WHATS IN THE WATER TANK

LEVEL

Level 8

ACTIVITY DESCRIPTION

On your visit to Puffing Billy Railway you may have taken a journey on the 8A locomotive. The 8A is a steam locomotive that carries its water in an onboard water tank. In this activity students learn about volume and capacity. They use mathematical formulas to calculate and solve problems.

THEME

Volume

Capacity

MATERIALS REQUIRED

• Student workbook

• Ruler

• Pencil

• Eraser

• Calculator

• "Volume of Prisms" worksheet

• "Match Measurements" worksheet

INSTRUCTIONS

1. Using the background information provided students use the Volume of Prisms formula to calculate the answers to each of the prisms on the worksheet provided.

2. Students work in pairs to match equivalent measurements. Using the "Match Measurements" worksheet provided, students cut out the cards, shuffle the cards and match them according to their equivalent measurement.

3. An extension activity on capacity can be completed to encourage higher order thinking.

SUGGESTIONS FOR ASSESSMENT

Successful individual completion of "Volume of Prisms" worksheet. Ability to work in pairs and complete the "Match Measurement" card task.

CURRICULUM LINKS

Mathematics

Level 8

Measurement and Geometry

Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (VCMMG289)

🔍 BACKGROUND INFORMATION
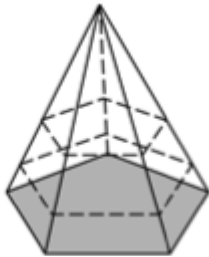
VOLUMES OF PRISMS

A prism is a solid that has identical polygon ends and the same cross-section across its entire length.

In other words, if you were to slice a prism along its height, the cross-sectional faces would be identical polygons.

Each prism has two congruent faces (ends), and the height of a prism is defined as the distance between these congruent faces.
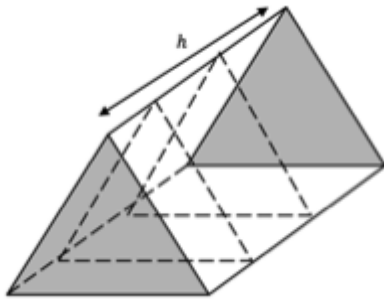
- Two congruent faces at the ends (shaded)

- Identical cross-section throughout

- No congruent faces at the ends

- Non-identical cross-section throughout

CALCULATING VOLUMES OF PRISMS

The formula for calculating the volume of a prism is:

$V = Ah$

Where:

- V is the volume

- A is the area of the cross-sectional face

- h is the height of the prism or the distance between the two congruent faces

WORKSHEET – VOLUME OF PRISMS
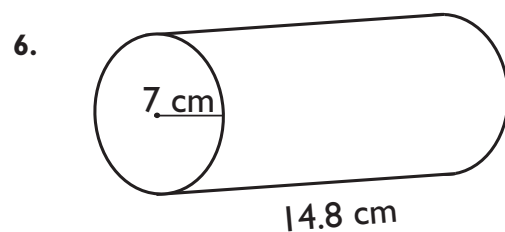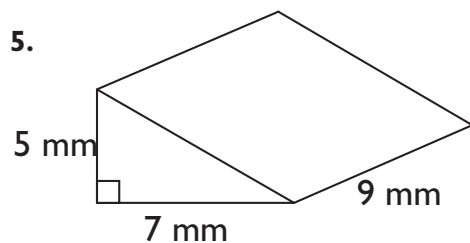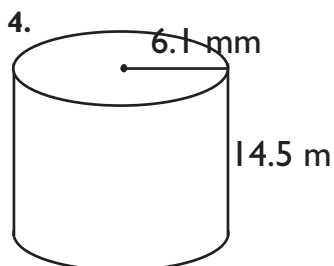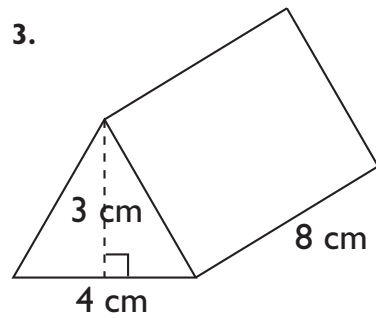
Calculate the volume of each of the following prisms.

1.

7 mm

13 mm

5 mm

Diagram not to scale

2.

6.7 mm

12.3 mm

5 mm

3.

3 cm

4 cm

8 cm

4.

6.1 mm

14.5 m

5.

5 mm

7 mm

9 mm

6.

7 cm

14.8 cm

7.

2 cm

2 cm

5 cm

8.

5.6 m

17.3 m

9.

4.8 cm

5.6 cm

2.3 cm

10.

