Name: _____

IGCSE (9–1) Maths new topics: Compound measures

Date:

Time: 70 minutes

Total marks available: 62

Total marks achieved: _____

Q1.

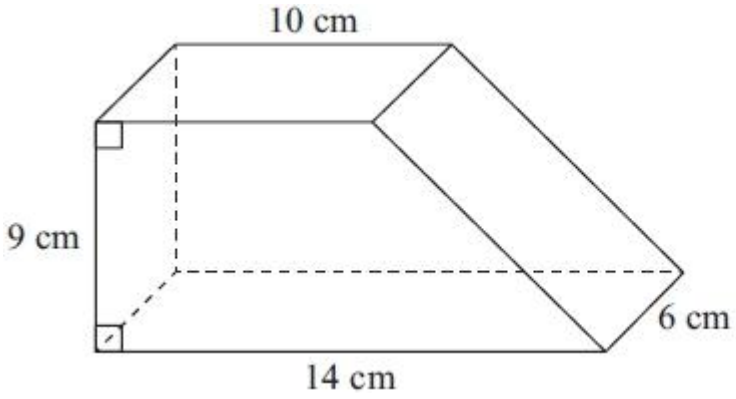


Diagram **NOT** accurately drawn

The diagram shows a solid prism.

The cross section of the prism is a trapezium.
The prism is made from wood with density 0.7 g/cm^3

Work out the mass of the prism.

..... g

(Total 4 marks)

[GCSE (9–1) SAMs]

Q2.

$$\text{Pressure} = \frac{\text{force}}{\text{area}}$$

Find the pressure exerted by a force of 900 newtons on an area of 60cm^2.
Give your answer in newtons/m^2.

..... newtons/m^2

(Total 2 marks)

[GCSE (9–1) Specimen papers set 1]

Q3. A box exerts a force of 140 newtons on a table.
The pressure on the table is 35 newtons/m^2.

$$p = \frac{F}{A}$$

p = pressure
F = force
A = area

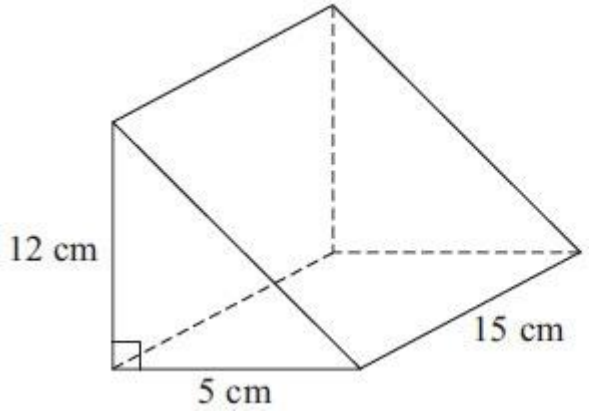
Calculate the area of the box that is in contact with the table.

(Total 3 marks)

[GCSE (1MA0) Nov 2012]

Q4. The diagram shows a solid triangular prism.

Diagram **NOT** accurately drawn



The prism is made from metal.
The density of the metal is 6.6 grams per cm^3.

Calculate the mass of the prism.

(Total 3 marks)

[GCSE (9–1) Specimen papers set 2]

Q5. One sheet of A3 card has area $\frac{1}{8}$ m^2.
The card has a mass of 160 g per m^2.

Work out the total mass of 25 sheets of A3 card.

(Total 4 marks)

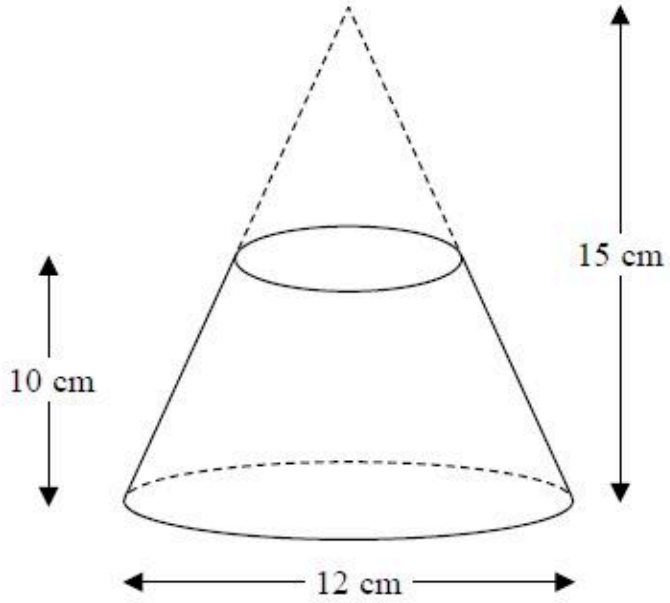
[GCSE (9–1) SAMs Issue 1]

Q6. A piece of wood has a mass of x kg and a volume of 0.002 m^3.
Show that the density of the wood is $0.5x$ g/cm^3.

