MA.3.M.1.2

Overarching Standard: MA.3.M.1 Measure attributes of objects and solve problems involving measurement.

Benchmark of Focus

MA.3.M.1.2: Solve real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures or liquid volumes.

Example: Ms. Johnson's class is having a party. Eight students each brought in a 2-liter bottle of soda for the party. How many liters of soda did the class have for the party?

Benchmark Clarifications:

Clarification 1: Within this benchmark, it is the expectation that responses include appropriate units.

Clarification 2: Problem types are not expected to include measurement conversions.

Clarification 3: Instruction includes the comparison of attributes measured in the same units.

Clarification 4: Units are limited to yards, feet, inches; meters, centimeters; pounds, ounces; kilograms, grams; degrees Fahrenheit, degrees Celsius; gallons, quarts, pints, cups; and liters, milliliters.

Related Benchmark/Horizontal Alignment

- MA.3.FR.1.1/1.2
- MA.3.FR.2.1/2.2
- MA.3.AR.1.2
- MA.3.GR.1.2
- MA.3.GR.2.3/2.4

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.2.M.1.3	MA.4.M.1.2

Purpose and Instructional Strategies

The purpose of this benchmark is for students to apply what they have learned about measurement to solve real-world problems.

- When solving real-world problems, instruction should facilitate students' understandings of contexts and quantities (MTR.4.1, MTR.5.1, MTR.7.1).
- Recommendations for helping students comprehend and solve real-world problems can be found in this document for benchmark MA.3.AR.1.2

Common Misconceptions or Errors

- Students who struggle to identify benchmarks on number lines can also struggle to measure units of length, liquid volume, and temperature. Allow students to measure often and receive feedback.

Students can also use error and reasoning analysis activities to identify this common measurement difficulty.

- Students may have difficulty creating effective models (e.g., drawings, equations) that will help them solve real-world problems. To assist students, provide opportunities for them to estimate solutions and try different models before solving. Beginning instruction by showing problems without their quantities is a strategy for helping students determine what steps and operations will be used to solve.
- Students can struggle to identify when real-world problems require two steps to solve and will complete only one of the steps. Focusing on comprehension of real-world problems helps students determine what step(s) are required to solve.

Strategies to Support Tiered Instruction

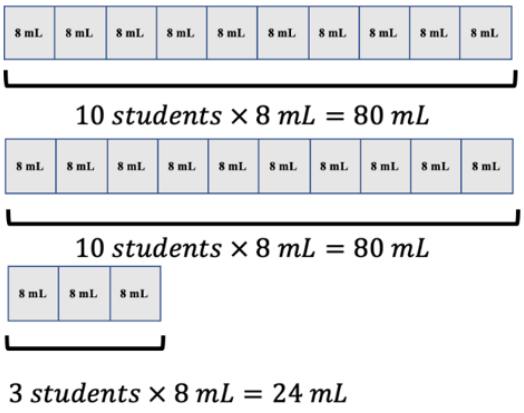
- Instruction includes providing opportunities to estimate solutions and try different models before solving. Instruction begins by showing problems without their quantities to determine what steps and operations will be used to solve. Teaching problem-solving strategies should focus on the comprehension of problem contexts and what quantities represent in them.
    - For example, "For a science experiment in Mr. Thomas's 3rd grade class, each student needs some milliliters of water. If there are some students in Mr. Thomas's class, how many milliliters will be needed in all?" Students will notice that the quantities have been removed from the problem. This will help them to determine what the quantities represent and which operation to choose to solve the problem. The numberless word problem may also be written as ___ students × ____milliliters of water = ___ milliliters needed in all.
- Teacher encourages exploration of estimation strategies to determine reasonable ranges for solutions (e.g., rounding, finding low and high estimates) and teach problem-solving strategies that build comprehension.
    - For example, the 3-Reads Protocol is a close reading strategy for solving problems that focuses on comprehension of the word problem.
        - The problem is read 3 times, each for a different purpose.
        - What is the problem, context, or story about?
        - What are we trying to find out?
        - What information is important in the problem?

What is the problem about?	What are we trying to find out?	What information is important to the problem?
• Students need water for a science experiment.	• How much water is needed for the whole class?	• Amount of students • Amount of water each student needs

- Instruction includes opportunities to measure often and provide feedback. Use error and reasoning analysis activities to address common measurement difficulties.
- Instruction includes opportunities to find the locations of points on number lines. Number lines should be represented vertically and horizontally. Instruction includes whole number values and fractions, including fractions greater than one.
    - For example, number lines should be included with benchmarks instead of every number in the sequence included. The blue line below extends from the 0 mark on the number

line to the first hashmark beyond 2. The dot plotted on the number line identifies the end of the blue line. Since each whole number interval is partitioned into four equal parts, the first hashmark beyond 2 is represented as $2\frac{1}{4}$.

