

WA6MMGTH2

Three-dimensional space and structures

Core + Challenge

Volume of Rectangular Prisms

I can find the volume of rectangular prisms by counting cubes in layers and by using $\text{length} \times \text{width} \times \text{height}$.

Name: _____ Date: _____ Score: _____ / 56

Key idea

Volume is the space an object takes up, measured in cubic units: cm^3 (1 cm cubes) or m^3 .

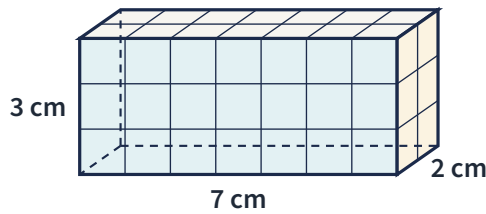
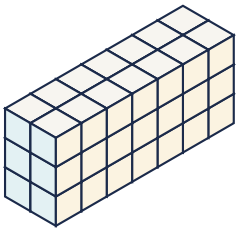
Build a prism in **layers**: one layer of $7 \times 2 = 14$ cubes, and 3 layers make $3 \times 14 = 42$ cubes.

So **volume = length $\times$ width $\times$ height**: $7 \text{ cm} \times 2 \text{ cm} \times 3 \text{ cm} = 42 \text{ cm}^3$. A 1 cm^3 cube holds **1 mL**.

Missing side? **Divide** the volume by the other two sides multiplied together: $42 \div (7 \times 2) = 3 \text{ cm}$.

3 layers of $7 \times 2 = 14$ cubes

$7 \text{ cm} \times 2 \text{ cm} \times 3 \text{ cm} = 42 \text{ cm}^3$



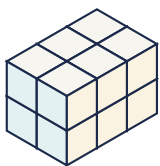
A

Warm up *count cubes and multiply*

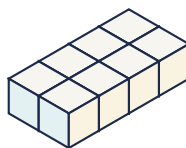
/ 16 marks

Each model is a solid rectangular prism (no gaps inside). How many cubes? 1 mark each.

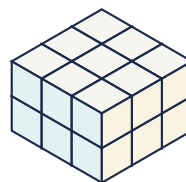
1



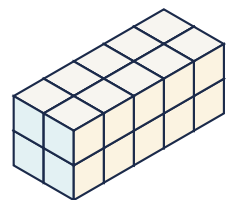
2



3



4



Which unit would you use to measure the volume: cm^3 or m^3 ? 1 mark each.

5

A dice

6

A swimming pool

7

A lunchbox

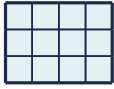
8

A shipping container

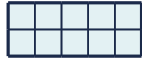
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The grid shows one layer. Find the volume in cubes. 1 mark each.

9 3 layers like this



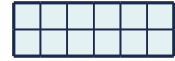
10 4 layers like this



11 3 layers like this

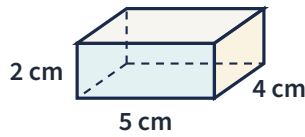


12 2 layers like this

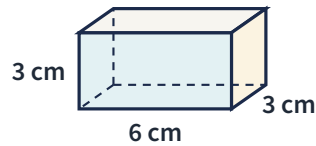


Find the volume. Use **length × width × height**. 1 mark each.

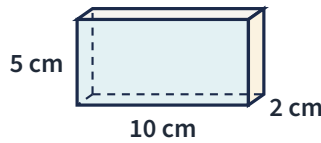
13



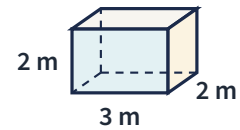
14



15



16

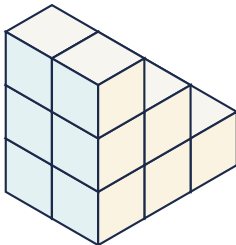


B

Practise *use the skill*

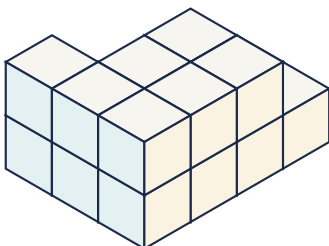
/ 21 marks

- 1 This staircase model is **2 cubes deep** all the way along, with no gaps. How many cubes are in it? Explain how you counted. [3 marks]



Answer: _____

- 2 Mia is building a rectangular prism **4 cubes long, 3 cubes wide and 2 cubes high**. The bottom layer is full. How many **more** cubes does she need? [2 marks]



Answer: _____

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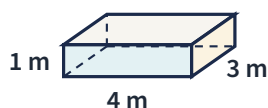
3 Complete the table for these rectangular prisms.

[3 marks]

Length	Width	Height	Volume
5 cm	3 cm	2 cm	
4 cm	4 cm		48 cm^3
6 cm		5 cm	90 cm^3
	2 cm	10 cm	100 cm^3

4 A school sandpit is **4 m** long, **3 m** wide and **1 m** deep. How many cubic metres of sand fill it? Sand costs **\$45 per m^3** . How much will the sand cost?