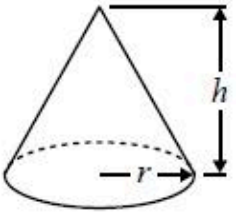
(Total 4 marks)

[GCSE (9–1) SAMs Issue 2]

Q7. A frustum is made by removing a small cone from a large cone as shown in the diagram.



Volume of cone $= \frac{1}{3}\pi r^2 h$



The frustum is made from glass.
The glass has a density of 2.5 g / cm^3

Work out the mass of the frustum.
Give your answer to an appropriate degree of accuracy.

..... g

(Total 5 marks)

[GCSE (2MB01) June 2014]

Q8. The diagram shows a solid wooden sphere.

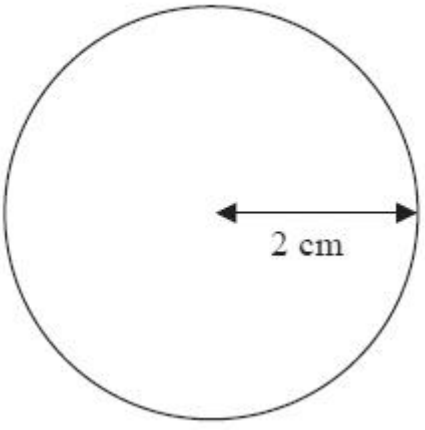


Diagram **NOT** accurately drawn

The radius of the sphere is 2 cm.
The mass of the sphere is 45 grams.

Wood will float on the Dead Sea only when the density of the wood is less than 1.24 g/cm^3.
Will this wooden sphere float on the Dead Sea?

(Total 4 marks)

[GCSE (1MA0) June 2016]

Q9. The diagram shows a metal bar in the shape of a prism.

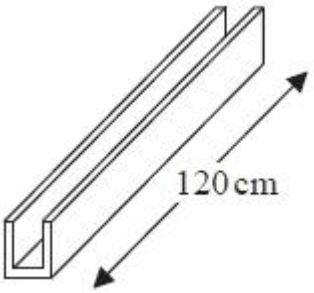


Diagram **NOT** accurately drawn

The length of the metal bar is 120 cm.
The cross section of the metal bar is shown below.

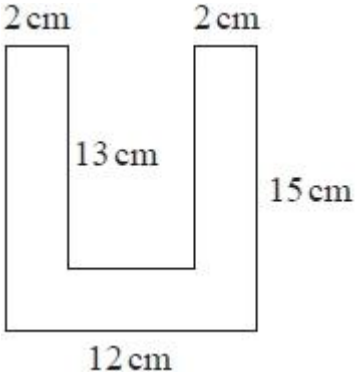


Diagram **NOT** accurately drawn

All corners are right angles.
The metal bar is made from steel with density 8 g/cm^3.

Sean has a trolley.
The trolley can carry a maximum mass of 250kg.

How many metal bars can the trolley carry at the same time?
You must show your working.

(Total 5 marks)

[GCSE (9–1) Specimen papers set 2]

Q10. Zahra mixes 150g of metal A and 150g of metal B to make 300g of an alloy.

Metal A has a density of 19.3g/cm^3.
Metal B has a density of 8.9g/cm^3.

Work out the density of the alloy.

..... cm^3

(Total 4 marks)

[GCSE (1MA0) June 2015]

Q11. Liquid A has a density of 0.7 g/cm^3.
Liquid B has a density of 1.6 g/cm^3.

140 g of liquid A and 128 g of liquid B are mixed to make liquid C.

Work out the density of liquid C.

..... g/cm^3

(Total 4 marks)

[GCSE (2MB01) November 2015]

Q12. Jade makes an orange drink by mixing orange concentrate with water.
She mixes 15 cm^3 of orange concentrate with 250 cm^3 of water.

The density of orange concentrate is 1.20 g/cm^3.
The density of water is 1.00 g/cm^3.

Work out the density of Jade's orange drink.
Give your answer correct to 2 decimal places.

.....g/cm^3

(Total 3 marks)

[GCSE (9–1) June 2017]

Q13. The density of apple juice is 1.05 grams per cm^3.
The density of fruit syrup is 1.4 grams per cm^3.
The density of carbonated water is 0.99 grams per cm^3.