  - For example, number lines can also have all numbers included to represent the values between the benchmarks.
  - For example, teaching problem-solving strategies should focus on the comprehension of problem contexts and what quantities represent in them.
- Instruction includes an emphasis on teaching problem-solving strategies, focusing on the comprehension of problem contexts and what quantities represent in them.
  - For example, questions that help students comprehend word problems are:
    - What is happening in the real-world problem?
    - What do you need to find out?
    - What do the quantities represent in the problem?
    - What will the solution represent in the problem?
- For example, "For a science experiment in Mr. Thomas's 3rd grade class, each student needs 8 milliliters of water. If there are 23 students in Mr. Thomas's class, how many milliliters will be needed in all?"



$80mL + 80\ mL + 24\ mL = 184\ mL$

Questions to ask students:

Show students a 2-liter soda bottle and a 1-liter water bottle. Ask them to find the total amount of liquid the bottles hold and explain how they know.

- *Sample answer that indicates understanding:* The bottles hold 3 liters of liquid, because I added 2 liters plus 1 liter and got 3 liters.

Ask students to find two objects with different lengths within the classroom and measure them both to the nearest inch. Then ask them to find the difference between their measurements.

- *Sample answer that indicates understanding*: A student measures the length of a notebook as 10 inches and the length of a marker as 4 inches, then subtracts 10 − 4 to get 6 inches.
- *Sample answer that indicates incomplete understanding or a misconception:* A student measures two items correctly but is unable to subtract to find the difference.

Ask the students, if a pencil has a mass of about 5 grams, what is the mass of 4 pencils?

- *Sample answer that indicates understanding*: 20 grams because each pencil is 5 grams and I counted by 5's for each of the 4 pencils
- *Sample answer that indicates incomplete understanding or a misconception:* 9 grams. The student may not have identified that **each** pencil has a mass of 5 grams.

Instructional Tasks

Instructional Task 1

Each year, the Tallahassee Pumpkin Festival hosts a contest to find the largest pumpkin grown that season. The winner of the competition has the greatest mass, in grams. The masses of the contest entries are in the table below.

Pumpkin	Mass (g)
A	8,164
B	7,322
C	9,002
D	6,488
E	7,450
F	8,098
G	6,341

Part A. Which pumpkin won the contest?
Part B. What is the difference of the mass, in grams, between the first and second place winning pumpkins?

Instructional Items

Instructional Item 1

For a science experiment in Mr. Thomas's 3rd grade class, each student needs 8 milliliters of water. If there are 23 students in Mr. Thomas's class, how many milliliters will be needed in all?

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.3.M.1.2 Solve real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures, or liquid volumes. Example: Ms. Johnson's class is having a party. Eight students each brought in a 2-liter bottle of soda for the party. How many liters of soda did the class have for the party? Clarification 1: Within this benchmark, it is the expectation that responses include appropriate units. Clarification 2: Problem types are not expected to include measurement conversions. Clarification 3: Instruction includes the comparison of attributes measured in the same units. Clarification 4: Units are limited to yards, feet, inches; meters, centimeters; pounds, ounces; kilograms, grams; degrees Fahrenheit, degrees	Real-world	Items involving multiplication and division are limited to multiplication factors within 12 and related division facts. Items involving addition or subtraction will not use numbers greater than 10,000. Items may include multiple procedural steps.

Celsius; gallons, quarts, pints, cups; and liters, milliliters.			
ALD 2	**ALD 3**	**ALD 4**	**ALD 5**
N/A	solves real-world problems involving addition and subtraction with whole-number lengths, masses, weights, temperatures, or liquid volumes.	solves real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures, or liquid volumes.	identifies an error and solves real-world problems involving any of the four operations with whole-number lengths, masses, weights, temperatures, or liquid volumes.

Additional Resources:
CPALMS Resources

Resources/Tasks to Support Your Child at Home:

Provide opportunities for your child to experiment with using any measurement tools you have at home.
For example, have them:

- measure the length of objects using a ruler or a measuring tape
- compare the weights of various objects using a bathroom scale
- practice finding the volume of water using measuring cups
- determine the temperature of tap water (warm, cold, room temperature) using a thermometer

Have your child look at the labels on items in the refrigerator or the pantry to identify their weight or volume. Have them look for units like pounds, ounces, kilograms, grams, gallons, quarts, pints, cups, liters, and milliliters. This will help them to visualize benchmark measurements when solving real-world problems.

Khan Academy: Word Problems with Mass

Khan Academy: Word Problems with Volume

Khan Academy: 2-Step Word Problem: Running

LearnZillion Video: Solve Length Word Problems Using a Number Line