

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, mass, larger, smaller, 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 more _____.

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

The silver will then be heavier, as its _____ (in 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 cm^3 brick has a mass of 3000 g.

(a) Mass of 1 cm^3 of brick = \div = grams

(b) Complete the sentence: The density of brick (in g/cm^3) is .

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

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

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

5 Gold has a density of 19 g/cm^3 .

(a) Complete the sentence: The mass of 1 cm^3 of gold is grams.

(b) Work out the mass of 4 cm^3 of gold using an equation.

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

(c) Work out the mass of 25 cm^3 of gold using an equation.

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

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

6 Toffee has a density of 4 g/cm^3 .

(a) What is the mass of 1 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 cm^3 (4 g) pieces.

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

$$\begin{array}{ccccc} \text{mass (g)} & = & \text{density (g/cm}^3\text{)} & \times & \text{volume (cm}^3\text{)} \\ \boxed{} & = & \boxed{1.2} & \times & \boxed{} \end{array}$$

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

Choose from the symbols m , V and ρ .

Choose from the units g, cm^3 and g/cm^3 .

| Quantity | Symbol | Unit |
|----------|--------|------|
| Volume | | |
| Mass | | |
| Density | | |

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

(a) mass =

(b) volume =

(c) density =

9 Rewrite your word equations using symbols.

(a) $V =$

(b) $\rho =$

(c) $m =$

- 10 Use your understanding of density, or the formulae, to calculate
- (a) The density of osmium (a metal) if 1100 g has a volume of 50 cm^3 .
 - (b) The mass of 200 cm^3 of brass (density = 8.7 g/cm^3).
 - (c) The volume of 60 g of packing polystyrene ($\rho = 0.03 \text{ g/cm}^3$).
 - (d) The mass of 1000 cm^3 of chocolate (density = 1.3 g/cm^3).
 - (e) The volume of 2 kg of petrol ($\rho = 0.75 \text{ g/cm}^3$, $1 \text{ kg} = 1000 \text{ g}$).
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- 11 A 45 g block of ice has a volume of 50 cm^3 .
- (a) Calculate the density of ice in g/cm^3 .
 - (b) Water has a density of 1.0 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 cm^3 .
 - (b) Calculate the mass of a cubic metre of water in grams. The density is 1.0 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.