Q1.

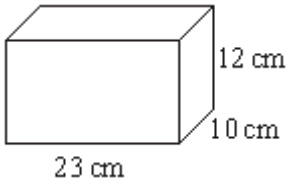


Diagram **NOT** accurately drawn

(a) Work out the volume of this solid cuboid.

..... cm^3

(2)

The solid cuboid is made of plastic.
The plastic has a density of 0.8 grams per cm^3.

(b) Work out the mass of the cuboid.

..... grams

(2)
(Total 4 marks)

Q2. The volume of a gold bar is 100 cm^3.
The density of gold is 19.3 grams per cm^3.

Work out the mass of the gold bar.

..... grams

(Total 2 marks)

Q3.

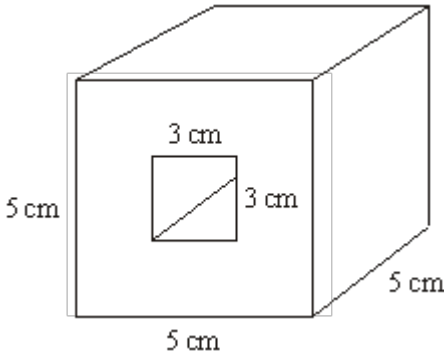


Diagram **NOT** accurately drawn

The solid shape, shown in the diagram, is made by cutting a hole all the way through a wooden cube.
The cube has edges of length 5 cm.
The hole has a square cross section of side 3 cm.

(a) Work out the volume of wood in the solid shape.

..... cm^3

(2)

The mass of the solid shape is 64 grams.

(b) Work out the density of the wood.

..... grams per cm^3

(2)
(Total 4 marks)

Q4. The density of juice is 4 grams per cm^3.
The density of water is 1 gram per cm^3.

315 cm^3 of drink is made by mixing 15 cm^3 of juice with 300 cm^3 of water.

Work out the density of the drink.

..... grams per cm^3

(Total 3 marks)

Q5.

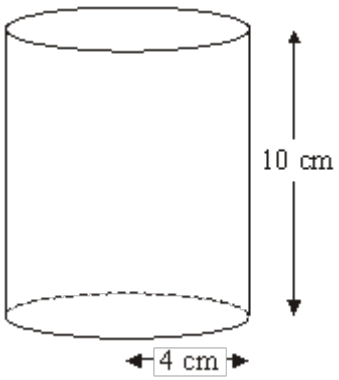


Diagram **NOT** accurately drawn

A solid cylinder has a radius of 4 cm and a height of 10 cm.

(a) Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

..... cm^3

(2)

