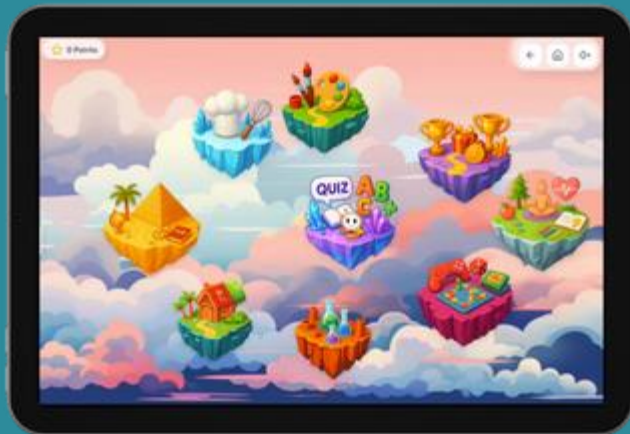


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Volume and Capacity - Year 6

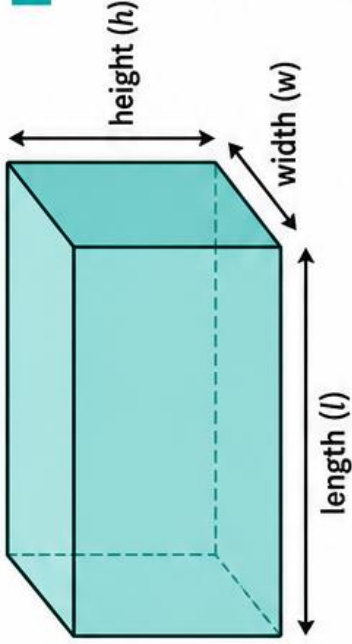
Table of Contents	
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Worksheet 4: Linking Volume and Capacity	
Worksheet 5: Volume and Capacity Problem-Solving	
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Assessment: Sustainable Science Lab Storage Challenge	
Rubric: Volume and Capacity Rubric	



Volume & Capacity at a Glance

VOLUME

- Space a 3D object occupies
- Measured in cubic units
- $V = l \times w \times h$



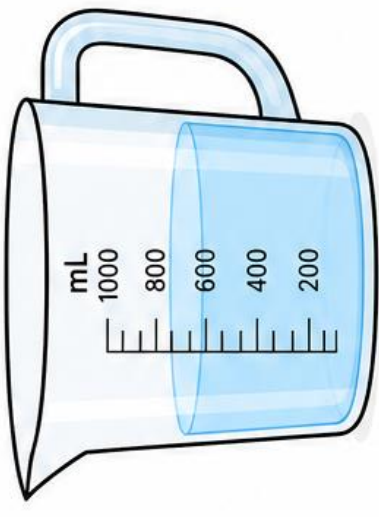
THE KEY CONNECTION

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$1000 \text{ cm}^3 = 1 \text{ L}$$

CAPACITY

- Amount a container can hold
- Measured in millilitres (mL) and litres (L)

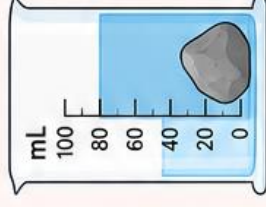
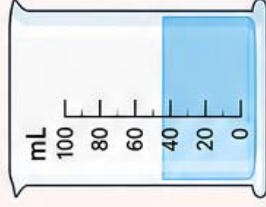


$$1000 \text{ mL} = 1 \text{ L}$$

$$3500 \text{ mL} = 3.5 \text{ L}$$

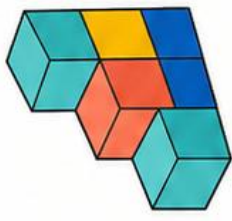


$$\text{Rise in water level (mL)} \\ = \text{object volume (cm}^3\text{)}$$





VOLUME ARCHITECT CHALLENGE



Roll. Build. Calculate. Explain.

WHAT YOU NEED



- 3 number dice
- Cubes or grid paper
- Pencil and recording paper
- Challenge cards

HOW TO PLAY



1. Roll three dice.
2. Assign the results to length, width and height.
3. Build or sketch the rectangular prism.
4. Calculate $V = l \times w \times h$ and explain your strategy.

SCORING



- ★ Correct volume = 1 point
- ★ Correct unit = 1 point
- ★ Clear explanation = 1 point
- ★ Challenge card solved = 2 bonus points



$V = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$ cubic units



How did rows and layers help you?

.....

.....

.....

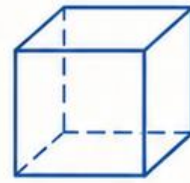
VOLUME ARCHITECT CHALLENGE CARDS

1



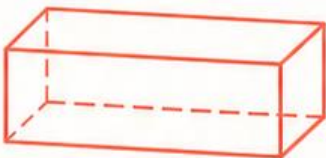
Calculate:
 $9\text{ cm} \times 4\text{ cm} \times 3\text{ cm}.$

2



Build 72 cubic units
using at least two
dimensions greater than 1.

3



Make two different
prisms with the
same volume.

4



A prism has volume 48 cm^3 .
Find two sets of whole-number
dimensions.

5



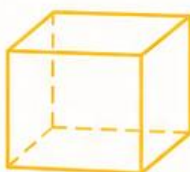
Double the length.
Predict and test what
happens to the volume.

6



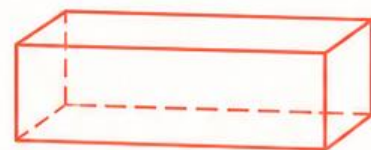
One side is 5 cm and
the volume is 200 cm^3 .
Choose two missing dimensions.

7



Use three odd dimensions.
Build, calculate and record.

8



Use one dimension
greater than 10.
Build, calculate and explain.

Cut out the cards. Draw one after each successful round.

CAPACITY CONVERSION MATCH

Cut, shuffle and place face down. Turn over two cards. Keep the pair if the capacities are equivalent.

250 mL



1200 mL



4.05 L



0.25 L



2.5 L



6400 mL



750 mL



6.4 L



0.75 L



2500 mL



4050 mL



1.2 L



CAPACITY CONVERSION MATCH

Match each capacity with its equivalent measure. The player with the most pairs wins.



125 mL



0.125 L



1.75 L



1750 mL



3 L



3000 mL



5.5 L



5500 mL



8.25 L



8250 mL



10 L



10 000 mL



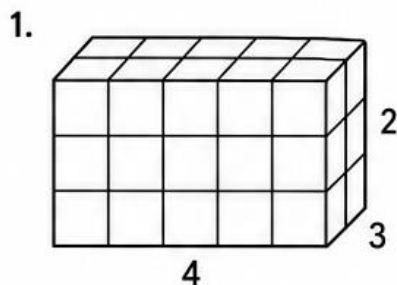
Name: _____

Date: _____

CUBIC UNITS AND LAYERS

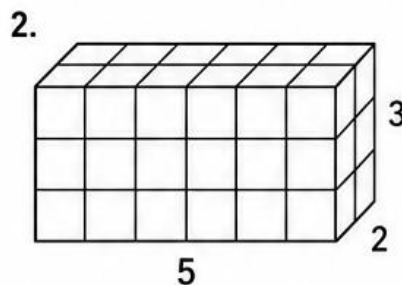
One cubic unit is $1 \times 1 \times 1$. Volume counts the cubes inside a 3D object.

