4.12 Volume and Surface Area of Prisms: 30-minute Pack

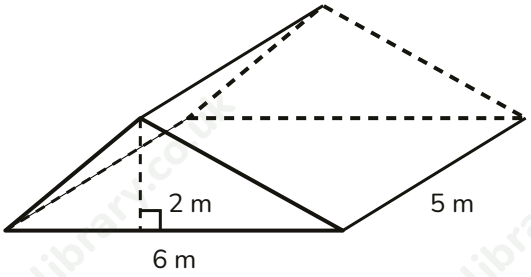
Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Sofia pours water into a triangular prism shaped tank. The triangular cross section has base 6 m and height 2 m. The tank length is 5 m. The tank is initially empty and rests on its 6 m by 5 m rectangular face. For this small rise, approximate the horizontal water surface area as constant and equal to the area of that face. If Sofia pours 50 litres into the tank, by how many centimetres does the water level rise? Give your answer to 2 decimal places. (1 m³ = 1000 L)

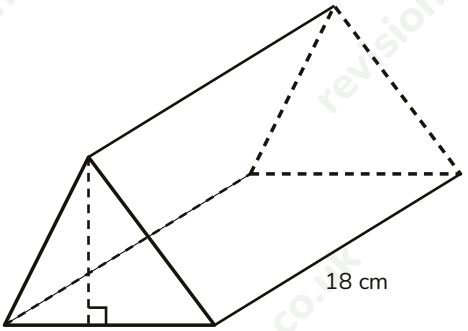
Diagram NOT accurately drawn



(3)

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2 A prism has a triangular cross section with base 10 cm and area 40 cm². Calculate the height of the triangle, then the volume of the prism if its length is 18 cm.



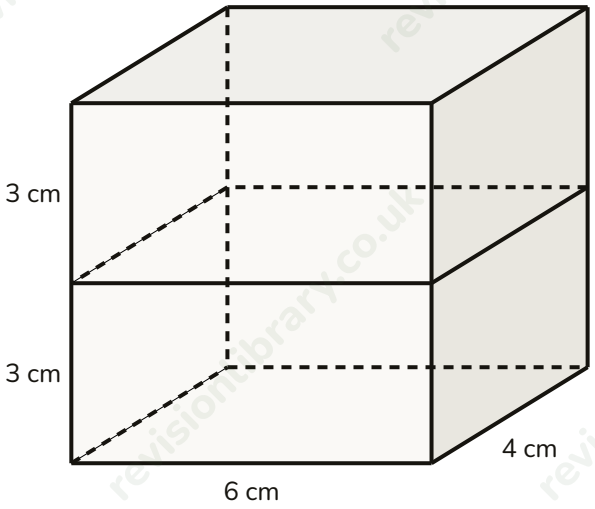
Cross-section area: 40 cm²

(3)

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3 A solid is made by joining two identical rectangular prisms, each 6 cm by 4 cm by 3 cm, along a 6 cm by 4 cm face. Calculate the volume and the total external surface area of the resulting solid.

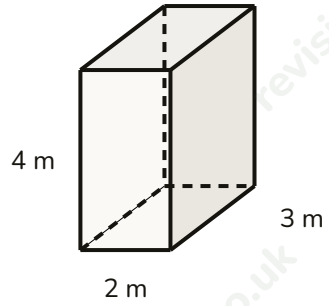
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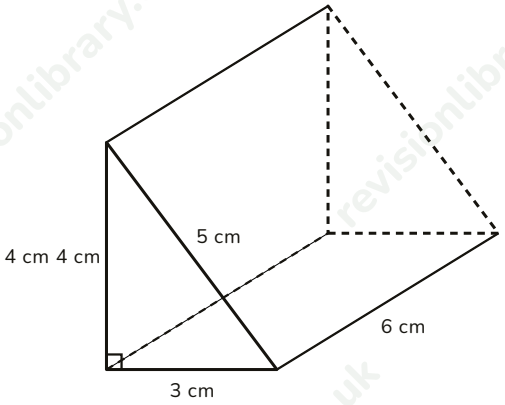
4 Find the total surface area of a cuboid with dimensions 2 m by 3 m by 4 m. Give your answer in square metres.



