Warm-up activity

**Here is a formula:** $d = \dfrac{m}{v}$

a) Work out the value of d when $m = 18$ and $v = 3$

b) Rearrange the formula to make m the subject.

c) Work out the value of m when $d = 5$ and $v = 10$

d) Rearrange the formula to make v the subject.

e) Work out the value of v when $m = 28$ and $d = 4$

Examples

Density, mass, volume

a) A cube of side 3 cm has a mass of 54 grams. What is the density of the cube?

b) Gold has a density of 19.32 g/cm^3. How much does 1 m^3 of gold weigh?

c) What is the volume of an object that weighs 1 kg and has a density of 6 g/cm^3?
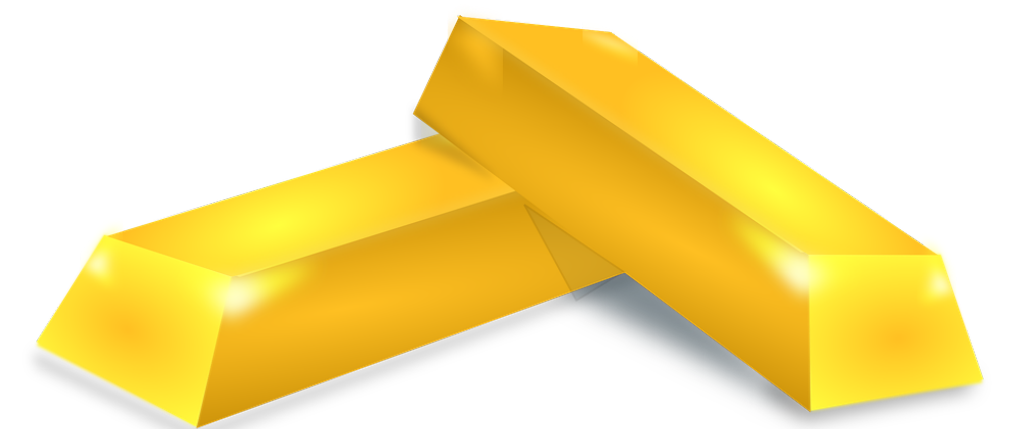
Diagnostic

Which of the following is a correct formula?

a) Density = Mass × Volume

b) Mass = $\dfrac{\text{Volume}}{\text{Density}}$

c) Volume = Mass × Density

d) Volume = $\dfrac{\text{Mass}}{\text{Density}}$

Diagnostic

10 cm³ of aluminium has a mass of 28 g. What is its density?

a) 280 g/cm³

b) 2.8 g/cm³

c) 0.28 kg/m³

d) 0.357 g/cm³

Diagnostic

Sea water has a density of 1.03 g/cm^3.
What is the mass of 100 cm^3 of sea water?

a) 103 g

b) 0.0103 g

c) 103 kg

d) 97.1 g

Diagnostic

Sea water has a density of 1.03 g/cm³.
What is the volume of 4.12 grams of sea water?

a) 4 g

b) 4 cm³

c) 0.25 cm³

d) 0.25 g/cm³

Alpha Exercise

a) A block with a volume of **8 cm³** weighs **80 g**. What is the density of this block in g/cm³?

b) A **1 cm x 2 cm x 10 cm cuboid** weighs 80 grams. What is the density of the cuboid?

c) A gym ball with a volume of **800 cm³** has a mass of 1600 g. What is the density of the ball?

Beta Exercise

a) A **2 cm x 5 cm x 6 cm cuboid** weighs **30 grams**. What is the density of the cuboid?

b) Silver has a density of **10.5 g/cm³**. How much does **5 cm³** of silver weigh?

c) What is the volume of an object that weighs **40 g** and has a density of **4 g/cm³**.

Gamma Exercise

a) A **cube of side 2 cm** has a mass of **72 grams**. What is the density of the cube?

b) Platinum has a density of **21.4 g/cm³**. How much does **1 m³** of platinum weigh?

c) What is the volume of an object that weighs **450 g** and has a density of **7.5 g/cm³**?

d) A ball with a volume of **900 cm³** has a mass of 225 g. What is the density of the ball? Will this ball float on water? (Water has a density of 1 g/cm³.)

Explain the mistake

Denise answers this question as follows:

Iridium has a density of 22.56 g/cm^3. How much does 1 m^3 of gold weigh? Give your answer in kg.

Each cm^3 of iridium weighs 22.56 g.

So 100 cm^3 weighs 22.56 x 100 = 2256 g.

Therefore 1 m^3 of iridium weighs 2256 g or 2.256 kg.

Denise has made a mistake. What is it?

Exam-style question

Wu has made a bronze sculpture.
The sculpture weighs 384.5 kg.
The density of the bronze used is 7.8 g/cm^3.
What is the volume of the sculpture, correct
to the nearest cm^3?

Challenge

A scientist has a measuring jug with a capacity of 800 cm³. The measuring jug weighs 90 g when empty.

The scientist adds 200 cm³ of liquid A and 600 cm³ of liquid B to the jug, so the jug is now full and has a mass of 850 g.

The mass of 200 cm³ of liquid A is equal to the mass of 350 cm³ of liquid B.

What is the density of liquid A?