 3.MD.8, 3.NF.2-3

4.NF.3-4

Standards for Mathematical Practice (SMP)

MP.1 Make sense of problems and persevere in solving them

MP.2 Reason abstractly and quantitatively

MP.3 Construct viable arguments and critique the reasoning of others

MP.4 Model with mathematics

MP.5 Use appropriate tools strategically

MP.6 Attend to precision

MP.7 Look for and make use of structure (Deductive reasoning)

MP.8 Look for and express regularity in repeated reasoning (Inductive Reasoning)

SOLVE PROBLEMS INVOLVING MEASUREMENT AND CONVERSION OF MEASUREMENTS FROM A LARGER UNIT TO A SMALLER UNIT

CONTENT

SKILLS

4.MD.1	Know relative sizes of measurement units within one system of units.	Know relative sizes of measurement units within one system of units. 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. 2. Compare the different units within the same system of measurement (e.g. 1 ft = 12 in; 1 lb = 16 oz) 3. Convert larger units of measurement within the same system to smaller units and record conversions in a 2-column table.
4.MD.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money.	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects and money. 1. Add, subtract, multiply, and divide fractions and decimals. 2. Express measurements given in a larger unit in terms of a smaller unit. 3. Solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money. 4. Solve word problems involving measurement that include simple fractions or decimals. 5. Solve word problems that require expressing measurements given in a larger unit in terms of a smaller unit. 6. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
4.MD.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	Apply the area and perimeter formulas for rectangles in real world and mathematical problems. 1. Know that the formula for the perimeter of a rectangle is $2L + 2W$ or $L+L+W+W$. 2. Know that the formula for the area of a rectangle is $L \times W$. 3. Apply the formula for perimeter of a rectangle to solve real world and mathematical problems. 4. Apply the formula for area of a rectangle to solve real world and mathematical problems. 5. Solve area and perimeter problems in which there is an unknown factor (n).
REPRESENT AND INTERPRET DATA		
4.MD.4	Solve problems involving addition and subtraction of fractions by using information presented in line plots.	Solve problems involving addition and subtraction of fractions by using information presented in line plots. 1. Add and subtract fractions. 2. Create a line plot to display a data set of measurements given in fractions of a unit. ($1/2$, $1/4$, $1/8$) 3. Analyze and interpret a line plot to solve problems involving addition and subtraction of fractions.

CCSS model curriculum
McGraw-Hill, **My Math**, Chapters 11-13
Georgia Math frameworks, Grade 4 Unit 7
fraction bars or strips
number lines
Yardsticks(meter sticks)
Rulers(marked with customary and metric units)
Graduated measuring cups (marked with customary and metric units)
Smartboard activities
Analog clock
money
Lengths of Time - Literature Reading