A. COUNT OR CALCULATE



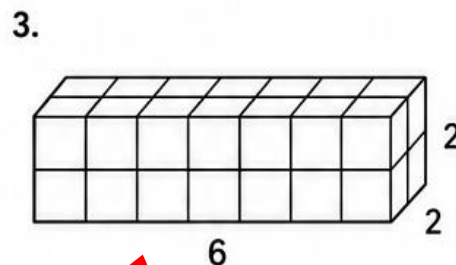
Dimensions: $4 \times 3 \times 2$

Volume = _____ cubic units



Dimensions: $5 \times 2 \times 3$

Volume = _____ cubic units



Dimensions: $6 \times 2 \times 2$

Volume = _____ cubic units

B. THINK IN LAYERS

4. A prism has 12 cubes in each layer and 4 layers. Volume = _____ cubic units

5. A prism has 15 cubes in each layer and 3 layers. Volume = _____ cubic units

6. A prism has a volume of 60 cubic units and 5 equal layers. Cubes per layer = _____

C. REASON AND CREATE

7. Compare $3 \times 4 \times 5$ and $2 \times 6 \times 5$. Which prism has the greater volume? Explain.

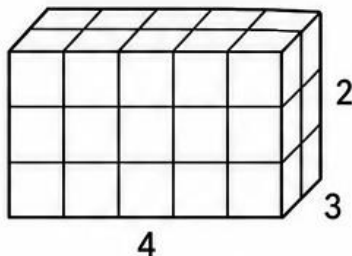
8. Sketch and label one rectangular prism with a volume of 36 cubic units.

CUBIC UNITS AND LAYERS

One cubic unit is $1 \times 1 \times 1$. Volume counts the cubes inside a 3D object.

A. COUNT OR CALCULATE

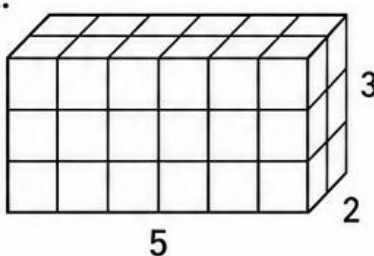
1.



Dimensions: $4 \times 3 \times 2$

Volume = 24 cubic units

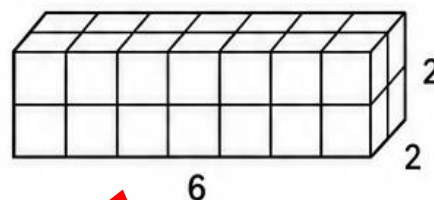
2.



Dimensions: $5 \times 2 \times 3$

Volume = 30 cubic units

3.



Dimensions: $6 \times 2 \times 2$

Volume = 24 cubic units

B. THINK IN LAYERS

4. A prism has 12 cubes in each layer and 4 layers. Volume = 48 cubic units

5. A prism has 15 cubes in each layer and 3 layers. Volume = 45 cubic units

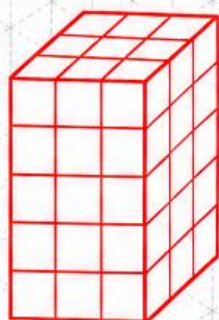
6. A prism has a volume of 60 cubic units and 5 equal layers. Cubes per layer = 12

C. REASON AND CREATE

7. Compare $3 \times 4 \times 5$ and $2 \times 6 \times 5$. Which prism has the greater volume? Explain.

They are equal: both have a volume of 60 cubic units.

8. Sketch and label one rectangular prism with a volume of 36 cubic units.



$3 \times 3 \times 4$

Volume = 36 cubic units

Name: _____

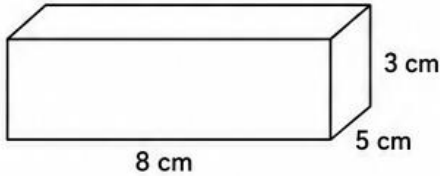
Date: _____

RECTANGULAR PRISM VOLUME

$$V = l \times w \times h \quad \text{Always include a cubic unit.}$$

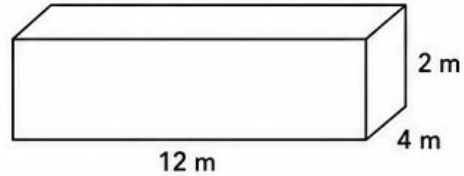
A. CALCULATE THE VOLUME

1. $8 \text{ cm} \times 5 \text{ cm} \times 3 \text{ cm}$



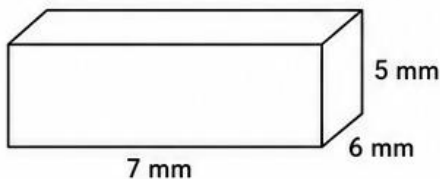
$V =$ _____

2. $12 \text{ m} \times 4 \text{ m} \times 2 \text{ m}$



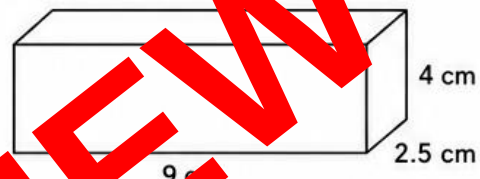
$V =$ _____

3. $7 \text{ mm} \times 6 \text{ mm} \times 5 \text{ mm}$



$V =$ _____

4. $9 \text{ cm} \times 2.5 \text{ cm} \times 4 \text{ cm}$



$V =$ _____

B. FIND THE MISSING DIMENSION

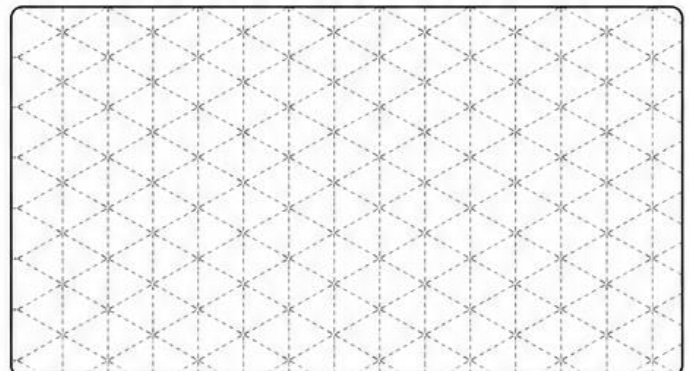
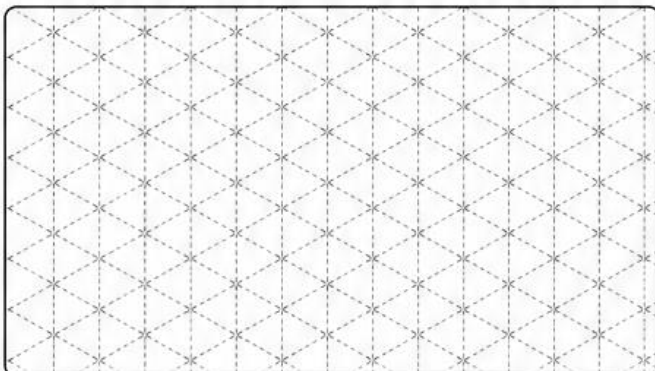
5. $V = 240 \text{ cm}^3$, $l = 10 \text{ cm}$, $w =$ _____ cm. Find h .

6. $V = 378 \text{ m}^3$, $l = 9 \text{ m}$, $w = 7 \text{ m}$. Find h .

C. COMPARE AND DESIGN

7. Box A: $15 \text{ cm} \times 8 \text{ cm} \times 6 \text{ cm}$. Box B: $12 \text{ cm} \times 10 \text{ cm} \times 5 \text{ cm}$. Which box has the greater volume, and by how much?

8. Design two different rectangular prisms with a volume of 480 cm^3 . Label both sets of dimensions.



Name: **ANSWERS**

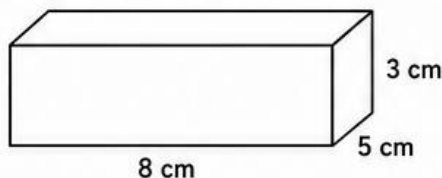
Date: _____

RECTANGULAR PRISM VOLUME

$$V = l \times w \times h \quad \text{Always include a cubic unit.}$$

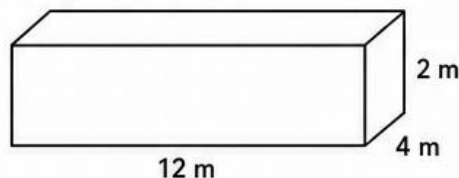
A. CALCULATE THE VOLUME

1. $8 \text{ cm} \times 5 \text{ cm} \times 3 \text{ cm}$



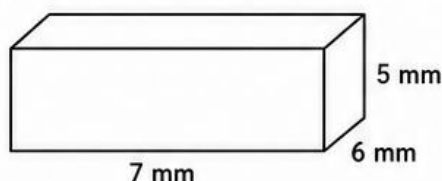
$$V = \underline{120 \text{ cm}^3}$$

2. $12 \text{ m} \times 4 \text{ m} \times 2 \text{ m}$



$$V = \underline{96 \text{ m}^3}$$

3. $7 \text{ mm} \times 6 \text{ mm} \times 5 \text{ mm}$



$$V = \underline{210 \text{ mm}^3}$$

4. $9 \text{ cm} \times 2.5 \text{ cm} \times 4 \text{ cm}$



$$V = \underline{90 \text{ cm}^3}$$

B. FIND THE MISSING DIMENSION

5. $V = 240 \text{ cm}^3$, $l = 10 \text{ cm}$, $w = 6 \text{ cm}$. Find h .

$$\underline{h = 240 \div (10 \times 6) = 4 \text{ cm}}$$

6. $V = 378 \text{ m}^3$, $l = 9 \text{ m}$, $w = 7 \text{ m}$. Find h .

