4.13 Volume of a Prism: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

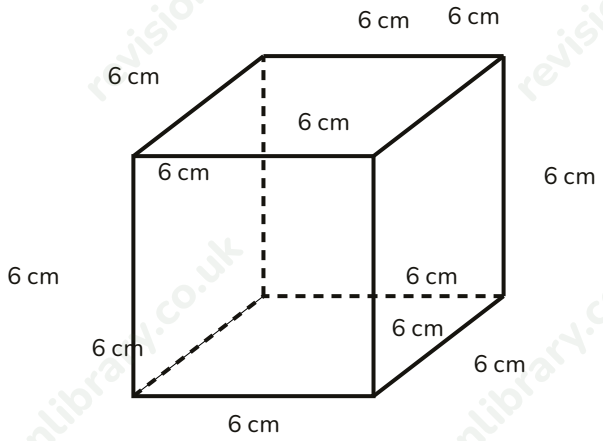
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A cube has an edge length of 6 cm.
Work out the volume of the cube.

Diagram NOT accurately drawn

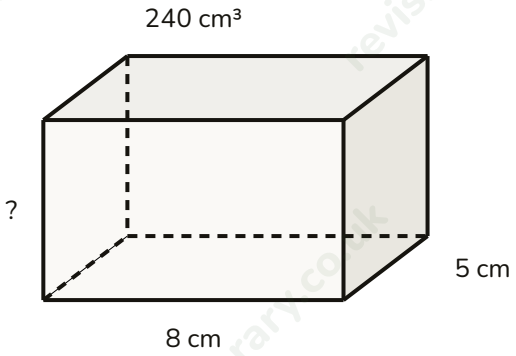


(Total for Question 1 is 2 marks)

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2 A cuboid has a volume of 240 cm³. The length of the cuboid is 8 cm and the width is 5 cm. Work out the height of the cuboid.

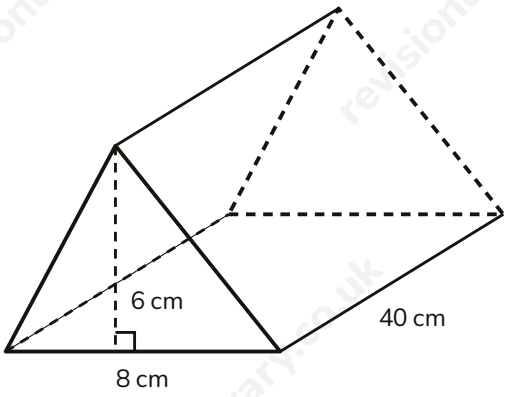
Diagram NOT accurately drawn



(Total for Question 2 is 3 marks)

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3 A triangular prism has a triangular cross-section with base 8 cm and height 6 cm. The length of the prism is 40 cm. Calculate the volume of the prism in cubic centimetres.

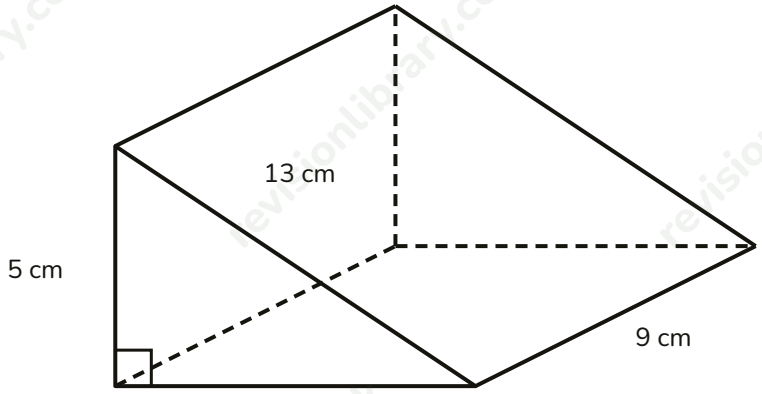


(Total for Question 3 is 3 marks)

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4 The cross-section of a prism is a right-angled triangle. The hypotenuse of the triangle is 13 cm and one of the other two sides is 5 cm. The prism is 9 cm long.
Work out the volume of the prism.

Diagram NOT accurately drawn

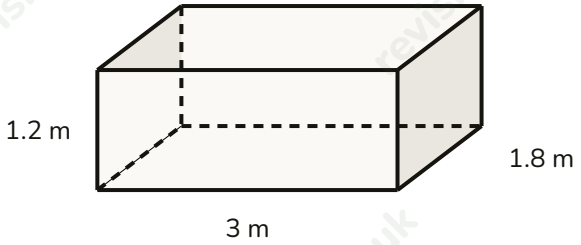


(Total for Question 4 is 5 marks)

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5 A builder's skip is in the shape of an open cuboid with length 3 m, width 1.8 m and height 1.2 m.