25 cm^3 of apple juice are mixed with 15 cm^3 of fruit syrup and
280 cm^3 of carbonated water to make a drink with a volume of 320 cm^3.

Work out the density of the drink.
Give your answer correct to 2 decimal places.

.....g/cm^3

(Total 4 marks)

[GCSE (9–1) Specimen papers set 1]

Q14. The densities of two different liquids A and B are in the ratio 19 : 22

The mass of 1 cm^3 of liquid B is 1.1 g.
5 cm^3 of liquid A is mixed with 15 cm^3 of liquid B to make 20 cm^3 of liquid C.

Work out the density of liquid C.

.....g/cm^3

(Total 4 marks)

[GCSE (2MB01) March 2013]

Q15. A solid sphere has

a mass of 1180 g measured to the nearest gram
and a radius of 6.2 cm measured to the nearest millimetre.

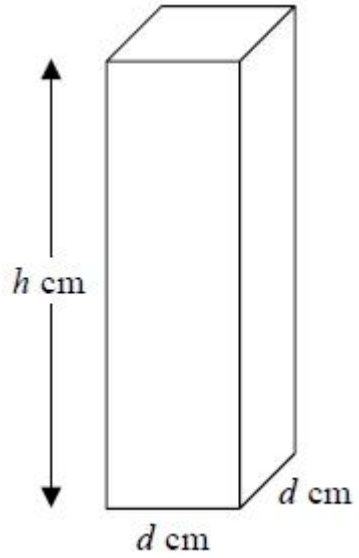
Find the upper bound for the density of the sphere.
Give your answer to 3 significant figures.

. . . . . g/cm^3

(Total 4 marks)

[GCSE (9–1) SAMs Issue 1]

Q16. Here is a solid bar made of metal.



The bar is in the shape of a cuboid.

The height of the bar is h cm.
The base of the bar is a square of side d cm.
The mass of the bar is M kg.

d = 8.3 correct to 1 decimal place.
M = 13.91 correct to 2 decimal places.
h = 84 correct to the nearest whole number.

Find the value of the density of the metal to an appropriate degree of accuracy.
Give your answer in g/cm^3.
You must explain why your answer is to an appropriate degree of accuracy.

(Total 5 marks)

Mark Scheme

Q1.

Question	Working	Answer	Mark	AO	Notes	
	$\frac{1}{2}(10+14)\times 9$ oe (= 108)			AO2	M1	for area of cross section
	'108' × 6 (=648)				M1	(dep on previous M1) for volume of prism
	'648' × 0.7				M1	(independent)
		453.6	4		A1	accept 454

Q2.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
		150 000	M1 $60 \div 100^2$ **or** $900 \div 60$ **or** $900 \div$ "60" A1

Q3.

Paper 1MA1: 1F			
Question	Working	Answer	Notes
		4 m^2	C1 substitution into formula eg $35 = \frac{140}{A}$ A1 4 (oe) stated C1 (indep) units stated eg m^2

Q4.

Question		Working	Answer	Mark	Notes
		Volume = $\frac{5\times 12}{2}\times 15$ Mass = $\frac{5\times 12}{2}\times 15\times 6.6$	2970	3	M1 $\frac{5\times 12}{2}\times 15$ (=450) M1 (dep on 1st M1) '450'×6.6 A1 cao SC: If no marks awarded then award B1 for an answer of 5940

Q5.

Question	Working	Answer	Notes
		500g	P1 $\frac{1}{8} \times 160$ (=20) P1 '20' × 25 A1 500 (or 0.5) B1 Correct units g (or kg)

Q6.

Question	Working	Answer	Mark type	AO	Notes
	$x \div 0.002$ $(x \times 1000) \div 0.02$ (g/m^3) $(x \times 1000) \div (0.02 \times 100^3)$	show	M M P P	1.1 1.1 2.2 2.2	M1 for use of density = mass ÷ volume M1 for at least one correct unit conversion P1 for process to use density and all unit conversions P1 for complete chain of reasoning

Q7

Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
		1361	P1 process using similar triangles to find base of small cone eg. 4 cm used as diameter or 2 cm used as radius P1 process to find volume of one cone P1 complete process to find volume of frustum P1 complete process to find mass or 1360 – 1362 A1 1361 or 1360 or 1400

Q8.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
*			No with reason	4	M1 for $\frac{4}{3} \times \pi \times 2^3$ (=33.51...) M1 for 45 ÷ "volume" A1 for 1.3 – 1.4 C1 (dep on M1) for No and eg. 1.34 > 1.24 OR M1 for (volume =) 45 ÷ 1.24 (= 36.29...) oe M1 for (r^3 =) "36.29..."÷ ($\frac{4}{3} \times \pi$) oe A1 for 8.6 − 8.7 C1 (dep on M1) for No and eg. 8.6... > 8

Q9.