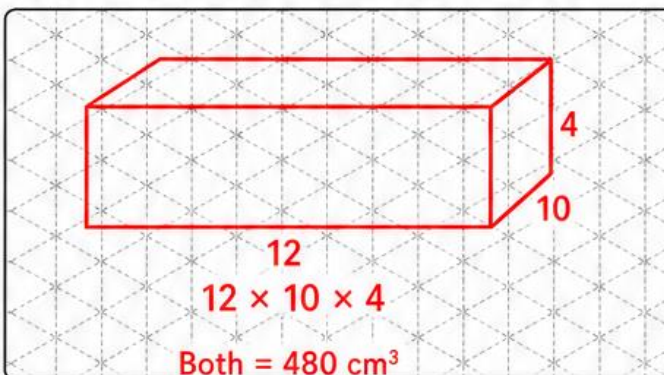
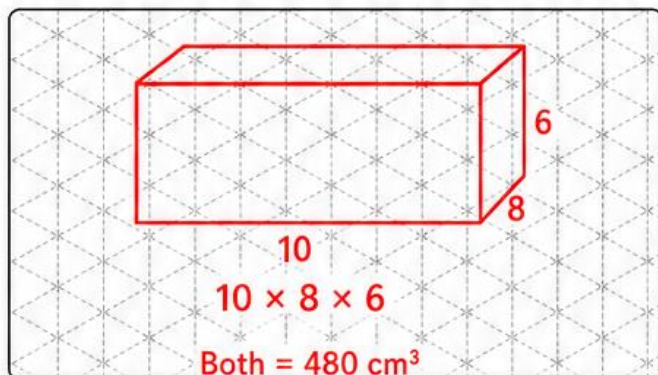
$$\underline{h = 378 \div (9 \times 7) = 6 \text{ m}}$$

C. COMPARE AND DESIGN

7. Box A: $15 \text{ cm} \times 8 \text{ cm} \times 6 \text{ cm}$. Box B: $12 \text{ cm} \times 10 \text{ cm} \times 5 \text{ cm}$. Which box has the greater volume, and by how much?

Box A = 720 cm^3 ; Box B = 600 cm^3 . Box A is greater by 120 cm^3 .

8. Design two different rectangular prisms with a volume of 480 cm^3 . Label both sets of dimensions.



Name: _____

Date: _____



CAPACITY CONVERSIONS



1000 mL = 1 L L to mL: $\times 1000$ mL to L: $\div 1000$

A. CONVERT

1. 1.8 L = _____ mL
2. 0.65 L = _____ mL
3. 4.25 L = _____ mL
4. 2750 mL = _____ L
5. 6000 mL = _____ L
6. 125 mL = _____ L

B. COMPARE

Write $<$, $>$ or $=$.

7. 2.4 L _____ 2350 mL

8. 0.9 L _____ 950 mL

C. SOLVE

9. A jug holds 3 L. After 750 mL is poured out, how many millilitres remain?

Answer: _____

10. Four bottles each hold 625 mL. What is their total capacity in litres?

Answer: _____

Which operation helps you convert from mL to L? Why?

Name: **ANSWERS**

Date: _____



CAPACITY CONVERSIONS

 $1000 \text{ mL} = 1 \text{ L}$ $\text{L to mL: } \times 1000$ $\text{mL to L: } \div 1000$

A. CONVERT

1. 1.8 L = 1800 mL
2. 0.65 L = 650 mL
3. 4.25 L = 4250 mL
4. 2750 mL = 2.75 L
5. 6000 mL = 6 L
6. 125 mL = 0.125 L

B. COMPARE

Write <, > or =.

7. 2.4 L
- >
- 2350 mL

8. 0.9 L
- <
- 950 mL

C. SOLVE

9. A jug holds 3.5 L. After 750 mL is poured out, how many millilitres remain?

 $3.5 \text{ L} = 3500 \text{ mL}; 3500 - 750 = 2750 \text{ mL}$ Answer: 2750 mL

10. Four bottles each hold 625 mL. What is their total capacity in litres?

 $4 \times 625 \text{ mL} = 2500 \text{ mL} = 2.5 \text{ L}$ Answer: 2.5 L

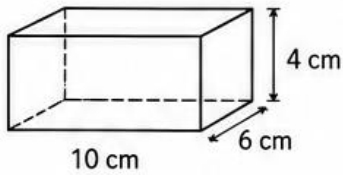
Which operation helps you convert from mL to L? Why?

Divide by 1000, because 1000 mL equals 1 L.

Name: _____

Date: _____

LINKING VOLUME AND CAPACITY



$$1 \text{ cm}^3 = 1 \text{ mL} \quad 1000 \text{ cm}^3 = 1 \text{ L}$$



A. FROM DIMENSIONS TO CAPACITY

1. A container is $10 \text{ cm} \times 6 \text{ cm} \times 4 \text{ cm}$. Find its volume and capacity in mL.

_____ Answer: _____

2. An aquarium is $20 \text{ cm} \times 10 \text{ cm} \times 15 \text{ cm}$. Find its volume in cm^3 and capacity in L.

_____ Answer: _____

3. A storage box is $25 \text{ cm} \times 8 \text{ cm} \times 5 \text{ cm}$. Find its volume and equivalent capacity in L.

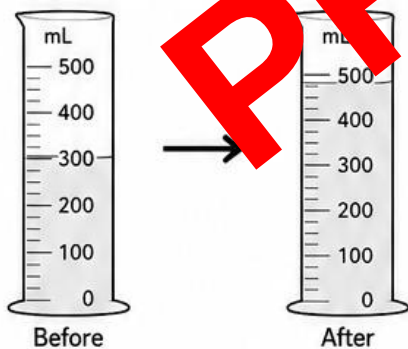
_____ Answer: _____

4. A container has a volume of 2750 cm^3 . What is its capacity in L?

_____ Answer: _____

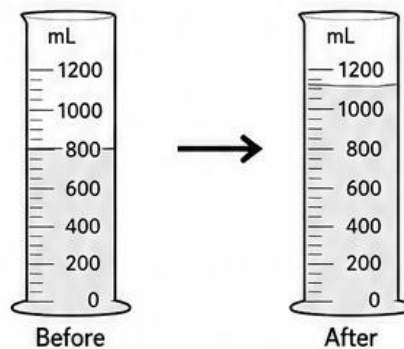
B. USE DISPLACEMENT

5. Water rises from 320 mL to 485 mL.



Object volume = _____ cm^3

6. Water rises from 750 mL to 1.15 L.



Object volume = _____ cm^3

C. EXPLAIN

7. Choose whole-number dimensions for a rectangular container with a capacity of 1.2 L.

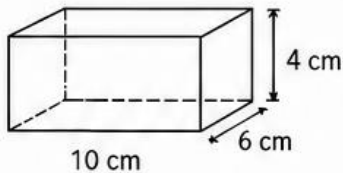
8. Why does the relationship $1 \text{ cm}^3 = 1 \text{ mL}$ make container problems easier?