32 mm

25 mm
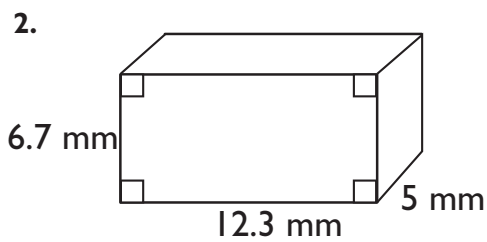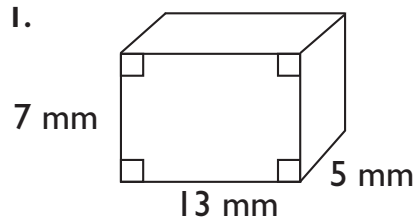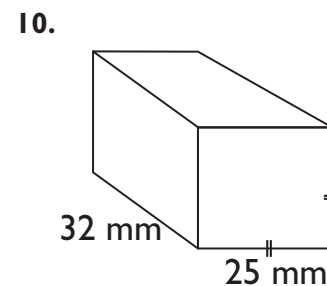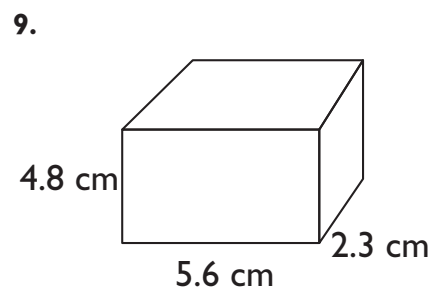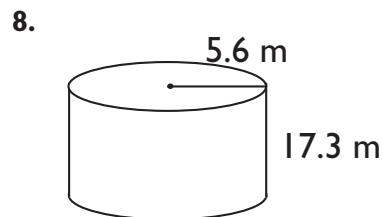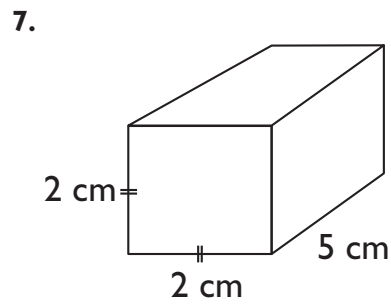
WORKSHEET – MATCH MEASUREMENT

Cut out each of the cards, shuffle and match the equivalent measurement.

68 kilolitres	**5.17 kilolitres**	**0.276 L**	**20 300 L**
20.3 kL	**97 L**	**2.3 kilolitres**	**68 000 litres**
361 litres	**2050 L**	**68.8 kL**	**0.000 276 kL**
2300 litres	**0.276 kL**	**0.361 kilolitres**	**0.097 kL**
276 L	**2.05 kL**	**68 800 L**	**5170 litres**

EXTENSION ACTIVITY

🔍 BACKGROUND INFORMATION

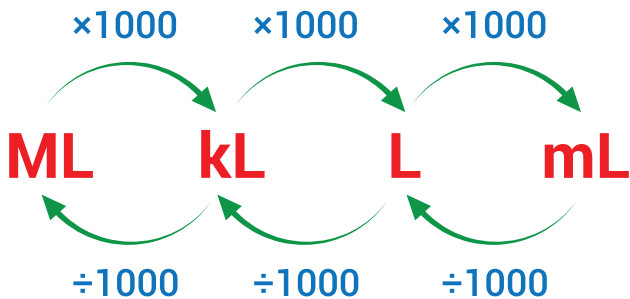### CONVERTING BETWEEN UNITS OF CAPACITY

Units of capacity include millilitres (mL), litres (L), kilolitres (kL) and megalitres (ML). The formulas for converting metric units of capacity are as follows:

- 1 L = 1000 mL

- 1 kL = 1000 L

- 1 ML = 1000 kL

Metric units of capacity follow multiples of 1000, making it an easy way to remember the conversion process.

Working with smaller units of capacity and then moving into larger units, allows students to have a better understanding of their scale. This understanding can then be used to make connections to real-world uses of larger units of capacity to measure a trains water tank and or a dam.

CONVERTING BETWEEN CAPACITY AND VOLUME

Introduce the relationship between the capacity of liquids and the volume of solids.

- A container with a volume of 1 cubic centimetre can hold 1 millilitre of liquid.

- A container with a volume of 1000 cubic centimetre can hold 1 litre of liquid.

- A container with a volume of 1 cubic metre can hold 1 kilolitre of liquid.
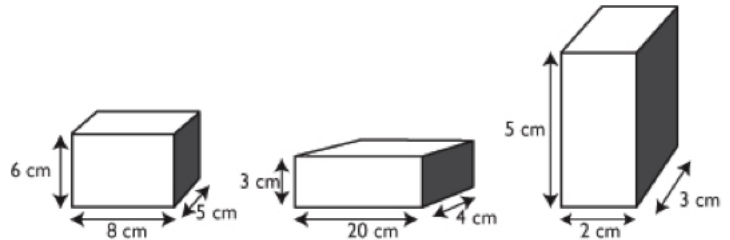
$1 \text{ cm}^3 = 1 \text{ mL}$	$1000 \text{ cm}^3 = 1 \text{ L}$	$1 \text{ m}^3 = 1 \text{ kL}$

INSTRUCTIONS

Students work in pairs to determine the capacity of a variety of rectangular prisms.

- Ask: How many millilitres would each of these containers hold?

The teacher reviews the conversions with the class and students complete these statements:

- 1 cubic centimetre is the same as (how many) cubic millimetres?

- 1 litre is the same as (how many) millilitres?

- 1 litre is also the same as (how many) cubic centimetres?

- 1 cubic metre is the same as (how many) litres?

- 1 cubic metre is also the same as (how many) kilolitres?

Using the "Volume of Prisms" worksheet that you have already completed, calculate the capacity of each of the prisms in millilitres (mL).

Now think about the water tanks on the locomotives at Puffing Billy Railway. What is their capacity? How many litres of water are required for each trip?