Grade 2 Math Unit 6 - Measurement and Data

UNIT OVERVIEW

Grade 2 math instructions centers arond 4 Critical Focus Areas. This unit addresses work in **Critical Focus Area #3, Using standard units of measure.** (See Connections for explanation)

This unit addresses 2 clusters:
- Measure and estimate lengths in standard units * (See Connections for explanation)
- Relate addition and subtraction to length **

STANDARDS

CC_Common Core State Standards - Mathematics (2010) - Grade 2
Domain 2.MD Measurement and Data
Cluster Statement Measure and estimate lengths in standard units.
Standard 2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
Standard 2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
Standard 2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.
Standard 2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
Cluster Statement Relate addition and subtraction to length.
Standard 2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
Standard 2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2,..., and represent whole-number sums and differences within 100 on a number line diagam.
Standard 2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

CONTENT ELABORATIONS

2.MD.1	**2.MD.1** calls for students to measure length of objects in both customary (inches and feet) and metric (centimeters and meters). Students should have ample experiences choosing objects, identifying the appropriate tool and unit and then measuring the object. The teacher should allow students to determine which tools and unites to use. Foundational understanding 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) -Understand the measuring of two-dimensional space (area) using non-standard units. Grade 2 students will build upon what they learned in Grade 1 from measuring length with non-standard units to the new skill of measuring length in metric and U.S. customary with standard units of measure. They should have many experiences measuring the length of objects with rulers, yardsticks, meter sticks, and tape measures. They will need to be taught how to actually use a ruler appropriately to measure the length of an object especially as to were to begin the measuring. It is important to elp students locate the starting point on the measuring instrument, especially when some have a protected edge. Asking students, "Do you start at the end of the ruler or at the zero?" helps them focus on where to start on the instrument. **MP.5, MP.6, MP.7** should be emphasized.

2.MD.2	**2.MD.2** calls for students to measure an object using two units of different lengths. If a student measures the length of their desk and finds that it is 3 feet and 36 inches, student should explore the idea that the length of the desk is larger in inches than in feet, since inches are smaller units than feet. This concept is referred to as the compensatory principle. Students need multiple opportunities to measure using different units of measure. They should not be limited to measuring within the same standard unit. Students should have access to tools, both U.S. Customary and metric. The more students work with a specific unit of measure, the better they become at choosing the appropriate tool when measuring. Students measure the length of the same object using different tools (ruler with inches, ruler with centimeters, a yardstick or meter stick). This will help students learn which tool is more appropriate for measuring a given object. They describe the relationship between the size of the measurement unit and the number of units needed to measure something. **MP.2, MP.3, MP.5, MP.6, MP.7** should be emphasized.
2.MD.3	**2.MD.3** calls for students to estimate the lengths of objects using inches, feet, centimeters and meters. Students should make estimates after seeing benchmark unit, such as the e/nth of one inch, before making their estimate. Estimation helps build familiarity with the specific unit of measure being used. Students should begin practicing estimation with objects that are familiar to them. **MP.2, MP.5, MP.6** should be emphasize.
2.MD.4	**2.MD.4** calls for students to determine the difference in length between two objects. Students should choose objects, identify appropriate tools and units, measure both objects and then determine the differences in lengths. Second graders should be familiar enough with inches, feet, yards, centimeters and meters to be able to compare the differences in lengths of two objects. They can make direct comparisons by measuring the difference in length between two objects by laying them side by side and selecting an appropriate standard length unit of measure. Students should use comparative phrases such as "It is longer by 2 inches" or "It is shorter by 5 centimeters" to describe the difference between two objects. It is important that students have multiple opportunities to work with actual objects in the process of measuring. **MP.2, MP.5, MP.6** should be emphasize.
2.MD.5	**2.MD.5** applies the concept of length to solve addition and subtraction word problems with numbers within 100. It is important that word problems stay within the same unit of measure. Counting on and/or counting back on a number line will help tie this concept to previous knowledge. Some representations students can use include drawings, number lines, rules, pictures and/or physical objects. **MP.1, MP.2, MP.4, MP.5, MP.8** should be emphasized.
2.MD.6	**2.MD.6** calls for students to create number lines using numbers within 100 to solve addition and subtraction problems. Students should create the number line with evenly spaced points corresponding to numbers. **MP.2, MP.4, MP.5** should be emphasized.
2.MD.9	**2.MD.9** calls for students to represent the length of several objects by making a line plot. Students should round their lengths to the nearest whole unit. This standard emphasizes representing data using a line plot. Line plots are first introduced in this grade level. A line plot can be thought of as plotting data on a number line. **MP.4, MP.5, MP.6, MP.8** should be emphasized.