Name: _____

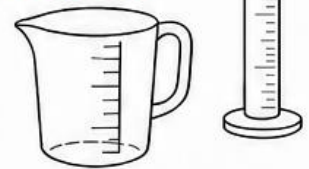
Date: _____

LINKING VOLUME AND CAPACITY

ANSWERS



$$1 \text{ cm}^3 = 1 \text{ mL} \quad 1000 \text{ cm}^3 = 1 \text{ L}$$



A. FROM DIMENSIONS TO CAPACITY

1. A container is 10 cm × 6 cm × 4 cm. Find its volume and capacity in mL.

240 cm³; 240 mL

Answer: _____

2. An aquarium is 20 cm × 10 cm × 15 cm. Find its volume in cm³ and capacity in L.

3000 cm³; 3 L

Answer: _____

3. A storage box is 25 cm × 8 cm × 5 cm. Find its volume and equivalent capacity in L.

1000 cm³; 1 L

Answer: _____

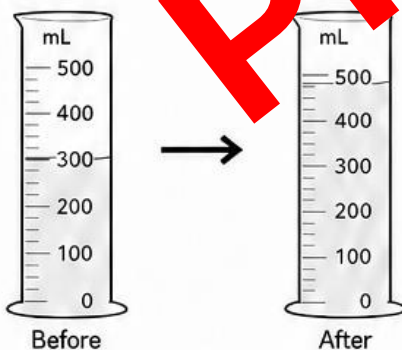
4. A container has a volume of 2750 cm³. What is its capacity in litres?

2.75 L

Answer: _____

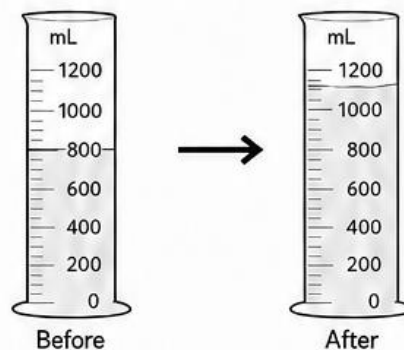
B. USE DISPLACEMENT

5. Water rises from 240 mL to 405 mL.



Object volume = **165** cm³

6. Water rises from 750 mL to 1.15 L.



Object volume = **400** cm³

C. EXPLAIN

7. Choose whole-number dimensions for a rectangular container with a capacity of 1.2 L.

Example: 10 cm × 10 cm × 12 cm = 1200 cm³ = 1.2 L

8. Why does the relationship 1 cm³ = 1 mL make container problems easier?

Equal numerical measures let us convert directly between cubic centimetres and millilitres.

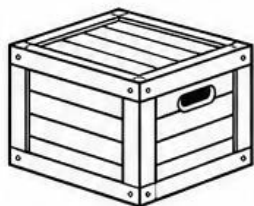
Name: _____

Date: _____

VOLUME AND CAPACITY PROBLEM-SOLVING

$$V = l \times w \times h \quad 1 \text{ cm}^3 = 1 \text{ mL} \quad 1000 \text{ mL} = 1 \text{ L}$$

1



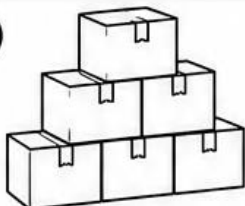
A storage crate measures $18 \text{ cm} \times 12 \text{ cm} \times 10 \text{ cm}$.
Find its volume.

2



A 2.75 L tank receives another 850 mL.
What is the total capacity in litres?

3



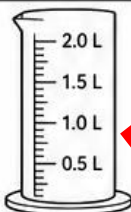
A shelf holds 6 boxes, each $20 \text{ cm} \times 8 \text{ cm} \times 10 \text{ cm}$.
Find the total volume of all six boxes.

4



A cooler measures $30 \text{ cm} \times 25 \text{ cm} \times 15 \text{ cm}$.
Find its capacity in litres.

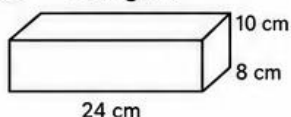
5



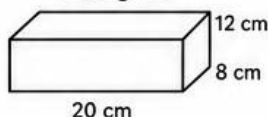
A rock makes the water rise from 1.4 L to 1.685 L.
Find the rock's volume in cm^3 .

6

Design A

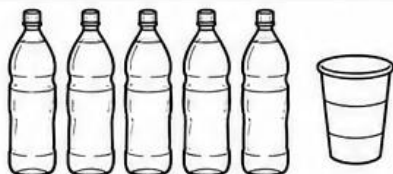


Design B



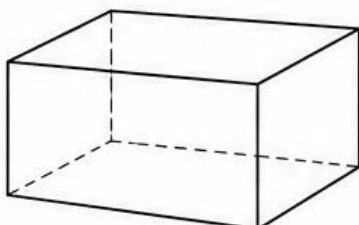
Compare Design A: $24 \text{ cm} \times 10 \text{ cm} \times 8 \text{ cm}$
and Design B: $20 \text{ cm} \times 12 \text{ cm} \times 8 \text{ cm}$.
Which has greater volume?

7



Five 1.2 L bottles are poured into 750 mL cups.
How many full cups can be filled, and how much remains?

8



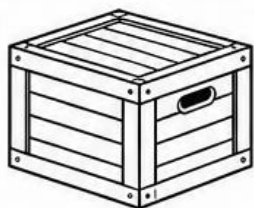
Design a rectangular container with whole-number
centimetre dimensions and a capacity of exactly 4.8 L.
Show and explain your choice.

Name: _____

Date: _____

VOLUME AND CAPACITY PROBLEM-SOLVING

$$V = l \times w \times h \quad 1 \text{ cm}^3 = 1 \text{ mL} \quad 1000 \text{ mL} = 1 \text{ L}$$

ANSWERS**1**

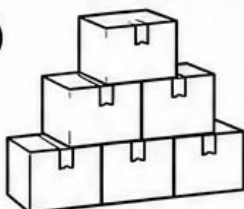
A storage crate measures $18 \text{ cm} \times 12 \text{ cm} \times 10 \text{ cm}$.
Find its volume.

$$18 \times 12 \times 10 = 2160 \text{ cm}^3$$

2

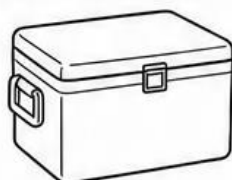
A 2.75 L tank receives another 850 mL.
What is the total capacity in litres?

$$2.75 \text{ L} + 0.85 \text{ L} = 3.60 \text{ L}$$

3

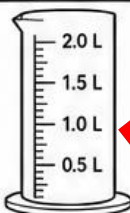
A shelf holds 6 boxes, each $20 \text{ cm} \times 8 \text{ cm} \times 5 \text{ cm}$.
Find the total volume of all six boxes.

$$20 \times 8 \times 5 = 800 \text{ cm}^3 \text{ each, } 6 \times 800 = 4800 \text{ cm}^3$$

4

A cooler measures $30 \text{ cm} \times 20 \text{ cm} \times 15 \text{ cm}$.
Find its capacity in litres.

$$30 \times 20 \times 15 = 9000 \text{ cm}^3 = 9 \text{ L}$$

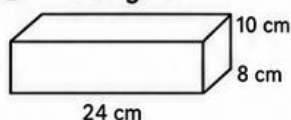
5

A rock makes water rise from 1.4 L to 1.685 L.
Find the rock's volume in cm^3 .