Question		Working	Answer	Mark	Notes
			3	5	M1 for a complete method to find the area of the cross section, eg. 15 × 2 + "(12 – 4)" × 2 + 15 × 2 (= 76) or for finding the volume of a relevant prism, eg. 15 × 2 × 120 (= 3600) "(12 – 4)" maybe just seen on the diagram M1 for a method to find the volume of the bar, eg. "76" × 120 (= 9120) or ft "area of cross section"×120 provided "area of cross section" includes a method to find the area of at least **two** relevant rectangles M1 for "volume" × 8, eg. "9120" × 8 (= 72960) or 250 × 1000 ÷ 8 (= 31250) NB "volume" must be dimensionally correct M1 (dep on previous M1) for 250 ÷ ("volume" × 8) ÷ 1000, eg. 250 ÷ "72960 ÷ 1000" (= 3.4265….) or "31250" ÷ "9120" A1 for an answer of 3 with correct working

Q10.

Question	Working	Answer	Notes
		12.2	P1 begins process eg 150÷19.3 (= 7.77..) or 150÷8.9 (= 16.85..) P1 complete process to find total volume P1 complete process to find the density of the alloy A1 for answer in range 12.1 to 12.2

Q11.

PAPER: 1MA0 2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
	Volume of A $= \frac{140}{0.7} = 200$ Volume of B $= \frac{128}{1.6} = 80$ Mass of C = 140+128 = 268 Density of C $= \frac{268}{280}$	0.957	4	M1 for finding the volume of either liquid A or B or the mass of liquid C M1 for a complete method to find the volume AND mass of liquid C M1 (dep M2) for "total mass" ÷ " total volume" A1 for 0.957 to 0.96

Q12.

5MB3H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
			1.01	3	M1 for 1.2 × 15 (= 18) or 1 × 250 clearly defined as mass M1 for $\frac{"18" + "250"}{15+250}$ A1 for 1.01(1…)

Q13.

Paper 1MA1: 3H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		1.01	P1	fruit syrup 15 × 1.4 (= 21) or water 280 × 0.99 (= 277.2) or apple juice 25 × 1.05 (= 26.25)
			P1	(dep P1) for complete process to find the total mass e.g. "277.2" + "26.25" + "21" (= 324.45) or a weighted density eg 15 × 1.4 ÷ 320 (= 0.065625) or 280 × 0.99 ÷ 320 (= 0.86625) or 25 × 1.05 ÷ 320 (= 0.08203125)
			P1	(dep P2) for complete process to find the density eg "324.45" ÷ 320 (=1.01..) or "0.065625" + "0.86625" + "0.08203125" (= 1.0139..)
			A1	1.01 to 1.014

Q14.

Paper 1MA1: 3F			
Question	**Working**	**Answer**	**Notes**
		1.0625	P1 for a complete process to find the density of liquid A P1 for a complete process to find the mass of liquid C P1 for a complete process to find the density of liquid C A1 cao

Q15.

		Working	Answer	Mark	Notes
		$1180.5 \div \frac{4}{3} \pi (6.15)^3$	1.21	4	M1 for 1180 ± 0.5 or 6.2 ± 0.05 M1 for 'max. mass' ÷ 'min. volume' where "min volume" is defined as any expression involving 6.15 M1 for $1180.5 \div \frac{4}{3} \pi (6.15)^3$ A1 for 1.21 – 1.22

Q16.

Question	Working	Answer	Mark	AO	Notes
	$\frac{1000 \times 13..915}{8.25^2 \times 83.5} = 2.448$	2.4 g /cm^3	B	1.1	B1 for $83.5 \leq h < 84.5$ or $8.25 \leq d < 8.35$ (or correct bounds) or $13.905 \leq M < 13.915$ (or correct bounds). Accept $h = 84.5$ or $d = 8.35$ or $M = 13.915$
	$\frac{1000 \times 13..905}{8.35^2 \times 84.5} = 2.360$		P	3.1c	P1 for correct process to find upper bound of D (= 2.4(48... or 0.0024(48...)) oe
			P	3.1c	P1 for correct process to find lower bound of D (= 2.3 (60... or 0.0023(6...)) oe
			P	2.4a	P1 for an explanation or a correct process to find D to an appropriate degree of accuracy
			A	1.3a	A1 2.4 g /cm^3