

Metric Mission

*Estimate, measure, convert, and decide***GRADE 5 • 5.MG.1**

5.MG.1 "The student will reason mathematically to solve problems, including those in context, that involve length, mass, and liquid volume using metric units. Determine the most appropriate unit of measure to use in a contextual problem that involves metric units: length (millimeters, centimeters, meters, and kilometers); mass (grams and kilograms); and liquid volume (milliliters and liters). Estimate and measure to solve contextual problems that involve metric units: length (millimeters, centimeters, and meters); mass (grams and kilograms); and liquid volume (milliliters and liters). Given the equivalent metric measure of one unit, in a contextual problem, determine the equivalent measurement within the metric system: length (millimeters, centimeters, meters, and kilometers); mass (grams and kilograms); and liquid volume (milliliters and liters)."

NAME _____

DATE _____

Complete the four real measurement tasks with the materials supplied. Record estimates before using tools. Show equations for numerical decisions. Explain your unit choices.

Materials and setup

Metric ruler with millimeter marks; paper strip; metric tape; desk/table; packed bag; scale readable in g or kg; jug with a marked mL scale and water.

Teacher: supply a suitable bag for the scale and a jug with up to 1 L of water. Students compare their own observations; the paper itself is not a scale drawing.

Read, Compare, Explain

Use $10\text{ mm} = 1\text{ cm}$; $100\text{ cm} = 1\text{ m}$; $1,000\text{ m} = 1\text{ km}$; $1,000\text{ g} = 1\text{ kg}$; $1,000\text{ mL} = 1\text{ L}$. Choose a unit that fits the object and purpose. Record an estimate before measuring. Use the same unit before comparing or calculating.

Try it together

A class needs 600 mL of water for a plant tray. Its jug has 1 L 200 mL. Is there enough, and how much will remain?

Jug record

Record	Your measurement
Water available	1 L 200 mL
Water needed	600 mL

$1\text{ L } 200\text{ mL} = 1,200\text{ mL}$. $1,200 - 600 = 600\text{ mL}$. Yes; 600 mL remains.

1. Choose useful units

Choose a suitable unit for each: coin thickness; pencil length; classroom length; distance between towns; eraser mass; packed backpack mass; spoonful of liquid; bucket of water. Use mm, cm, m, km, g, kg, mL, or L. Explain two choices.

2. Make a bookmark

Estimate a paper strip’s length in mm. Measure to the nearest mm, then express that measurement in cm. The strip must be at least 12 cm long for a bookmark. Does yours qualify? Show the comparison.

Bookmark record

Record	Your measurement
Estimate (mm)	
Measured (mm)	
Equivalent (cm)	

3. Cover a work surface

Estimate a desk or table length in meters. Measure to the nearest cm; record m and cm. A cover is 2 m long. Is the cover longer than, shorter than, or exactly as long as your surface? Find the difference in cm.

Surface record

Record	Your measurement
Estimate (m)	
Measured (m and cm)	

4. Pack a supply bag

Estimate the mass of a packed supply bag in kg. Use a scale to measure it; record kg and g, then equivalent g. A shelf holds at most 5 kg. How much below or above that limit is your bag?

5. Plan water for seedlings

Estimate the water in a teacher-prepared jug in mL. Measure it using the jug scale; record mL and equivalent L. Seedlings need 750 mL. Find how much will remain or how much more is needed.

6. Reach the field-trip stop

The route is 2 km long. The class has walked 1,350 m. How far remains in meters? Express the remaining distance in centimeters too, using the metric facts above.

7. Rainwater budget

The garden collects 4 L 275 mL on Monday and 2 L 950 mL on Tuesday, then uses 3,725 mL. Find the water remaining in mL and in L. Explain your conversions and subtraction.

Teacher notes

Prepare a paper strip, a desk/table, a packed supply bag and a jug of water. Check each student's estimate, actual tool reading, conversion and decision separately. Variable observations have no fixed target answer. Accept equivalent forms consistent with tool precision. Do not replace measurement with the sample values in this key.

Task 1

Typical units, in order: mm, cm, m, km, g, kg, mL, L. Explanations should connect object size and useful precision to the unit. Accept reasonable alternatives with a sound purpose.

Task 2

Answers vary. Divide measured mm by 10 for cm. Compare with 120 mm or 12 cm. For example, 137 mm = 13.7 cm, so it qualifies. Estimate must precede measurement.

Task 3

Answers vary. Compare the cover (200 cm) with the measured surface. A 135 cm surface needs less than 200 cm: the cover is $200 - 135 = 65$ cm longer. A 240 cm surface needs more: the cover is $240 - 200 = 40$ cm shorter. Equal lengths give 0 cm difference.

Task 4

Answers vary. Convert the scale reading to grams and compare with 5,000 g. For example, 2 kg 400 g = 2,400 g, which is 2,600 g below the limit. Record an estimate first.

Task 5

Answers vary. Convert measured mL to L by dividing by 1,000. Compare with 750 mL. For example, 900 mL = 0.9 L; 150 mL remains. If below 750 mL, subtract the measured amount from 750 to find the shortage.

Require the stated evidence and reasoning; accept equivalent correct wording.

Task 6

2 km = 2,000 m. $2,000 - 1,350 = 650$ m remains. $650 \text{ m} = 65,000 \text{ cm}$.

Require the stated evidence and reasoning; accept equivalent correct wording.

Task 7

$4,275 + 2,950 = 7,225 \text{ mL}$. $7,225 - 3,725 = 3,500 \text{ mL} = 3.5 \text{ L}$ (or 3 L 500 mL).