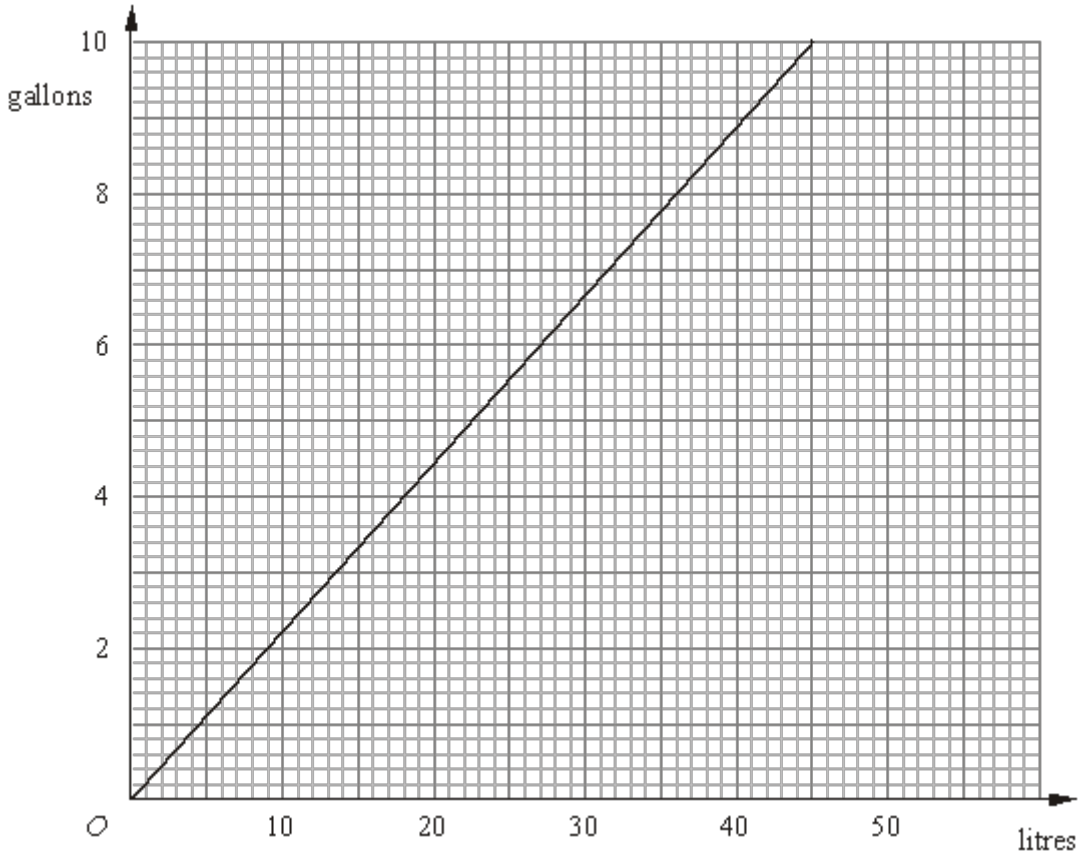
The cylinder is made from wood.
The density of the wood is 0.6 grams per cm^3.

(b) Work out the mass of the cylinder.
Give your answer correct to 3 significant figures.

..... grams

(2)
(Total 4 marks)

Q6. The graph can be used to convert between gallons and litres.



The diagram shows a central heating oil tank.

The oil tank is in the shape of a cylinder of length 180 cm and radius 60 cm.

The oil tank contains 200 gallons of oil.

(a) Is the oil tank more or less than $\frac{1}{2}$ full?

.....

(5)

The oil has a density of 0.85 g/cm^3.

(b) Work out, in kg, the mass of the oil in the tank.

..... kg

(3)

(Total 8 marks)

M1.

	Working	Answer	Mark	Additional Guidance
(a)	23 × 10 × 12	2760	2	**M1** for 23 × 10 × 12 **A1** cao
(b)	2760 × 0.8	2208	2	**M1** for '2760' × 0.8 **A1** f.t.
				Total for Question: 4 marks

M2.

Answer	Mark	Additional Guidance
1930	2	**M1** for 100 × 19.3 **A1** for 1930 cao
		Total for Question: 2 marks

M3.

	Working	Answer	Mark	Additional Guidance
(a)	5^3 – 5 × 3 × 3 125 – 45	80	2	**M1** for attempt to find volume of cube (e.g. 5 × 5 × n where $n \neq 6$) and subtract volume of the hole (e.g. 3 × 3 × n where $n \neq 6$)

	(5 × 5 – 3 × 3) × 5 (25 – 9) × 5 16 × 5			(needs to be dimensionally correct) **A1** cao **Alternative method** **M1** for attempt to find area of the cross section and multiply by the depth of the prism (depth ≠ 6) **A1** cao
(b)	64 ÷ 80	0.8	2	**M1** ft 64 ÷ "80" **A1** ft (to 2 sf or better)
				Total for Question: 4 marks

M4.

Working	Answer	Mark	Additional Guidance
Mass of water = 300 × 1 = 300g Mass of juice = 15 × 4 = 60g Total mass = 360 Total volume = 315 Density = 360 ÷ 315	$1\frac{1}{7}$	3	**M1** for 300 × 1 or 15 × 4 or 60 or 360 seen **M1** for $\frac{'300\times1'+'15\times4'}{'300+15'}$ **A1** for $1\frac{1}{7}$ oe or 1.14…
			Total for Question: 3 marks

M5.