Diagram NOT accurately drawn



(a) Work out the volume of the skip in m^3. **(2)**

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(b) Given that 1 m^3 = 1000 litres, work out the capacity of the skip in litres. **(2)**

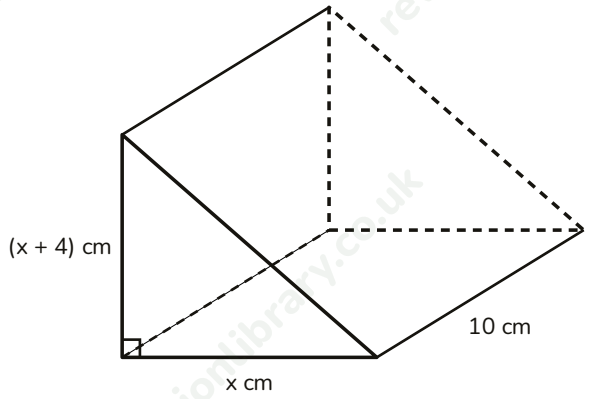
.....

(Total for Question 5 is 4 marks)

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6 A prism has a cross-section that is a right-angled triangle. The base of the triangle is x cm and the height of the triangle is (x + 4) cm. The prism is 10 cm long. The volume of the prism is 300 cm^3.

Diagram NOT accurately drawn



(a) Show that $x^2 + 4x - 60 = 0$. **(2)**

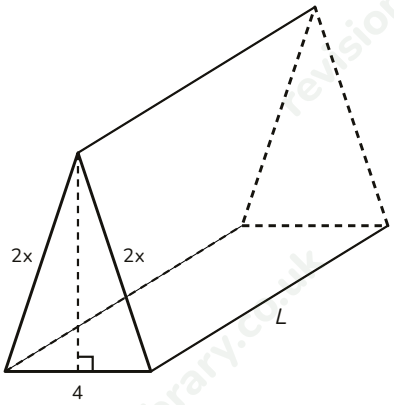
(b) Hence work out the value of x, given that $x > 0$. **(3)**

.....

(Total for Question 6 is 5 marks)

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7 Show that the volume, V cm^3, of a prism whose cross-section is an isosceles triangle with sides 2x, 2x and base 4 is $V = 4*\sqrt{x^2 - 1} * L$, where L is the length of the prism.



(Total for Question 7 is 4 marks)

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Mark scheme · 4.13 Volume of a Prism: 30-minute Pack

Question 1

6 x 6 x 6 oe	**M1**
216 cao (units cm^3)	**A1**

Answer: 216 cm^3

Question 2

8 x 5 (= 40) oe	**M1**
240 / 40 ft (240 divided by their 40)	**M1**
6 cao (units cm)	**A1**

Answer: 6 cm

Question 3

Use of area triangle = 1/2 * base * height = 1/2 * 8 * 6 = 24 cm^2	**M1**
Multiply cross-sectional area by length: 24 * 40	**M1**
960 cm^3 cao	**A1**

Answer: 960 cm^3

Question 4

$13^2 - 5^2$ oe (= 144)	**M1**
12 cao (third side of triangle)	**A1**
0.5 x 5 x 12 ft (= 30)	**M1**
30 x 9 ft (their area x 9)	**M1**
270 cao (units cm^3)	**A1**

Answer: 270 cm^3

Question 5

(a) 3 x 1.8 x 1.2 oe	**M1**
(a) 6.48 cao (units m^3)	**A1**

(a) Answer: 6.48 m^3

(b) their (a) x 1000 ft	**M1**
(b) 6480 cao (units litres)	**A1**

(b) Answer: 6480 litres

Question 6

(a) 10 x 0.5 x x(x + 4) = 300 oe	**M1**
(a) $x^2 + 4x - 60 = 0$ cso (correct rearrangement shown)	**A1**

(a) Answer: $x^2 + 4x - 60 = 0$ (shown)

(b) (x + 10)(x - 6) = 0 oe (or correct use of the quadratic formula)	**M1**
(b) x = 6 and x = -10 identified	**A1**
(b) x = 6 cao (positive root selected since x > 0)	**A1**

(b) Answer: x = 6 cm

Question 7

split the isosceles triangle into two right-angled triangles using the altitude from the apex to the base, each with hypotenuse 2x and base 2 (half of the base 4)	**dM1**
use Pythagoras to find the altitude: $\sqrt{(2x)^2 - 2^2} = \sqrt{4x^2 - 4} = 2*\sqrt{x^2 - 1}$	**M1**
area = 1/2 * base * height = 1/2 * 4 * $2*\sqrt{x^2 - 1} = 4*\sqrt{x^2 - 1}$	**M1**
multiply area by length L to get V = $4*\sqrt{x^2 - 1}$ * L, as required cso	**A1**

Answer: V = $4*\sqrt{x^2 - 1}$ * L cso

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