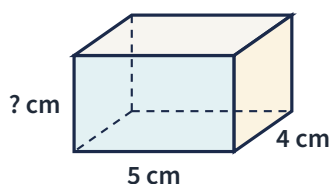
[2 marks]



Answer: _____

5 This box has a volume of **60 cm^3** . Find its height. Show your working.

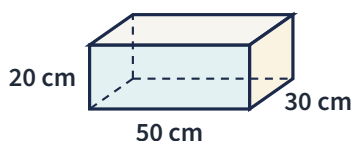
[2 marks]



Answer: _____

6 A fish tank is **50 cm** long, **30 cm** wide and **20 cm** high. **a)** Find its volume in cm^3 .
b) 1 cm^3 holds 1 mL of water. How many **litres** does the tank hold when full?

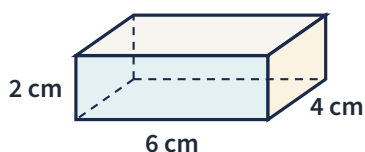
[3 marks]



Answer: _____

7 How many **2 cm** cubes will fit inside a box that is **6 cm** long, **4 cm** wide and **2 cm** high? Explain.

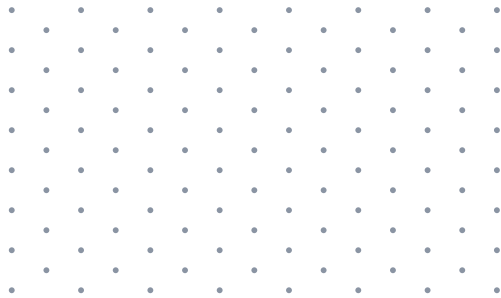
[2 marks]



Answer: _____

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- 8 On the dot paper, draw a rectangular prism with a volume of **12 cubes**. Choose one that fits on the dots. Write its length, width and height. [2 marks]



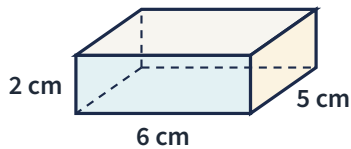
Length: _____

Width: _____

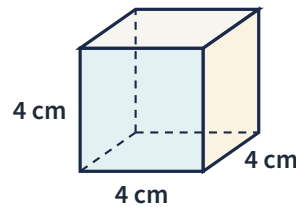
Height: _____

- 9 Which box holds **more**, A or B? By how much? [2 marks]

A



B

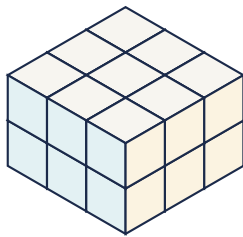


Answer: _____

C Think it through *explain your thinking*

/ 10 marks

- 1 Ava counted the cubes she could see in this solid prism and said the volume is **14 cubes**. Do you agree with Ava? Explain. [2 marks]



- 2 **True or false?** “If you double every edge of a 1 cm × 2 cm × 3 cm box, the volume doubles.” Show your working. [2 marks]

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- 3 **Always, sometimes or never true?** “A box with a longer length has a bigger volume.” Circle one and give examples. [2 marks]

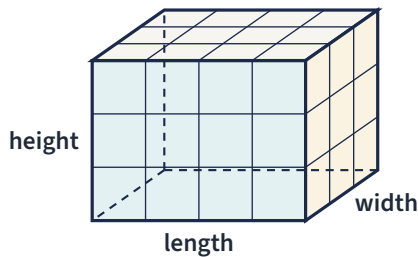
Always

Sometimes

Never

- 4 Which box is the **odd one out**? $2\text{ cm} \times 3\text{ cm} \times 8\text{ cm}$, $4\text{ cm} \times 3\text{ cm} \times 4\text{ cm}$, $6\text{ cm} \times 2\text{ cm} \times 4\text{ cm}$, $5\text{ cm} \times 2\text{ cm} \times 5\text{ cm}$. Explain. [2 marks]

- 5 Explain why **length $\times$ width $\times$ height** gives the number of cubes in a rectangular prism. Use the words **row** and **layer**. [2 marks]



D Challenge *stretch yourself*

/ 9 marks

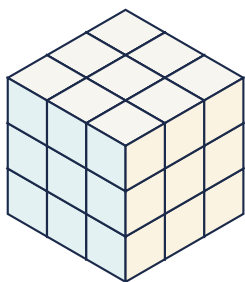
- 1 **Find all** the rectangular prisms with whole-number sides that have a volume of **24 cm^3** . (A $2 \times 3 \times 4$ box is the same as a $4 \times 3 \times 2$ box.) Which one is closest to a cube? [3 marks]

Length	Width	Height	Volume
			24 cm^3
			24 cm^3
			24 cm^3
			24 cm^3
			24 cm^3
			24 cm^3
			24 cm^3

Closest to a cube: _____

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- 2 A $3 \times 3 \times 3$ cube is made from 27 small cubes. The outside of the big cube is painted. How many small cubes have paint on **3 faces**, **2 faces**, **1 face** and **no faces**? [3 marks]



Answer: _____

- 3 A box has a **square** base and is **5 cm** high. Its volume is **80 cm^3** . **a)** How long is each side of the base? **b)** How many of these boxes fit, standing upright, in a carton **20 cm** long, **8 cm** wide and **10 cm** high? [3 marks]

Answer: _____

How did I go?

Warm up ___ / 16 Practise ___ / 21 Think it through ___ / 10 Challenge ___ / 9 **Total ___ / 56**

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