

## R11a Part 2 Density, mass, and volume © BossMaths

### Warm-up activity



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

- 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  $d = 4$

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### Alpha Exercise

- a) A block with a volume of  **$8 \text{ cm}^3$**  weighs **80 g**. What is the density of this block in  $\text{g/cm}^3$ ?
  
  
  
  
  
  
  
  
  
  
- b) A  **$1 \text{ cm} \times 2 \text{ cm} \times 10 \text{ cm}$  cuboid** weighs 80 grams. What is the density of the cuboid?
  
  
  
  
  
  
  
  
  
  
- c) A gym ball with a volume of  **$800 \text{ cm}^3$**  has a mass of 1600 g. What is the density of the ball?

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### 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/cm<sup>3</sup>**. How much does **5 cm<sup>3</sup>** of silver weigh?
- c) What is the volume of an object that weighs **40 g** and has a density of **4 g/cm<sup>3</sup>**.

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### 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/cm<sup>3</sup>**. How much does **1 m<sup>3</sup>** of platinum weigh?
- c) What is the volume of an object that weighs **450 g** and has a density of **7.5 g/cm<sup>3</sup>**?
- d) A ball with a volume of **900 cm<sup>3</sup>** 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/cm<sup>3</sup>.)

## Explain the mistake



Denise answers this question as follows:

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

Each  $\text{cm}^3$  of iridium weighs  $22.56 \text{ g}$ .

So  $100 \text{ cm}^3$  weighs  $22.56 \times 100 = 2256 \text{ g}$ .

Therefore  $1 \text{ m}^3$  of iridium weighs  $2256 \text{ g}$  or  $2.256 \text{ kg}$ .

**Denise has made a mistake.** What is it?

## Exam-style question

Wu has made a bronze sculpture.

The sculpture weighs  $384.5 \text{ kg}$ .

The density of the bronze used is  $7.8 \text{ g/cm}^3$ .

What is the volume of the sculpture, correct to the nearest  $\text{cm}^3$ ?

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### Challenge

A scientist has a measuring jug with a capacity of  $800 \text{ cm}^3$  weighs  $90 \text{ g}$  when empty.

The scientist adds  $200 \text{ cm}^3$  of liquid A and  $600 \text{ cm}^3$  of liquid B to the jug, so the jug is now full and has a mass of  $850 \text{ g}$ .

The mass of  $200 \text{ cm}^3$  of liquid A is equal to the mass of  $350 \text{ cm}^3$  of liquid B.

What is the density of liquid A?