

## Density Practice

1 Is each sentence sometimes true, always true, or always false?

(a) Gold is denser than water.

(c) Air is denser than water.

(b) Gold is heavier than water.

(d) Helium is heavier than air.

2 Complete the sentences filling in the blanks.

Use the words **density, more, less, sink, float, metre, centimetre, volume**.

Not all words are used.

A cubic \_\_\_\_\_ of water is heavier than a cubic \_\_\_\_\_ of silver.

This is because it has \_\_\_\_\_ mass.

If we want to compare fairly, we take some water and silver of the same \_\_\_\_\_.

The silver will then be heavier, as its \_\_\_\_\_ (in  $\text{g/cm}^3$ ) is larger.

This means that a silver lump will \_\_\_\_\_ in water.

3 Here is a list of materials. Number them in order of density. Put 1 against the least dense material, and 5 against the most dense.

air

ice

water

gold

iron

4 A  $1500 \text{ cm}^3$  brick has a mass of 3000 g.

(a) Mass of  $1 \text{ cm}^3$  of brick =   $\div$   =  grams

(b) Complete the sentence: The density of brick (in  $\text{g/cm}^3$ ) is .

(c) 15 g of cement has a volume of  $10 \text{ cm}^3$ . Work out its density using an equation.

$$\begin{array}{rcccl} \text{mass (g)} & = & \text{density (g/cm}^3\text{)} & \times & \text{volume (cm}^3\text{)} \\ \hline 15 & = & \text{ } & \times & 10 \end{array}$$

(d) 40 g of straw has a volume of  $800 \text{ cm}^3$ . Work out the density in  $\text{g/cm}^3$ .

5 Gold has a density of  $19 \text{ g/cm}^3$ .

(a) Complete the sentence: The mass of  $1 \text{ cm}^3$  of gold is  grams.

(b) Work out the mass of  $4 \text{ cm}^3$  of gold using an equation.

$$\begin{array}{rcccl} \text{mass (g)} & = & \text{density (g/cm}^3\text{)} & \times & \text{volume (cm}^3\text{)} \\ \hline \text{ } & = & 19 & \times & 4 \end{array}$$

(c) Work out the mass of  $25 \text{ cm}^3$  of gold using an equation.

$$\begin{array}{rclclcl} \text{mass (g)} & = & \text{density (g/cm}^3\text{)} & \times & \text{volume (cm}^3\text{)} \\ \boxed{\phantom{000}} & = & \boxed{19} & \times & \boxed{25} \end{array}$$

(d) If a gram of gold costs £50, what is the cost of  $25 \text{ cm}^3$  of gold.

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6 Toffee has a density of  $4 \text{ g/cm}^3$ .

(a) What is the mass of  $1 \text{ cm}^3$  of toffee?

(b) If you divide 80 g of toffee into 4 g pieces, how many pieces would you have?

(c) What is the volume of 80 g of toffee? Count the  $1 \text{ cm}^3$  (4 g) pieces.

(d) Work out the volume of 600 g of toffee using an equation.

$$\begin{array}{rclclcl} \text{mass (g)} & = & \text{density (g/cm}^3\text{)} & \times & \text{volume (cm}^3\text{)} \\ \boxed{600} & = & \boxed{4} & \times & \boxed{\phantom{000}} \end{array}$$

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7 In the table, match each quantity to its unit and symbol.

Choose from the symbols  $m$ ,  $V$  and  $\rho$ .

Choose from the units g,  $\text{cm}^3$  and  $\text{g/cm}^3$ .

Quantity	Symbol	Unit
Volume		
Mass		
Density		

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8 Complete the word equations using **density**, **mass** and **volume**.

(a) mass =

(b) volume =

(c) density =

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9 Rewrite your word equations using symbols.

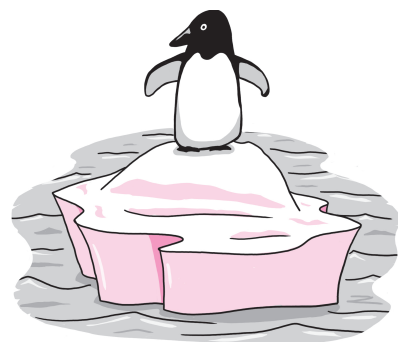
(a)  $V =$

(b)  $\rho =$

(c)  $m =$

- 10 Use your understanding of density, or the equations, to calculate
- (a) The density of osmium (a metal) if 1100 g has a volume of  $50 \text{ cm}^3$ .
  - (b) The mass of  $200 \text{ cm}^3$  of brass with a density of  $8.7 \text{ g/cm}^3$ .
  - (c) The volume of 60 g of packing polystyrene with a density of  $0.03 \text{ g/cm}^3$ .
  - (d) The mass of  $1000 \text{ cm}^3$  of chocolate with a density of  $1.3 \text{ g/cm}^3$ .
  - (e) The volume of 2 kg of petrol of density  $0.75 \text{ g/cm}^3$ . ( $1 \text{ kg} = 1000 \text{ g}$ )
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- 11 A 45 g block of ice has a volume of  $50 \text{ cm}^3$ .
- (a) Calculate the density of ice in  $\text{g/cm}^3$ .
  - (b) Water has a density of  $1.0 \text{ g/cm}^3$ . Do you think an ice cube will float in water? Why?
  - (c) Will all masses of ice float in water, or only small ones?



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- 12 In this question, we will work out the mass of the water in a swimming pool.
- (a) A cubic metre of water measures  $100 \text{ cm} \times 100 \text{ cm} \times 100 \text{ cm}$ . Calculate the volume of a cubic metre in  $\text{cm}^3$ .
  - (b) Calculate the mass of a cubic metre of water in grams. The density is  $1.0 \text{ g/cm}^3$ .
  - (c) Write the mass of a cubic metre of water in kilograms. ( $1 \text{ kg} = 1000 \text{ g}$ )
  - (d) A swimming pool measures  $50 \text{ m} \times 10 \text{ m}$  and the water is 1.25 m deep. Calculate the volume of water in the pool in cubic metres.
  - (e) Multiply your answers to parts (c) and (d) to get the mass of the water in the pool in kilograms.