

MA.5.M.1.1

Overarching Standard: MA.5.M.1 Convert measurement units to solve multi-step problems

Benchmark of Focus

MA.5.M.1.1 Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement.

Example: There are 60 minutes in 1 hour, 24 hours in 1 day and 7 days in 1 week. So, there are $60 \times 24 \times 7$ minutes in one week which is equivalent to 10,080 minutes.

Benchmark Clarifications

Clarification 1: Within the benchmark, the expectation is not to memorize the conversions.

Clarification 2: Conversions include length, time, volume and capacity represented as whole numbers, fractions and decimals.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.1.1
 - MA.5.NSO.2.1/2.4/2.5
 - MA.5.AR.1.2
 - MA.5.AR.2.1
 - MA.5.M.2.1
 - MA.5.GR.1.1
 - MA.5.GR.2.
 - MA.5.GR.3.3
-

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.4.M.1.2	MA.6.AR.3.5

Purpose and Instructional Strategies

The purpose of this benchmark is for students to be able to understand the relationship between units of measure through problem solving. This benchmark builds on 4th grade concepts of converting measurement units (MA.4.M.1.2), and becomes a part of a larger context of ratios and rates in Grade 6 (MA.6.AR.3.5).

- Instruction should allow students to convert measurements flexibly. For example, when finding the number of inches in 2 yards, students may start with inches, feet or yards when calculating. Classroom discussion should compare those conversions to explore their similarities and differences (MTR.2.1, MTR.4.1).
 - For students to have a better understanding of the relationships between units, it is important for teachers to allow students to have practice with tools during instruction. This will show students how the number of units relates to the size of the unit. For example, for students to discover converting inches to yards, teachers can have them use 12-inch rulers and yardsticks. This will allow students to see that three of the 12-inch rulers are equivalent to one yardstick ($3 \times 12 \text{ inches} = 36 \text{ inches}$; $36 \text{ inches} = 1 \text{ yard}$), so that students understand that there are 12 inches in 1 foot and 3 feet in 1 yard. Using this knowledge, students will be able to determine whether to multiply or divide when making conversions (MTR.2.1).
 - When moving into real-world problem solving, it is important to begin with problems that allow for renaming the units to represent the solution before using problems that require renaming to find the solution (MTR.7.1).
-

Common Misconceptions or Errors

Students confuse renaming units of measurement with the renaming that they do with whole numbers and place value. For example, when subtracting 6 inches from 3 feet, they get 2 feet 4 inches because they think of subtracting 6 inches from 30 inches. Students need to pay attention to the unit of measurement which dictates the renaming (inches in this example) and the number to use (12 inches in a foot instead of 10 inches in a foot).

Questions to ask students:

What kind of model can you use to determine the number of yards equal to 12 feet?

Possible student response showing understanding: I can use a bar model, for example drawing 1 box for 1 yard is equal to 3 boxes for 3 feet. So I would need 12 boxes for 12 feet, each 3 feet is equal to 1 yard. So I need 4 yards.

How did you know which operation(s) to use when determining how many meters are equal to 700 centimeters

Possible student response showing understanding: I know that meters are larger units than centimeters, 1 meters is the same as 100 centimeters. So I need to divide 700 by 100 to find the number of meters. $7 \text{ m} = 700 \text{ cm}$

What do you notice about the solution when converting smaller measurement units to larger measurement units?

Possible student response showing understanding: When converting smaller units to larger units, I would need to multiply because I'm finding groups of the smaller units. For example, converting minutes to hours, there are 60 minutes in 1 hour, so for each hour, that is a group of 60 minutes. Multiplication means making equal groups.

Why do some conversions require only one step while other conversions require two steps? What operations would you use to convert 5 feet 6 inches into inches?

Possible student response showing understanding: I need to find the number of inches in 5 feet, which means I need to multiply 5×12 . But then there are still the extra 6 inches, so I need to add those afterwards. $5 \times 12 = 60$ $60 + 6 = 66$ inches

Instructional Tasks

Instructional Task 1

Zevah is helping her mom plan her sister's surprise birthday party.

Part A. The recipe to make one bowl of punch is shown below. How many cups of punch will they be able to serve at the party if they only make one bowl of punch and there is no punch leftover in the bowl?

Liquid Fluid Ounces

Pineapple Juice 32 oz

Fruit Punch 64 oz

Ginger Ale 76 oz

Part B. At the party, Zevah wants each balloon to have a string that is 250 centimeters long. The string she wants to buy comes in rolls of 30 meters. How many rolls of string does Zevah need to buy if she plans to have 36 balloons at the party?

Instructional Items

Instructional Item 1

- Michael is measuring fabric for the costumes of a school play. He needs 11.5 meters of fabric. He has 280 centimeters of fabric. How many more centimeters of fabric does he need?

Instructional Item 2

- A recipe requires 24 ounces of milk. Edwin has only a $\frac{1}{2}$ cup measuring cup. How many measuring cups of milk will Edwin need?
 - a. 6
 - b. 12

c. 18

d. 24

Benchmark		Context	Assessment Limits
MA.5.M.1.1 Solve multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement. Example: There are 60 minutes in 1 hour, 24 hours in 1 day and 7 days in 1 week. So, there are $60 \times 24 \times 7$ minutes in one week which is equivalent to 10,080 minutes. Clarification 1: Within the benchmark, the expectation is not to memorize the conversions. Clarification 2: Conversions include length, time, volume, and capacity represented as whole numbers, fractions and decimals.		Real-world	Items including decimals will not include fractions. Items including fractions will not include decimals. Decimals are limited to the thousandths place. Items including one procedural conversion must include a decimal, the use of tons, the use of days, or the use of weeks.
ALD 2	ALD 3	ALD 4	ALD 5
Solves two-step real-world problems that involve converting whole measurement units to equivalent measurements within a single system of measurement.	Solves two-step real-world problems that involve converting measurement units that may include decimals to equivalent measurements within a single system of measurement.	Solves multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement.	Identifies an error and solves multi-step real-world problems that involve converting measurement units to equivalent measurements within a single system of measurement.

Additional Resources:

Khan Academy: Converting Units of Measure

<https://www.khanacademy.org/math/cc-fifth-grade-math/imp-measurement-and-data-3>

Resources/Tasks to Support Your Child at Home:

LearnZillion: Solve real-world problems distance problems with unit conversions

https://learnzillion.com/lesson_plans/6806-solve-real-world-distance-problems-with-unit-conversions

Khan Academy: Converting Metric System Unit of Volume

https://www.pcsb.org/cms/lib/FL01903687/Centricity/Domain/170/FSA_Grade_5_Mathematics_ReferenceSheet.pdf