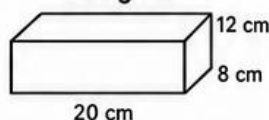
$$1.685 \text{ L} - 1.4 \text{ L} = 0.285 \text{ L} = 285 \text{ mL, so } 285 \text{ cm}^3$$

6

Design A



Design B



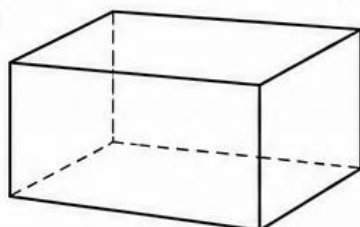
Compare Design A: $24 \text{ cm} \times 10 \text{ cm} \times 8 \text{ cm}$
and Design B: $20 \text{ cm} \times 12 \text{ cm} \times 8 \text{ cm}$.
Which has greater volume?

$$A = 1920 \text{ cm}^3; B = 1920 \text{ cm}^3; \text{equal volume}$$

7

Five 1.2 L bottles are poured into 750 mL cups.
How many full cups can be filled, and how much remains?

$$5 \times 1.2 \text{ L} = 6000 \text{ mL}; 6000 \div 750 = 8 \text{ full cups}; \\ 0 \text{ mL remains}$$

8

Design a rectangular container with whole-number
centimetre dimensions and a capacity of exactly 4.8 L.
Show and explain your choice.

$$\text{Example: } 20 \text{ cm} \times 20 \text{ cm} \times 12 \text{ cm} = \\ 4800 \text{ cm}^3 = 4.8 \text{ L.}$$

SUSTAINABLE SCIENCE LAB STORAGE CHALLENGE

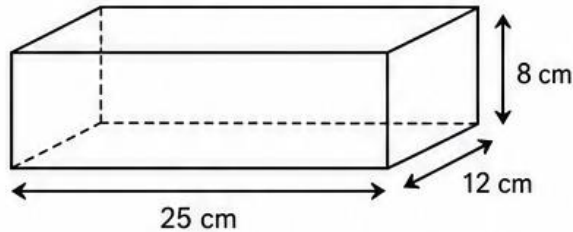
Assessment — Page 1 of 2

Name: _____ Date: _____

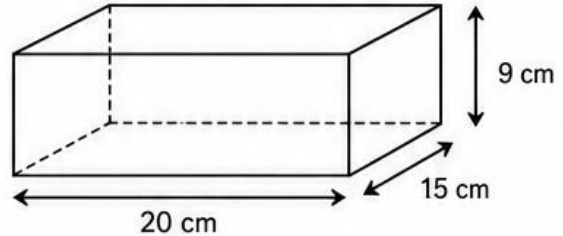
Show all working. Include correct units.

A sustainable science lab needs spill-safe rectangular containers for liquids and samples.

Design A: 25 cm × 12 cm × 8 cm



Design B: 20 cm × 15 cm × 9 cm



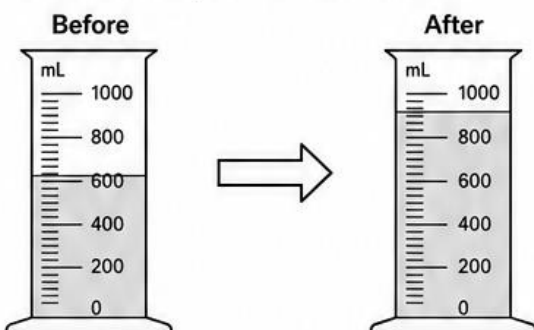
1. Calculate the volume of Design A in cm^3 and its capacity in litres.

2. Calculate the volume of Design B in cm^3 and its capacity in litres.

3. Compare the designs. Which holds more and by how much?

4. The lab needs a container that holds at least 2.5 L. Which design meets the requirement? Justify your answer.

5. A measuring cylinder rises from 600 mL to 925 mL when a sample is added. Find the sample's volume in cm^3 .



SUSTAINABLE SCIENCE LAB STORAGE CHALLENGE

Assessment — Page 1 of 2 **ANSWERS**

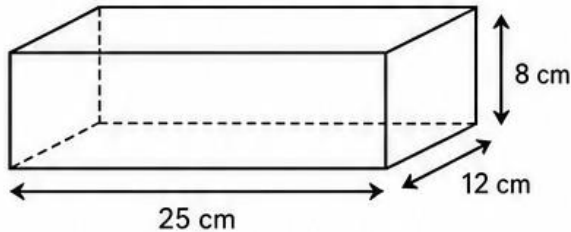
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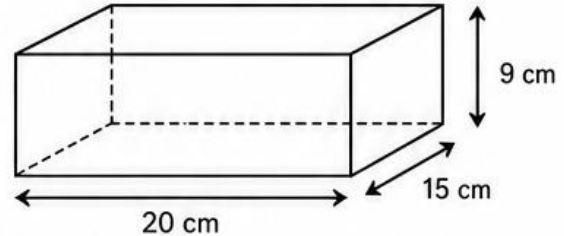
Show all working. Include correct units.

A sustainable science lab needs spill-safe rectangular containers for liquids and samples.

Design A: 25 cm × 12 cm × 8 cm



Design B: 20 cm × 15 cm × 9 cm



1. Calculate the volume of Design A in cm^3 and its capacity in litres.

$$25 \times 12 \times 8 = 2400 \text{ cm}^3 = 2400 \text{ mL} = 2.4 \text{ L}$$

2. Calculate the volume of Design B in cm^3 and its capacity in litres.

$$20 \times 15 \times 9 = 2700 \text{ cm}^3 = 2700 \text{ mL} = 2.7 \text{ L}$$

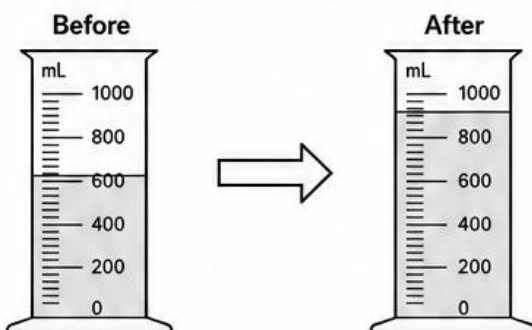
3. Compare the designs. Which holds more and by how much?

Design B holds more. $2700 - 2400 = 300 \text{ cm}^3$, or 300 mL more.

4. The lab needs a container that holds at least 2.5 L. Which design meets the requirement? Justify your answer.

Design B; $2.7 \text{ L} \geq 2.5 \text{ L}$. Design A is only 2.4 L.

5. A measuring cylinder rises from 600 mL to 925 mL when a sample is added. Find the sample's volume in cm^3 .



$$925 - 600 = 325 \text{ mL};$$

therefore the sample's
volume is 325 cm^3 .

SUSTAINABLE SCIENCE LAB STORAGE CHALLENGE

Assessment — Page 2 of 2

Name: _____

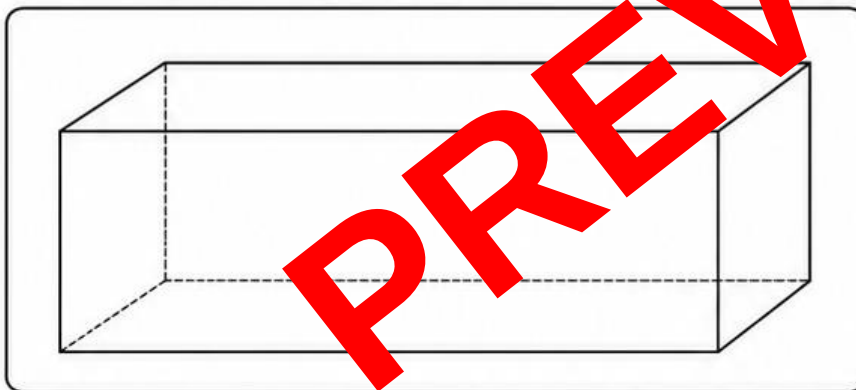
Date: _____

6. The lab must store 12 identical sample jars.
Each jar holds 350 mL.
Find the total capacity in millilitres and litres.



7. The available tanks hold 4.2 L and 5 L.
Which is the most efficient choice for the 12 jars? Explain.

8. Design a rectangular storage container with whole-number centimetre dimensions and a capacity of exactly 6 L.
Label a clear rectangular-prism sketch and show all working.



Show all working.

9. Explain the difference between volume and capacity, and explain why $1 \text{ cm}^3 = 1 \text{ mL}$ is useful.

Volume	Capacity

10. Reflection: tick one statement —

☐

I can calculate volume confidently.

☐

I can convert capacity units confidently.

☐

I need more practice with both.