	Working	Answer	Mark	Additional Guidance

(a)	$\pi \times 4^2 \times 10$ = 502.65 (502-503)	503	2	**M1** $\pi \times 4^2 \times 10$ (= 502.65) **A1** 502-503 SC **B1** $\pi \times 8^2 \times 10$
(b)	"502.65" × 0.6 = 301.59	302	2	**M1** "502.65" × 0.6 **A1** 300 – 302 ft on "502.65" to an answer which would be correct on ft if rounded or truncated to 3SF
				Total for Question: 4 marks

M6.

		Working	Answer	Mark	Additional Guidance
FE	(a)	1 gallon = 4.54 litres, 200 gallons = 908 litres = 908000 cm^3 Vol of tank $60^2 \times x \times \pi \times 180$ = 2035752.04..cm^3 908000 < 1017876.02 **OR** Vol of tank $60^2 \times \pi \times 180$ = 2035752.04..cm^3 Half vol of tank = 1017876.02 cm^3 = 1017.876…litres 1017.876 ÷ 4.54 = 224 gallons 224 > 200	No	5	Response may convert into gallons, litres, or cm^3 Calculations may be performed in different orders **M1** Using formulae to find volume of tank **B1** Converts between litres and cubic centimetres **M1** reads off graph for 1l, 2l , 4l, 5l or 10 litres within tolerance (4.4 – 4.6) **A1** Answer in cm^3, litres or gallons **C1** Decision and reason **QWC: Decision should be stated, with appropriate supporting statement**
	(b)	"908000" cm^3 × 0.85 g/cm^3 = 771800 g	771.8	3	**M1** "908000" × 0.85 **M1**(dep) 771800 ÷ 1000 **A1** 770 – 772
					Total for Question: 8 marks

E1. This question was answered well. Over 85% of candidates gained 1 or more marks for their answers. Most candidates could find the volume of the cuboid though some attempts at finding the total surface area were seen. In part (b) nearly all candidates either multiplied or divided their answer to part (a) by 0.8. Those who multiplied were able to access both marks for this part. Full marks for the question were awarded to over a half of the candidates entered for this examination.

E2. Density is a well understood topic and the success rate in this question was very high with almost all candidates obtaining one mark for attempting to multiply 19.3 by 100 though the answer was only fully correct in about two thirds of cases.

E3. Fully correct answers to this question were only given by 23% of candidates. In part (a) it was common to see the volume of the 5cm cube being given correctly but then incorrect calculations for the hole were frequently seen. Some candidates thought the hole was a 3 cm cube and not a square prism with length 5cm. Where candidates tried to subtract two sensible volumes they were awarded a mark, however it was quite common to see candidates try to subtract 9cm² away from 125cm³ and therefore achieve no marks.

In part (b) full marks were awarded for dividing the mass of 64 grams by the volume calculated in part (a) and 39% of candidates scored 2 marks usually for doing this. A large number of candidates divided volume by mass or multiplied mass and volume and so gained no credit. It was disappointing to see 39% of candidates gaining no marks at all in this question.

E4. Over 60% of candidates were awarded at least one mark for their responses to this question. These candidates were able to find the mass of the juice or of the combined

drink to gain one mark.

However, relatively few candidates could make any further progress.

Only about one in eight were able to complete the question successfully. Of those candidates who scored no marks on this question, a significant minority worked out 15 ÷ 4 and 300 ÷ 1 or 315 ÷ 5.

E5. For a standard volume question this was poorly answered. Common errors included circumference × height, $k\pi r^2$ where k was usually 2 (from 2 ends?), 0.5 or 4. Some candidates evaluated $\pi \times 4^2$ as $(\pi \times 4)^2$.

Part (b) was generally well done with the vast majority of candidates multiplying their answer to part (a) by 0.6.