(2)

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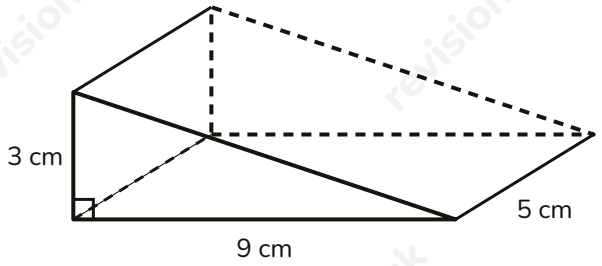
5 A triangular prism has a right-angled triangle as its cross-section. The triangle has sides 3 cm, 4 cm and 5 cm (the longest side is 5 cm). The prism is 6 cm long. Work out the total surface area.



(4)

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6 A triangular prism has a right-angled triangle for its cross-section, with base 9 cm and height 3 cm. The prism is 5 cm long. Work out its volume.



(3)

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7 A tank holds 9000 cm³ of water. How many litres is this? (1 litre = 1000 cm³)

(2)

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8 Convert 3500 cm³ to litres. Give your answer in litres.

(1)

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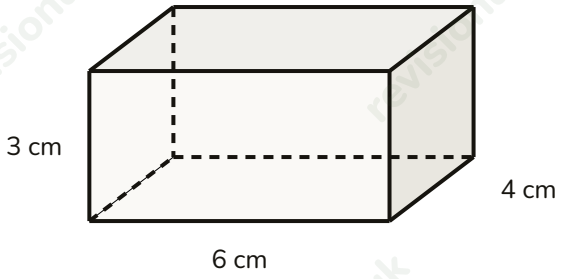
9 Convert 175000 cm² into m^2.

(2)

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10 Calculate the volume of a cuboid with length 6 cm, width 4 cm and height 3 cm.

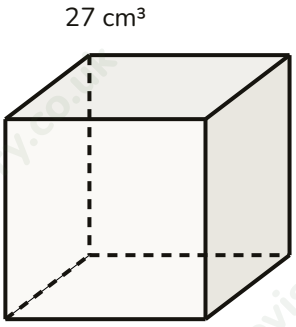
Diagram NOT accurately drawn



(1)

11 A cube has volume 27 cm³. Write down the length of one side.

Diagram NOT accurately drawn



(1)

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Mark scheme · 4.12 Volume and Surface Area of Prisms: 30-minute Pack

Question 1

convert 50 L to m3: 50/1000 = 0.05 m^3 and find horizontal face area = 6 x 5 = 30 m^2	M1
using the constant surface area approximation, added volume = 30 x rise, so 30 x rise = 0.05	M1
rise = 0.05/30 = 0.001666... m = 0.166666... cm so 0.17 cm to 2 d.p. cao	A1

Answer: **0.17 cm**

Question 2

use area triangle = 1/2 x base x height so height = 2 x area / base = 2 x 40 / 10 = 8 cm	M1
volume = area x length = 40 x 18 = 720 cm^3	M1
height 8 cm and volume 720 cm^3 cao	A1

Answer: **height 8 cm; volume 720 cm^3**

Question 3

volume = 2 x (6x4x3) = 2 x 72 = 144 cm^3	M1
surface area: two prisms joined removes two 6x4 faces: total SA = 2 x SA(prism) - 2 x 24 = 2 x (2(6x4 + 6x3 + 4x3)) - 48 = compute gives 168 cm^2 cao	A1

Answer: **144 cm^3; 168 cm^2**

Question 4

method: calculate areas of pairs of faces, e.g. 2(2x3 + 2x4 + 3x4) or listing areas	M1
52 m^2 cao	A1

Answer: **52 m^2**

Question 5

two triangles: 2 x 1/2 x 3 x 4 = 12	M1
perimeter of triangle x length: 12 x 6	M1
adds the triangles and the rectangles	M1
84 cm^2 cao	A1

Answer: **84 cm^2**

Question 6

cross-section area 1/2 x 9 x 3	M1
x 5	M1
67.5 cm^3 cao	A1

Answer: **67.5 cm^3**

Question 7

9000 ÷ 1000	M1
9 litres cao	A1

Answer: **9 litres**

Question 8

3.5 L cao	B1

Answer: **3.5 L**

Question 9

175000 ÷ 10 000	M1
17.5 m^2 cao	A1

Answer: **17.5 m^2**

Question 10

72 cao	B1

Answer: **72 cm^3**

Question 11

3 cao	B1

Answer: **3 cm**

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