SUSTAINABLE SCIENCE LAB STORAGE CHALLENGE ANSWERS

Assessment — Page 2 of 2

Name: _____

Date: _____

6. The lab must store 12 identical sample jars.
Each jar holds 350 mL.
Find the total capacity in millilitres and litres.



$$12 \times 350 \text{ mL} = 4200 \text{ mL} = 4.2 \text{ L}$$

7. The available tanks hold 4.2 L and 5 L.
Which is the most efficient choice for the 12 jars? Explain.

Choose 4.2 L. It holds the jars exactly, while 5 L leaves 0.8 L unused.

8. Design a rectangular storage container with whole-number centimetre dimensions and a capacity of exactly 6 L.
Label a clear rectangular-prism sketch and show all working.



Show all working.

$$25 \times 20 \times 12 = 6000 \text{ cm}^3 = 6000 \text{ mL} = 6 \text{ L}$$

9. Explain the difference between volume and capacity, and explain why $1 \text{ cm}^3 = 1 \text{ mL}$ is useful.

Volume	Capacity
The three-dimensional space an object occupies, measured in cubic units.	How much a container can hold, measured in mL or L.

Because $1 \text{ cm}^3 = 1 \text{ mL}$, cubic volume converts directly to liquid capacity.

10. Reflection: tick one statement —

Student self-assessment — accept any honest choice.

☐

I can calculate volume confidently.

☐

I can convert capacity units confidently.

☐

I need more practice with both.

VOLUME AND CAPACITY RUBRIC

Student: _____

Date: _____

Teacher: _____

	BEGINNING	DEVELOPING	ACHIEVING	CONFIDENT	EXCEEDING
Concepts	Shows limited understanding of volume and capacity. Struggles to identify cubic units, litres and millilitres.	Shows some understanding of volume and capacity. Identifies cubic units, litres or millilitres with support.	Understands volume as space in 3D objects (measured in cubic units) and capacity as how much a container holds (measured in litres/mL).	Clearly explains the difference between volume and capacity and identifies appropriate units in a range of contexts.	Deeply understands volume and capacity and their measurements. Makes connections and explains using precise mathematical language.
Volume Calculations	Needs support with using the formula $V = l \times w \times h$. Makes many errors in calculations.	Uses $V = l \times w \times h$ with support. Makes errors in calculations with multiplication of decimals.	Accurately calculates volume of rectangular prisms using $V = l \times w \times h$. May make occasional minor calculation errors.	Accurately and independently calculates volume for a variety of rectangular prisms. Handles decimal measurements well.	Accurately and independently solves multi-step volume problems, including composite shapes. Shows flexible and efficient strategies.
Metric Conversions	Has difficulty converting between mL and L. Needs frequent support and reminders.	Converts between mL and L with support. Errors with place value or decimal placement are common.	Accurately converts between mL and L using decimals and place value. Minor errors may occur in complex cases.	Accurately and independently converts between mL and L. Understands and uses decimal notation confidently.	Flexibly and accurately converts between mL and L in a wide range of contexts, including multi-step problems and real-world situations.
Volume-Capacity Connection	Struggles to connect volume and capacity. Limited understanding that $1 \text{ L} = 1000 \text{ mL}$.	Recognises that $1 \text{ L} = 1000 \text{ mL}$ with support. Limited application to solve problems involving both.	Understands and uses the connection between volume and capacity to solve problems accurately.	Confidently connects volume (in cm^3 or m^3) and capacity (in L/mL) and applies this to solve complex problems.	Insightfully applies the volume-capacity connection in challenging contexts and justifies reasoning clearly.
Problem Solving and Reasoning	Needs significant support to interpret problems and choose strategies. Solutions are incomplete.	Solves simple problems with support. May miss key steps or make errors in reasoning or calculations.	Solves a range of problems using appropriate strategies. Provides logical reasoning with minor gaps.	Solves problems independently using efficient strategies. Provides clear reasoning and checks solutions.	Solves challenging problems with creativity and efficiency. Provides well-justified reasoning and evaluates solutions.
Communication and Units	Work is difficult to follow. Units are missing or incorrect most of the time.	Uses units inconsistently. Explanations are limited or unclear.	Uses appropriate units consistently. Explains thinking clearly using correct mathematical terms.	Communicates clearly and organised work. Consistently uses correct units and mathematical language.	Communicates ideas with precision and clarity. Uses accurate units and justifies solutions thoroughly.

Overall level:

☐ BEGINNING

☐ DEVELOPING

☐ ACHIEVING

☐ CONFIDENT

☐ EXCEEDING

Teacher feedback / next steps:

Volume and Capacity Year 6 Mathematics



Today's Focus

- Measure volume using cubic units
- Calculate rectangular prism volume with $V = l \times w \times h$
- Convert between millilitres and litres
- Connect 1 m^3 of volume with 1 mL of capacity



Volume or Capacity:

VOLUME

The three-dimensional space an object occupies.

Measured in cubic units cm^3 or m^3 .

CAPACITY

How much a container can hold.

Measured in mL or L.



Cubic Units

A cubic unit is a cube with equal side lengths.

1 cm^3 is a cube measuring $1 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$.

We count cubes to measure the space inside a 3D object.



Build in Layers

A prism has 4 cubes in each row, 3 rows in each layer and 2 layers.

$4 \times 3 = 12$ cubes in one layer

$12 \times 2 = 24$ cubes altogether

Volume = 24 cm^3



The Volume Formula

$$V = l \times w \times h$$

length $\times$ width gives the area of one layer.

Multiplying by height counts all the layers.

Answer in cubic units with your answer.



Worked Example

A rectangular prism measures 8 cm $\times$ 5 cm $\times$ 4 cm.

$$V = l \times w \times h$$

$$V = 8 \times 5 \times 4$$

$$= 160 \text{ cm}^3$$



Your Turn

A storage box measures $9\text{ m} \times 4\text{ m} \times 3\text{ cm}$.

Calculate its volume.

Show the formula, substitution and cubic unit.



Answer

$$V = l \times w \times h$$

$$= 9 \times 4 \times 3$$

$$V = 108 \text{ cm}^3$$

The storage box occupies 108 cubic centimetres.



Choose the Best Unit

cm^3 – small objects and containers

m^3 – rooms, pools and large spaces

mL – small liquid capacities

L – bottles, buckets and tanks

Choose the unit to the size and context.



Metric Capacity Factors

1000 mL = 1 L

1 m = 0.001 L

mL to L: multiply by 1000

mL to L: divide by 1000

Keep place value aligned when decimals are used.



Convert 3.45 Litres

$$3.45 \text{ L} = 3 \text{ L} + 0.45$$

$$3 \text{ L} = 3000 \text{ mL}$$

$$0.45 \text{ L} = 450 \text{ mL}$$

$$3.45 \text{ L} = 3450 \text{ mL}$$



Capacity Practice

Convert each measurement.

1. 2.6 L to mL

2. 850 mL to L

3. 0.48 L to mL

Estimate first, then check that your answer is sensible.



Capacity Answers

1. $2.6 \text{ l} = 260 \text{ mL}$

2. $8250 \text{ mL} = 8.25 \text{ L}$

3. $0.48 \text{ L} = 480 \text{ mL}$

Each conversion preserves the same capacity.



The Key Connection

$$1 \text{ cm}^3 = 1 \text{ mL}$$

A container with an inside volume of 750 cm^3 can hold 750 mL.

$$1000 \text{ cm}^3 = 1000 \text{ mL} = 1 \text{ L}$$



Container Example

A container measures 12 cm $\times$ 10 cm $\times$ 8 cm.

$$V = 12 \times 10 \times 8 = 960 \text{ cm}^3$$

Capacity = 960 mL

Capacity = 0.96 L



Measure by Displacement

Water begins at 425 mL and rises to 680 mL.

$$680 - 425 = 255 \text{ mL}$$

The object displaces 255 mL, so its volume is 255 cm^3 .



