

Name:

Exam Style Questions

Density



Equipment needed: Calculator, pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

www.corbettmaths.com/contents

Video 384



Answers and Video Solutions



1. A piece of wood has a mass of 8g and a volume of 10cm³.
Work out the density of the wood.



$$\rho = \frac{m}{v} \quad \frac{8}{10}$$

.....0.8.....g/cm³
(2)

2. What is the volume of a piece of metal that has a mass of 300g and density of 6g/cm³?



$$v = \frac{m}{\rho} \quad \frac{300}{6}$$

.....50.....cm³
(2)

3. A piece of plastic has a density of 1.3g/cm³ and a volume of 100cm³.
Work out the mass of the piece of plastic.



$$m = \rho \times v$$
$$1.3 \times 100$$

.....130.....g
(2)

4. Iron has a density of 7.8g/cm³.
A solid iron statue has a mass of 877.5g.
Work out the volume of the statue.



$$v = \frac{m}{\rho} \quad \frac{877.5}{7.8}$$

.....112.5.....cm³
(2)

5. A solid silver spoon has a mass of 65.1g.
 The volume of the spoon is 6.2cm³.
 Calculate the density of silver.



$$\frac{M}{V} \quad \frac{65.1}{6.2}$$

$$\frac{10.5}{\dots\dots\dots} \text{g/cm}^3$$

(2)

6. A glass cube of side length 5cm has a mass of 306.25g.
 Calculate the density of the glass.



$$V = 125 \quad 5 \times 5 \times 5$$

$$\frac{M}{V} \quad \frac{306.25}{125}$$

$$\frac{2.45}{\dots\dots\dots} \text{g/cm}^3$$

(3)

7. A liquid has mass of 10kg and a density of 1.18g/cm³.
 Calculate the volume of the liquid.
 Include suitable units.



$$M = 10000g$$

$$d = 1.18 \text{g/cm}^3$$

$$\frac{M}{d} = \frac{10000}{1.18} = 8474.576 \text{cm}^3$$

$$\frac{8474.6 \text{cm}^3}{\dots\dots\dots}$$

(3)

8. A garden ornament has a volume of 0.05m³.
 The ornament is made from a stone that has a density of 6.4g/cm³.
 Calculate the mass of the ornament.
 Include suitable units.



$$D \times V$$

$$6.4 \times 50000 = 320000g$$

$$1 \text{m}^3 = 1,000,000 \text{cm}^3$$

$$\frac{320kg}{\dots\dots\dots}$$

(3)

9. The mass of 3m^3 of tin is 21840kg .



(a) Work out the density of tin.

$$\frac{m}{v} = \frac{21840 \text{ kg}}{3 \text{ m}^3}$$

$$\dots 7280 \text{ kg/m}^3 \quad (2)$$

The density of aluminium is 2712kg/m^3 . $\times 5 = 13560 \text{ kg}$

(b) Work out the difference in mass between 5m^3 of tin and 5m^3 of aluminium.

$$\begin{aligned} \text{tin} &= 21840 \text{ kg} \div 3 \times 5 = 36400 \text{ kg} \\ \text{Aluminium} &= 13560 \text{ kg} \end{aligned}$$

$$\dots 22840 \text{ kg} \quad (3)$$

10. Mr. Dixon is building a toy boat for his son.



He has three different planks of wood to choose from.

Plank A	Plank B	Plank C
Volume = 750cm^3 Mass = 900g	Volume = 0.0152m^3 Mass = 7.6kg	Volume = 1000cm^3 Mass = 1.02kg

If wood has a density under 1g/cm^3 , it will float.

Which plank of wood is the most suitable?

Explain your answer.

$$D = \frac{m}{v}$$

$$\frac{900}{750} = 1.2\text{g/cm}^3$$

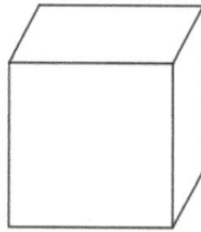
$$\frac{7600}{15200} = 0.5\text{g/cm}^3$$

$$\frac{1020}{1000} = 1.02\text{g/cm}^3$$

Plank B

(4)

11. The diagram below shows a solid block of ice.



81cm

$$81^3 = 531441 \text{ cm}^3$$

$$= 0.531441 \text{ m}^3$$

A block of ice weighs $\frac{1}{2}$ tonne. 500kg
The block is a cube with side length 81cm.

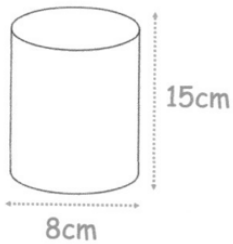
Find the density of the ice.
Give your answer in kilograms per cubic metre.

$$\frac{500}{0.531441}$$

$$\frac{940.8}{\dots\dots\dots} \text{ kg/m}^3$$

(3)

12. The diagram shows a solid cylinder.



$$V = \pi r^2 h$$

$$= \pi \times 4^2 \times 15$$

$$= 753.98 \dots \text{ cm}^3$$

The cylinder is made from titanium.
The density of titanium is 4.43 g/cm^3

Calculate the mass of the cylinder.

