VOLUME OF A PRISM

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

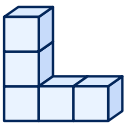
KEY IDEA

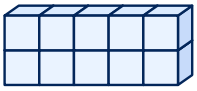
Volume is the amount of space inside a 3-D shape.
We count 1 cm cubes. Each 1 cm cube is 1 cm³.

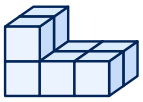
This cuboid is made of 12 cubes, so its volume is 12 cm³.



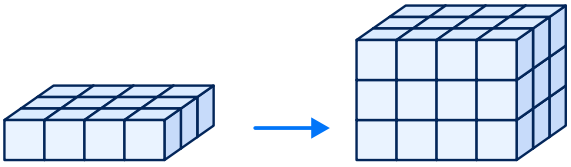
1 Each cube is 1 cm³. Count the cubes to find the volume of each shape.

a)  ☐ cm³

b)  ☐ cm³

c)  ☐ cm³

2 This cuboid is built from layers of cubes. Fill in the boxes.

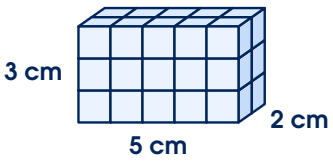


One layer has ☐ cubes.

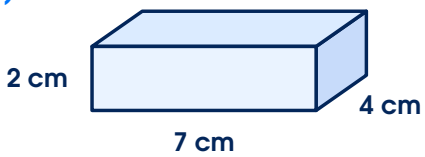
There are ☐ layers.

Volume = ☐ × ☐ = ☐ cm³

3 Work out the volume of each cuboid: length × width × height.

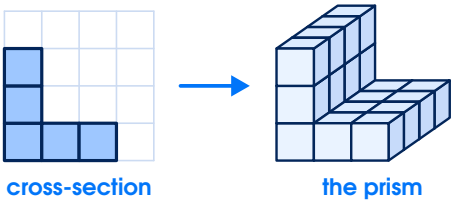
a) 

☐ × ☐ × ☐ = ☐ cm³

b) 

☐ × ☐ × ☐ = ☐ cm³

4 The shaded cross-section is repeated along the prism. Each square is one cube.



Squares in the cross-section ☐

Number of layers ☐

Volume = ☐ × ☐ = ☐ cm³

VOLUME OF A PRISM

SUPPORT

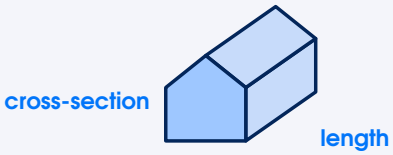
NAME _____ CLASS _____ DATE _____

KEY IDEA

A prism has the same cross-section all the way along.

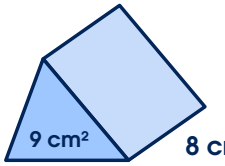
Volume = area of cross-section × length

Volume is measured in cubic units: cm^3 or m^3.



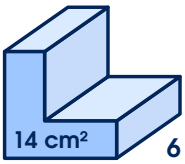
1 The area of each shaded cross-section is given. Work out the volume of each prism.

a)



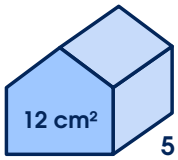
☐ × ☐ = ☐ cm^3

b)



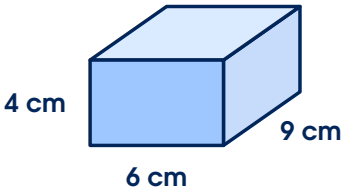
☐ × ☐ = ☐ cm^3

c)



☐ × ☐ = ☐ cm^3

2 A cuboid is a prism. Work out its volume.

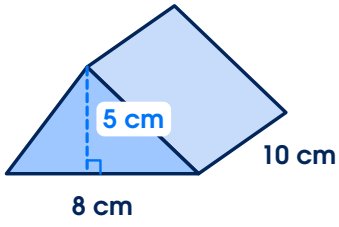


Area of cross-section = ☐ × ☐ = ☐ cm^2

Volume = ☐ × ☐ = ☐ cm^3

The shaded rectangle is the cross-section.