Aquarium Application

Inside dimensions: 40 cm × 25 cm × 30 cm

$$V = 40 \times 25 \times 30$$

$$= 30,000 \text{ cm}^3$$

$$\text{Capacity} = 30,000 \text{ mL} = 30 \text{ L}$$



Avoid These Misconceptions

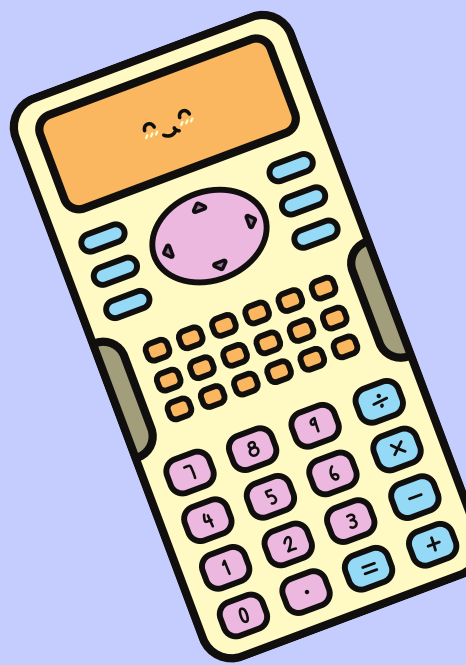
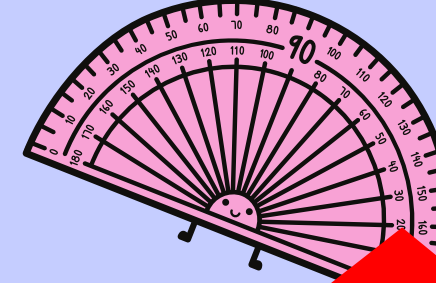
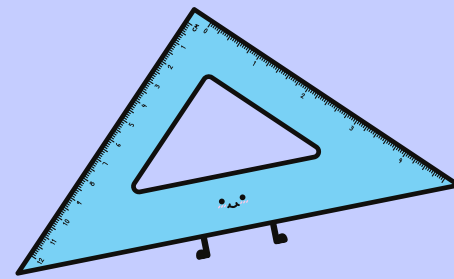
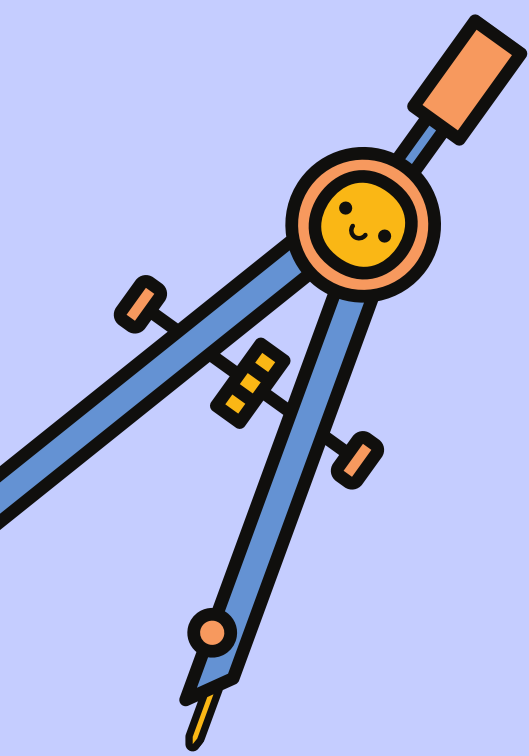
- Area uses square units; volume uses cubic units.
 - Rotating a solid does not change its volume.
- Capacity describes what a container can hold.
 - $1\text{ L} = 1000\text{ mL}$, not 100 mL .
- Include units in every final answer.



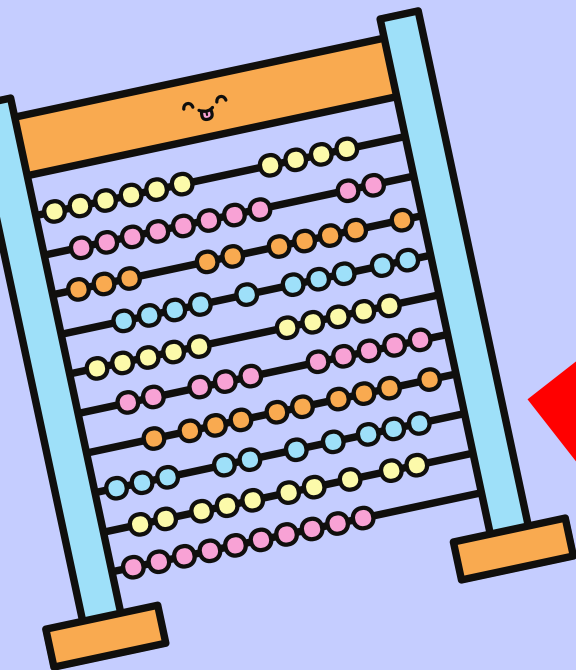
Review Challenge

1. Find the volume and capacity of a container measuring $15\text{ cm} \times 8\text{ cm} \times 5\text{ cm}$.
 2. A tank holds 3.2 L . If 650 mL is removed, how much remains in liters?
- Remember to show your work in each step and check your units.

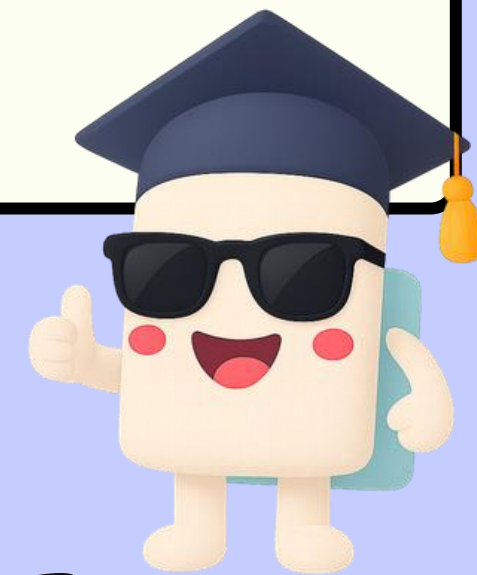
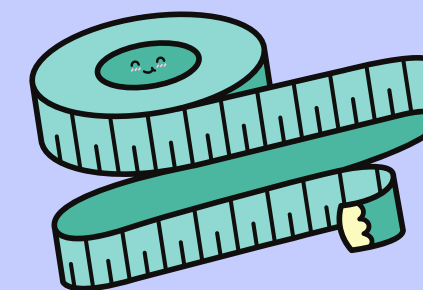
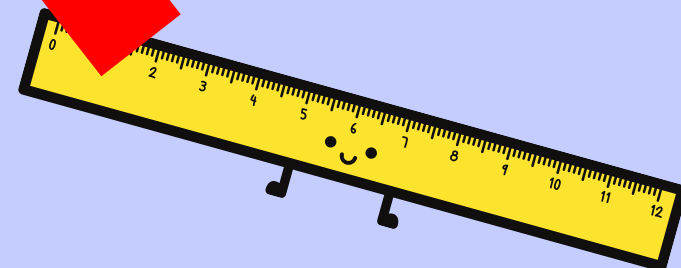




Well Done!
You can measure volume
and capacity.



PREF



Volume and Capacity

Year 5 Mathematics



Question 1 — True or False

cm^3 is equal to 1 mL.



Answer 1

One cubic centimetre of space corresponds to one millilitre of capacity.



Question 2 — Multiple Choice

What is the volume of a prism measuring $6\text{ cm} \times 4\text{ cm} \times 3\text{ cm}$?

- A. 13 cm^3 B. 12 cm^3 C. 72 cm^3 D. 144 cm^3



Answer 2

C. 72 cm^3

$$V = 3 \times 4 \times 6 = 72 \text{ cm}^3$$



Question 3 — Short Answer

Convert 2.15 L to millilitres.



Answer 3

$$2.5 \text{ L} = 2500 \text{ mL}$$

Multiply litres by 1000.



Question 4 — Multiple Choice

Which unit is best for the capacity of a drink bottle?

A. cm^3 B. cm^2 C. mL D. m



Answer 4

C.I

Millilitres is the liquid capacity of a drink bottle.



Question 5 — Short Answer

A container measures $12\text{ cm} \times 8\text{ cm} \times 5\text{ cm}$.

Find its volume and capacity in millilitres.



