



Surface area and volume

GCSE Mathematics 1MA1 · L036 · 60 minutes

Objective: Find surface area and volume using appropriate nets and formulae, and explain the difference between exposed area and capacity.

Calculator conditions: questions are labelled NC (non-calculator) or C (calculator). Use exact π unless a decimal answer is requested.

Connect & Check 5 min

Complete the baseline independently. Keep your first response so you can compare it with the exit task.

C1. A cuboid measures 8 cm by 5 cm by 3 cm. Find its volume. **[NC] [2 marks]**

C2. What is the difference between surface area and volume? Include the correct type of units for each. **[NC] [2 marks]**

Share 5 min

Choose one route below. All routes lead to the same core evidence. Compare your route with a partner before you move on.

Route	What you do	Evidence you produce
A · Visual	Sketch or label a net before calculating.	A labelled net + calculation.
B · Method	Use a formula/face table and explain each term.	A clear method + units.
C · Explain	Start by explaining which	A written justification +

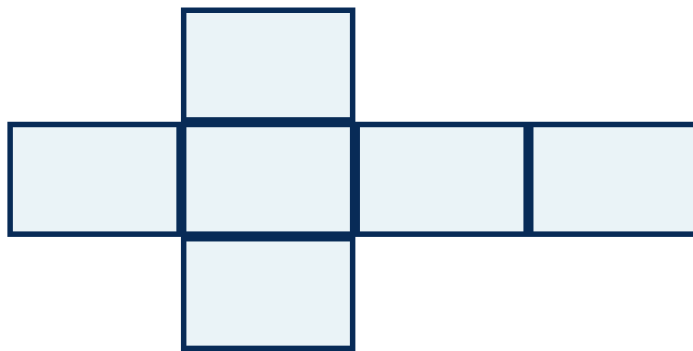
faces count and why.

calculation.

Present
12 min

Study the two models. Annotate the images and complete the worked examples with the teacher.

Cuboid net: every exposed face counts once



8 cm

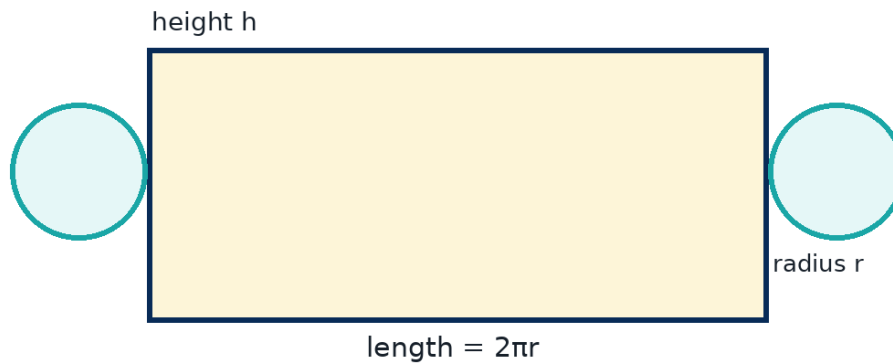
5 cm

3 cm

Surface area uses square units; volume uses cubic units.

P1. For an 8 cm by 5 cm by 3 cm cuboid, complete: surface area = $2(8 \times 5 + 8 \times 3 + 5 \times 3) = \underline{\hspace{2cm}}$ cm².
Then check the volume. **[NC] [3 marks]**

Cylinder surface area = rectangle + two circles



$$\text{Total surface area} = 2\pi r^2 + 2\pi rh$$

P2. A closed cylinder has radius 4 cm and height 9 cm. Write an exact expression for its total surface area and volume. **[C] [4 marks]**

Apply
25 min

Complete the supported questions first. Then remove the scaffold and complete the independent and exam-style questions.

Supported practice

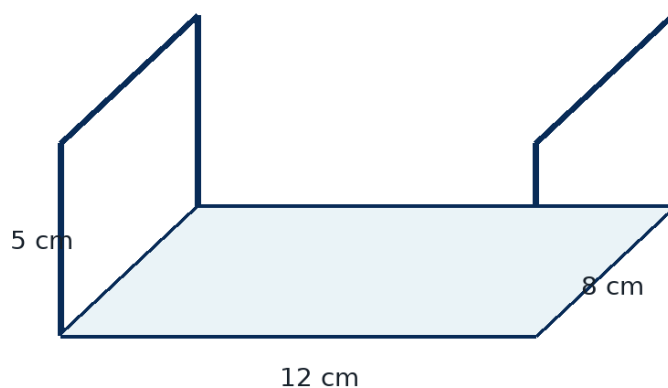
A1. A cuboid is 10 cm long, 6 cm wide and 4 cm high. Use the face-pair structure $2(lw + lh + wh)$ to find the total surface area. **[NC] [3 marks]**

A2. The same cuboid has volume 240 cm^3 . Explain why the units are cm^3 rather than cm^2 . **[NC] [2 marks]**

Independent practice - scaffold removed

A3. A closed cylinder has radius 3.5 cm and height 12 cm. Find its total surface area and volume. Give each answer to 1 decimal place. **[C] [6 marks]**

Open-top box: distinguish capacity from exposed area



No top face in surface area. Volume still uses base area $\times$ height.

A4. An open-top box measures 12 cm by 8 cm by 5 cm. Find (a) its exposed surface area and (b) its capacity in cm^3 . **[NC] [5 marks]**

Exam-style practice

E1. A solid is a closed cylinder of radius 5 cm and height 7 cm. A learner says its surface area is $2\pi rh$ because “that is the outside”. Explain the error and calculate the correct total surface area in terms of π . **[C] [4 marks]**

E2. A cuboid has volume 360 cm^3 . Its base is 12 cm by 5 cm. Find its height, then find its total surface area. **[NC] [5 marks]**

Extension and deep challenge

X1 · Stretch. A closed cuboid has volume 120 cm^3 and dimensions 4 cm by 5 cm by h . Find h and then its surface area. **[NC] [4 marks]**

X2 · Deep challenge. A cylinder has radius r and height $2r$. Express its total surface area and volume in terms of r . Compare how each changes if r is doubled. **[C] [6 marks]**

Recall & Review 8 min

Without notes, complete the exit task. Then compare it with your Connect & Check response and write one WWW and one EBI.

R1. A closed cuboid measures 9 cm by 4 cm by 2 cm. Find both its surface area and volume, using correct units. **[NC] [4 marks]**

WWW: _____

EBI: _____

Next lesson preparation: Sketch the front, side and plan views of a stack of 4 cubes arranged as a 2×2 square on the base.

Recall & Review: feedback and extension integration

Lesson L036: Surface area and volume

Objective: Find surface area and volume using appropriate nets and formulae.

Timing for a 60-minute lesson

0-7 Connect & Check; 7-14 Share; 14-25 Present/model; 25-44 Apply route choice/practice; 44-52 independent exam-style check; 52-60 Recall & Review, WWW/EBI and next step.

Recall & Review evidence

At the end of the lesson, solve a fresh question without prompts, explain one check, correct one error and record the next practice step.

What Went Well (WWW)

I selected the correct geometric fact, theorem, formula or transformation and used a clear diagram with appropriate labels and units.

Even Better If (EBI)

I will name the fact or theorem, show the substitution or construction step and check whether the size, direction and units of the result are reasonable.

Integrated stretch and deep challenge

Stretch: A closed cuboid has volume 120 cm^3 and dimensions 4 cm by 5 cm by h . Find h and surface area.

Deep challenge: A cylinder has radius r and height $2r$. Express its total surface area and volume in terms of r .

My next-step response