3 This is a triangular prism. Work out its volume.

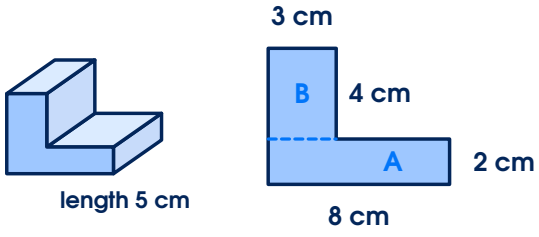


Area of triangle = ☐ × ☐ ÷ 2 = ☐ cm^2

Volume = ☐ × ☐ = ☐ cm^3

Use the perpendicular height (dashed).

4 Split the L-shaped cross-section into rectangles A and B. Then find the volume.



Area A = ☐ × ☐ = ☐ cm^2

Area B = ☐ × ☐ = ☐ cm^2

Total = ☐ + ☐ = ☐ cm^2

Volume = ☐ × ☐ = ☐ cm^3

VOLUME OF A PRISM

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

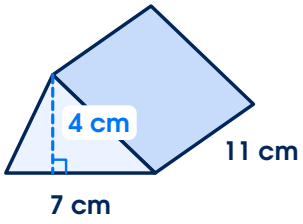
Volume of a prism = area of cross-section × length

Use the perpendicular height for a triangle or trapezium. Give units: cm³ or m³.

FLUENCY

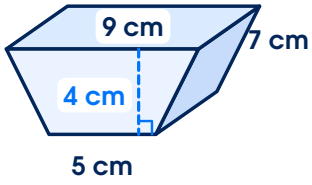
1 Work out the volume of each prism.

a)



_____ cm³

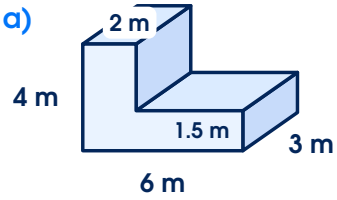
b)



_____ cm³

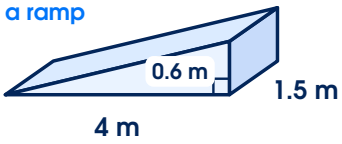
2 Work out the volume of each prism in m³.

a)



_____ m³

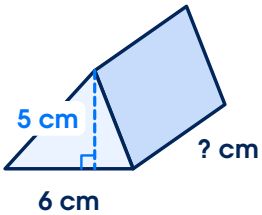
b)



_____ m³

REASONING

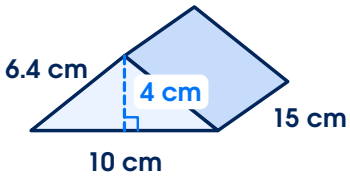
3 Work out the missing lengths.



a) This triangular prism has a volume of 180 cm³.
Its length is _____ cm

b) A prism has a volume of 156 cm³ and a cross-section of area 24 cm². Its length is _____ cm

4 Priya works out the volume of this prism. Explain her mistake and find the correct volume.



Priya's working

10 × 6.4 ÷ 2 = 32

32 × 15 = 480 cm³

Correct volume = _____ cm³

VOLUME OF A PRISM

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Give a reason for each.

a) Doubling the length of a prism doubles its volume. ALWAYS SOMETIMES NEVER

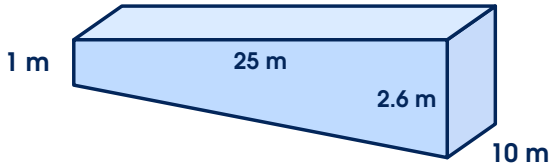
b) A prism with a bigger cross-section has a bigger volume. ALWAYS SOMETIMES NEVER

c) Two prisms with equal volumes have equal lengths. ALWAYS SOMETIMES NEVER

d) Halving a triangle's base and height halves the volume. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 A swimming pool is a prism, 25 m long and 10 m wide. The floor slopes evenly.