Answer 5

$$V = 12 \times 8 \times 5 = 480 \text{ cm}^3$$

$$\text{Capacity} = 480 \text{ mL}$$



Question 6 — True or False

Rotating a rectangular prism changes its volume.



Answer 6

FALSE

Rotation changes orientation, not dimensions or volume.



Question 7 — Multiple Choice

Water rises from 310 mL to 895 mL when an object is added.

What is the object's volume?

- A. 275 cm^3 B. 585 cm^3 C. 895 cm^3 D. 275 m^3



Answer 7

A. 275 cm^3

$585 - 310 = 275 \text{ cm}^3$ so the object's volume is 275 cm^3 .



Question 8 — Short Answer

Give whole-number dimensions for a rectangular prism with a volume of 360 cm^3 .



Answer 8

Example: $12\text{ cm} \times 10\text{ cm} \times 3\text{ cm}$

$$12 \times 10 \times 3 = 360\text{ cm}^3$$

Other correct factor combinations are possible.



Question 9 — Multiple Choice

Design A: $8\text{ cm} \times 5\text{ cm} \times 4\text{ cm}$

Design B: $10\text{ cm} \times 4\text{ cm} \times 3\text{ cm}$

Which has greater volume?

- A. Design A B. Design B C. They are equal



Answer q

A. sign

$A = 10 \text{ cm}^3$ and $B = 120 \text{ cm}^3$.

Design is greater by 40 cm^3 .



Question 10 — Short Answer

A tank contains 3.4 L. Another 650 mL is added.

What is the total capacity in litres?



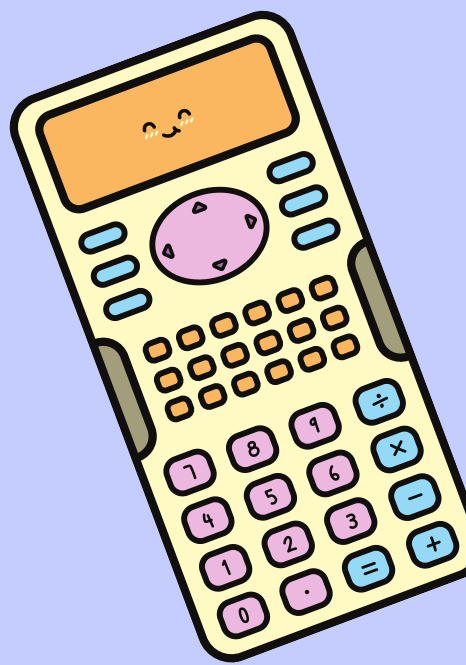
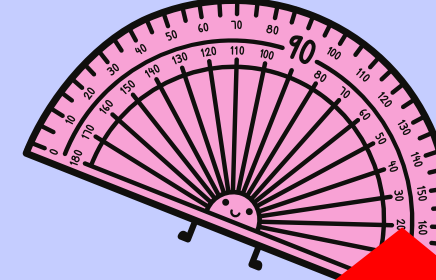
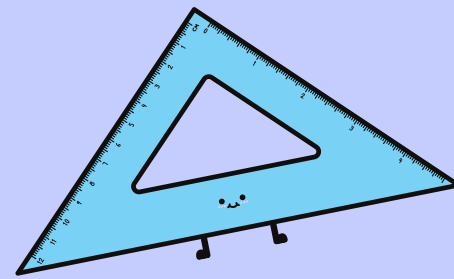
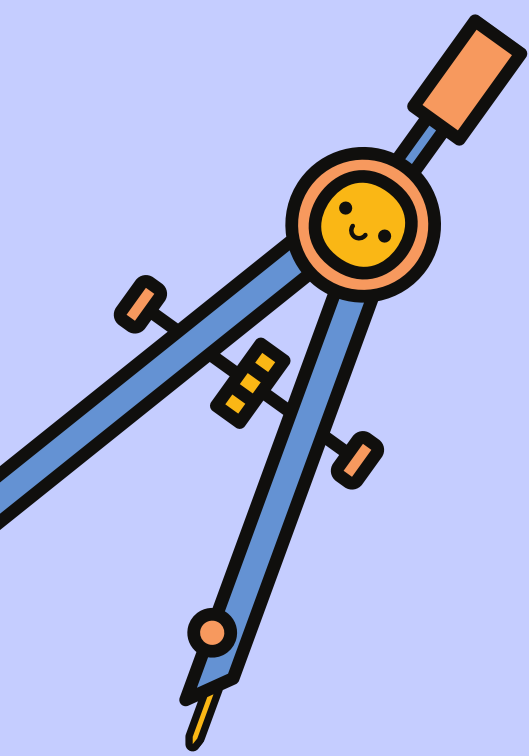
Answer 10

$$3 \text{ L} = 3000 \text{ mL}$$

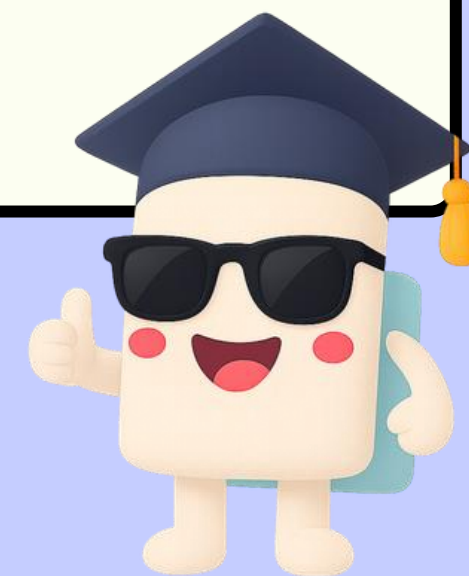
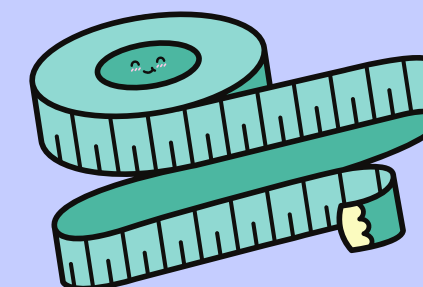
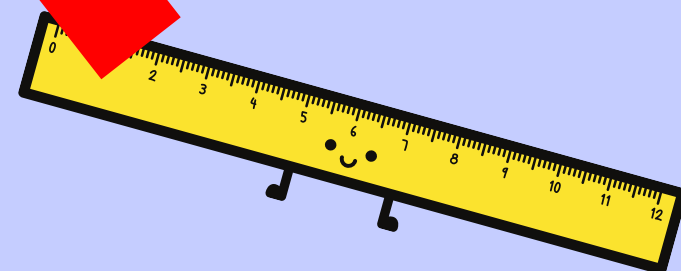
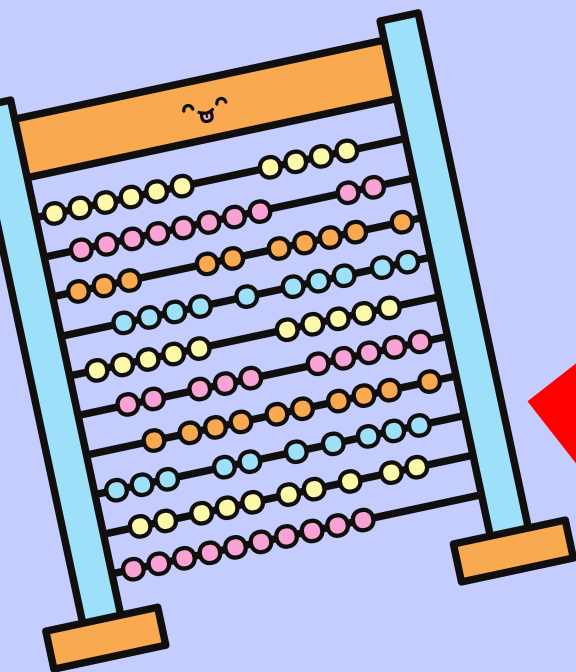
$$3000 + 50 = 4050 \text{ mL}$$

$$4050 \text{ mL} = 4.05 \text{ L}$$





Well Done.
Quiz complete.



PREVIEW