Grade 7 Mathematics: Measurement

Free sample lesson

Ontario curriculum: Mathematics (2020), Strand E: Spatial Sense, part E2 Measurement (Grade 7). 17 days.

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This is Lesson 1 of 12 from the full unit, exactly as it appears in the Teacher Guide, followed by the student worksheet. The full unit is at unitplans.ca.

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Lesson 1: Volume and capacity

1 day · about 60 minutes · E2.1

Learning goal

- We are learning how volume and capacity are alike and different, and how millilitres connect to cubic centimetres.

Success criteria

- I can explain the difference between volume and capacity.
- I can say that 1 mL takes up the same space as 1 cm³ and that 1 L is 1 000 cm³.
- I can switch between cm³, mL and L to solve problems.

Materials

- Small clear containers, a 1 L carton or bottle
- Centimetre cubes (about 100)
- A measuring cup marked in mL
- A small funnel and a tray

Minds On (10 min)

1. Hold up a 1 L carton and a solid wooden block. Ask students what could be measured about each one.
2. Ask: "Which one can hold water, and which one only takes up space?"
3. Let pairs share, then record the words volume (space taken up) and capacity (how much it can hold).

Action (35 min)

1. Build a 10 cm by 10 cm by 10 cm cube with centimetre cubes (or show a picture) and note it holds 1 000 cm³. Pour 1 L of water into a see-through 10 cm cube box to show it is full.
2. Show that 1 mL of water fills a 1 cm cube. Build the chain: 1 cm³ = 1 mL, 1 000 cm³ = 1 000 mL = 1 L.
3. Students work through the worksheet, using a table to switch between units.

Consolidation (15 min)

1. Discuss question 5: a vase has a thick glass base. Which is larger, its volume or its capacity?
2. Exit: "Give one object that has volume but no capacity, and say why."

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Questions to ask

- How many 1 cm cubes would fill a box 10 cm by 10 cm by 10 cm?
- Why do we say a solid has volume but no capacity?
- If a container holds 750 mL, what is its capacity in cm³ when it is full?

Watch for

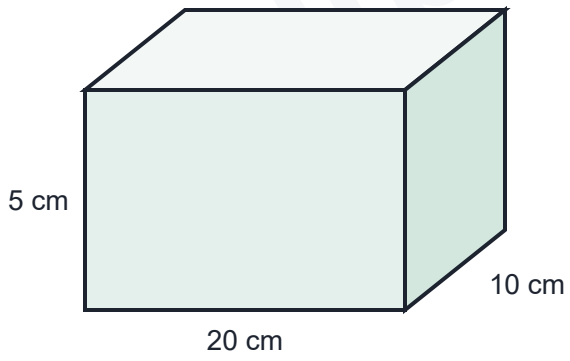
- Students think volume and capacity are the same word. Use a solid brick and a hollow box to separate them.
- Students mix up 1 L = 100 cm³. Build the 10 by 10 by 10 cube so they see 1 000.

Differentiation

Support	Extend
Give a chart: cm³ and mL are equal; multiply L by 1 000 to get mL. Use real containers so students can pour and see.	A cylinder-shaped vase has thick glass at the bottom. Predict how much less it holds than its volume suggests.

Answer key: Volume and capacity

1. A fish tank is a rectangular prism 20 cm long, 10 cm wide and 5 cm tall. What is its volume? Assume thin walls.



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> **Answer:** 1000 cm³
> 20 × 10 × 5 = 1000

2. The tank in question 1 is filled to the top. How many millilitres of water does it hold?

> **Answer:** 1000 mL
> 1 cm³ holds 1 mL, so 1000 cm³ holds 1000 mL

3. A juice box holds 250 mL. What is its capacity in cm³?

> **Answer:** 250 cm³
> 1 mL = 1 cm³

4. A jug holds 2.5 L. What is its capacity in cm³?

> **Answer:** 2500 cm³
> 2.5 × 1 000 = 2500

5. A glass vase has a thick solid glass base. Is its volume greater than, less than or equal to its capacity? Explain.

> **Answer:** Its volume is greater than its capacity. The volume includes the glass base, which takes up space, but the capacity counts only the empty space inside that can hold water.

6. A tank holds 3600 cm³ of water. How many litres is that?

> **Answer:** 3.6 L
> 3600 ÷ 1 000 = 3.6

7. A fish tank measures 40 cm by 25 cm by 30 cm inside. How many litres of water does it hold when full?

> **Answer:** 30 L
> 40 × 25 × 30 = 30000 cm³ = 30000 mL = 30 L

8. True or false: a brick has volume but no capacity. Explain your answer.

> **Answer:** True. A brick is solid, so it takes up space (volume) but has no empty space inside to hold a liquid (no capacity).

9. A bottle holds 1.5 L. A paper cup holds 250 mL. How many cups can be filled from one full bottle?

> **Answer:** 6 cups
> 1.5 L = 1500 mL; 1500 ÷ 250 = 6

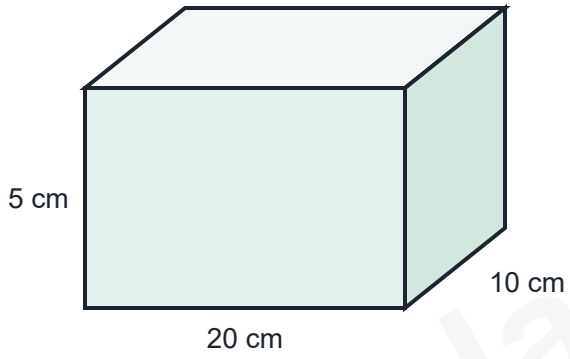
Student worksheet: Volume and capacity

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- I can explain the difference between volume and capacity.
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- I can switch between cm³, mL and L to solve problems.

Show your work. 1 mL = 1 cm³ and 1 L = 1 000 mL.

1. A fish tank is a rectangular prism 20 cm long, 10 cm wide and 5 cm tall. What is its volume? Assume thin walls.



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