1 m deep at one end, 2.6 m deep at the other

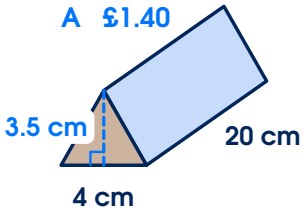
a) Volume of water when full ____ m³

b) A pump adds 25 m³ of water an hour.

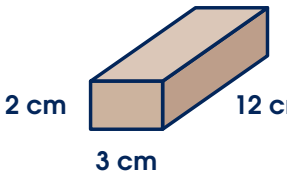
Hours to fill the empty pool ____

3 Two chocolate bars are prisms. Which bar gives more chocolate for each penny?

A £1.40



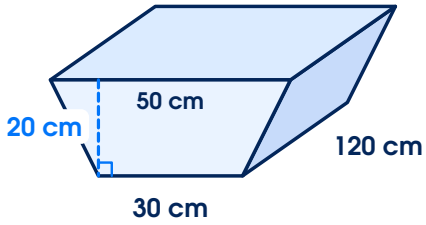
B £0.80



Better value: bar ____

★ CHALLENGE FOR ALL

4 A water trough is a prism with a trapezium cross-section.



a) Volume when full ____ cm³

b) Water is poured in until it is 10 cm deep. Lily says, "The trough is now half full." Is Lily right? Show your working.

VOLUME OF A PRISM – ANSWERS

ANSWERS

BUILDING BLOCKS

1 a) 5 cm^3 b) 10 cm^3 c) 8 cm^3
2 One layer has 12 cubes · 3 layers · 12 × 3 = 36 cm^3
3 a) 5 × 2 × 3 = 30 cm^3 b) 7 × 4 × 2 = 56 cm^3 (any order)
4 5 squares · 4 cubes long · 5 × 4 = 20 cm^3

SUPPORT

1 a) 9 × 8 = 72 cm^3 b) 14 × 6 = 84 cm^3 c) 12 × 5 = 60 cm^3
2 6 × 4 = 24 cm^2 · 24 × 9 = 216 cm^3
3 8 × 5 ÷ 2 = 20 cm^2 · 20 × 10 = 200 cm^3
4 A = 8 × 2 = 16 cm^2 · B = 3 × 4 = 12 cm^2 · total 28 cm^2 · 28 × 5 = 140 cm^3

CORE

1 a) 7 × 4 ÷ 2 = 14 cm^2, 14 × 11 = 154 cm^3 b) (9 + 5) ÷ 2 × 4 = 28 cm^2, 28 × 7 = 196 cm^3
2 a) 6 × 1.5 + 2 × 2.5 = 14 m^2, 14 × 3 = 42 m^3 b) 4 × 0.6 ÷ 2 = 1.2 m^2, × 1.5 = 1.8 m^3
3 a) 6 × 5 ÷ 2 = 15 cm^2, 180 ÷ 15 = 12 cm b) 156 ÷ 24 = 6.5 cm
4 She used the slant side 6.4 cm instead of the perpendicular height 4 cm. 10 × 4 ÷ 2 = 20 cm^2, 20 × 15 = 300 cm^3

GREATER DEPTH

1 a) always (the cross-section is repeated twice as many times) b) sometimes (it depends on the length too) c) sometimes (e.g. 10 cm^2 × 6 cm and 20 cm^2 × 3 cm are both 60 cm^3) d) never (the area becomes a quarter, so the volume is quartered)
2 a) (1 + 2.6) ÷ 2 × 25 = 45 m^2, 45 × 10 = 450 m^3 b) 450 ÷ 25 = 18 hours
3 A: 4 × 3.5 ÷ 2 = 7 cm^2, 7 × 20 = 140 cm^3, 140 ÷ 140p = 1 cm^3 per penny. B: 3 × 2 × 12 = 72 cm^3, 72 ÷ 80p = 0.9 cm^3 per penny. Bar A gives more chocolate for each penny.
4 a) (50 + 30) ÷ 2 × 20 = 800 cm^2, 800 × 120 = 96 000 cm^3 b) No. At 10 cm deep the water is 40 cm across, (30 + 40) ÷ 2 × 10 = 350 cm^2, 350 × 120 = 42 000 cm^3, which is less than half of 96 000 (48 000 cm^3).