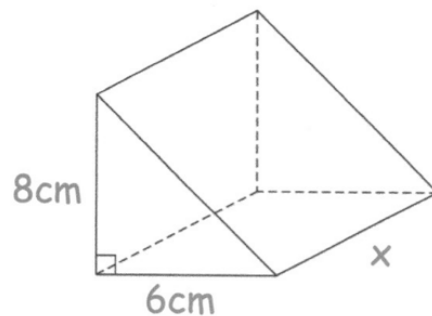
$$m = D \times V$$

$$4.43 \times 753 \dots$$

$$\frac{3340}{\dots\dots\dots} \text{ g}$$

(3)

13. The diagram shows a solid triangular prism.



The prism is made from wood and has a mass of 643.8g
The density of wood is 1.85g/cm³

Calculate the length of the prism.

$$\frac{M}{D} = \frac{643.8}{1.85} = 348 \text{ cm}^3$$

$$24 \times x = 348$$

$$\dots\dots\dots 14.5 \text{ cm}$$

(4)

14. Material A has a density of 5.8g/cm³. 65 cm³
Material B has a density of 4.1g/cm³. 400 cm³



377g of Material A and 1.64kg of Material B form Material C.

Work out the density of Material C.

Volume of A

Volume of B

$$\frac{377}{5.8} = 65 \text{ cm}^3$$

$$\frac{1640}{4.1} = 400 \text{ cm}^3$$

$$D = \frac{m}{v}$$

$$\frac{(377 + 1640)}{(65 + 400)}$$

$$\dots\dots\dots 4.3376 \text{ g/cm}^3$$

(4)

15. Liquid A and liquid B are mixed in the ratio of volumes, 2 : 5 to make liquid C.



Liquid A has a density of 1.25g/cm^3

Liquid B has a density of 0.98g/cm^3

Work out the density of liquid C.

$$\begin{array}{r} 1.25 \times 2 = 2.5 \\ 0.98 \times 5 = 4.9 \\ \hline 7.4 \end{array}$$

$$7.4 \div 7 = 1.0571\dots$$

$$\begin{array}{r} 1.057 \\ \dots\dots\dots\text{g/cm}^3 \\ \text{to 3 dp. (4)} \end{array}$$

16. Winston has two blocks, A and B, each made from a different metal.



The density of the metal used to make block A is twice the density of the metal used to make block B.

The mass of block A is six times of the mass of block B.

Complete the sentence.

$$v = \frac{m}{d} \times 6 \times 2$$

$$\frac{6}{2} = 3$$

The volume of block A is 3 times the volume of block B.

(1)

17. Isabella is loading granite tiles into her trailer, that can carry up to 600kg.



Each tile measures 30cm by 30cm by 2.5cm

The density of the granite is 2.7g/cm³

Isabella says that she can placed 100 tiles in the trailer.

Is she correct?

Explain your answer.

$$30 \times 30 \times 2.5 = 2250 \text{ cm}^3$$

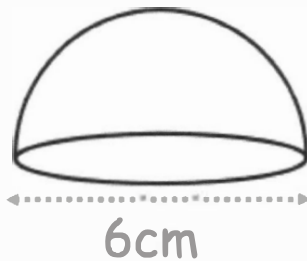
$$2250 \times 2.7 = 6075 \text{ g}$$
$$6.075 \text{ kg}$$

$$100 \times 6.075 = 607.5 \text{ kg}$$

No, the tiles weigh 607.5 kg, which is more than the trailer's limit.

(5)

18. The diagram shows a solid glass paperweight.



The paperweight is a hemisphere with diameter 6cm.
The glass has a density of 3g/cm^3 .

Calculate the mass of the paperweight.

$$\begin{aligned} M &= D \times V \\ &= 3 \times 56.548 \dots \\ &= 169.646 \end{aligned}$$

$$\begin{aligned} V &= \frac{1}{2} \left(\frac{4}{3} \pi r^3 \right) \\ &= \frac{1}{2} \left(\frac{4}{3} \times \pi \times 3^3 \right) \\ &= 56.548 \dots \text{cm}^3 \end{aligned}$$

$$\begin{aligned} &169.646 \dots \text{g} \\ &\text{(4)} \end{aligned}$$

19. A solid metal sphere has a radius of 4cm, correct to the nearest centimetre.



Mass of the sphere is 720g , correct to two significant figures.

Work out the greatest possible density of the metal.

Give your answer to three significant figures.

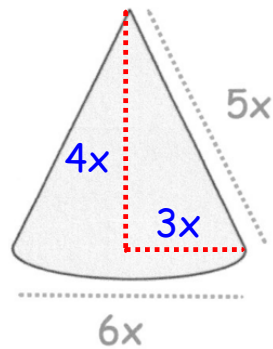
$$D = \frac{M}{V} \quad \begin{array}{l} \swarrow \uparrow \\ 725 \\ \hline 179.59438 \end{array}$$

$$V = \frac{4}{3} \times \pi \times 3.5^3$$

$$\frac{4}{3} \times \pi \times 3.5^3 = 179.594 \dots \text{cm}^3$$

$$\begin{aligned} &4.04 \dots \text{g/cm}^3 \\ &\text{(4)} \end{aligned}$$

20. The diagram below shows a solid cone.



$$V = \frac{1}{3} \pi r^2 h$$
$$V = \frac{1}{3} \times \pi \times (3x)^2 \times 4x$$
$$V = \frac{1}{3} \times \pi \times 9x^2 \times 4x$$

The cone is made from a material with density 5g/cm^3 .

Write an expression for the mass of the cone, in terms of x .

$$m = D \times V$$

$$= \frac{1}{3} \times \pi \times 36x^3$$
$$= 12\pi x^3$$

$$m = 5 \times 12\pi x^3$$
$$= 60\pi x^3$$

$$\dots 60\pi x^3 \text{ cm}^3$$

(4)