UNIT VOCABULARY

length	measure	centimeter
inch	foot	meter
estimate	yard	

BIG IDEAS

ENDURING UNDERSTANDINGS

ESSENTIALS QUESTIONS

Choose a few questions based on the needs of your students

• Measurement is a consistent distance. • The length of objects can be measured using customary units (inch, foot, yard). • The length of objects can be measured using Metric units (centimeter, meter). • Relationships of one unit to another may be compared by measuring an object with each unit. For example: something that measures 17 inches could also be expressed as 1foot 5 inches. • A number line has evenly spaced points corresponding to the numbers.	• How can we decide on appropriate units of measurement (i.e. inch, foot, yard, centimeter, meter, seconds, minutes, hours, days)? • Why is it important for us to know how to measure different objects using different tools of measurement? • How can we tell if an estimate is reasonable? • How does using a different unit change our measurement? • Why do we need to be able to estimate a measurement or value? • Why is it important for us to know how to measure different units of measurement? • How can using a number line help us when we are solving math problems?

CONNECTIONS

In **Critical Area of Focus #3**, students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iteration they need to cover a given length.

* This cluster connects to *Measure lengths indirectly and by iterating length units* in Grade 1, and to *Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures* in Grade 3.
** This cluster connects to *Use place value understanding and properties of operations to add and subtract* in Grade 1, to *Represent and solve problems involving addition and subtraction* in Grade 2 and to *Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures* in Grade 3.

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)

MEASURE AND ESTIMATE LENGTHS IN STANDARD UNITS

	CONTENT	SKILLS
A.	Measure the length of an object by selecting and using appropriate tools.	Measure the length of an object by selecting and using appropriate tools. 1. Identify tools that can be used to measure length. 2. Identify the unit of length for the tool used (inches, centimeters, feet, meters). 3. Determine which tool to use to measure the length of an object. 4. Measure the length of objects by using appropriate tools.

B.	Measure the length of an object twice, using length units of different lengths fro the two measurements.	Measure the length of an object twice, using length units of different lengths fro the two measurements. 1. Know how to measure the length of objects with different units. 2. Compare measurements of an object taken with two different units. 3. Describe why the measurements of an object taken with two different units are different. 4. Explain the length of an object in relation to the size of the units used to measure it.
C.	Estimate lengths using units of inches, feet, centimeters, and meters.	Estimate lengths using units of inches, feet, centimeters, and meters. 1. Know strategies for estimating length. 2. Recognize the size of inches, feet, centimeters, and meters. 3. Estimate lengths in units of inches, feet, centimeters, and meters. 4. Determine if estimate is reasonable.
D.	Measure to determine how much longer one object is than another.	Measure to determine how much longer one object is than another. 1. Name standard length units. 2. Compare lengths of two objects. 3. Determine how much longer one object is than another in standard length units.
	RELATE ADDITION AND SUBTRACTION TO LENGTH	
	CONTENT	**SKILLS**
A.	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units.	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units. 1. Add and subtract lengths within 100. 2. Solve word problems involving lengths that are given in the same units. 3. Solve word problems involving length that have equations with a symbol for the unknown number.
B.	Represent whole numbers as lengths on a number line diagram.	Represent whole numbers as lengths on a number line diagram. 1. Represent whole numbers from 0 on a number line with equally spaced points. 2. Explain length as the distance between zero and another mark on the number line diagram. 3. Use a number line to represent the solution of whole-number sums and differences related to length within 100.
	REPRESENT AND INTERPRET DATA	
	CONTENT	**SKILLS**
A.	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object.	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. 1. Read tools of measurement to the nearest unit. 2. Measure lengths of several objects to the nearest whole unit. 3. Measure lengths of objects by making repeated measurements of the same object. 4. Represent measurement data on a line plot. 5. Create a line plot with a horizontal scale marked in whole numbers using measurements.

UNIT RESOURCES
Math Common Core State Standards McGraw-Hill, **My Math** Chapter 11 Georgia Math Framework, Grade 2 Unit 3 Debbie Diller Math Work Stations materials and process Manipulatives - including, but not exclusively: pattern blocks, snap cubes, counting disks, counting bears, a variety of counters, buttons, base ten blocks, dot dice, numeral dice, spinners, number cards, five and ten frames, dominoes