

## Compound measures

### Starter

1. **(Review of last lesson)**  
How long is a train which passes signal in 20 seconds at a speed of 108 km/h?
2. **(Review of previous material)** Two people run towards each other at 4 m/s and 9 m/s respectively. Initially they are 650 m apart. How long will it be before they meet?

### Notes

The following formulae will have been covered in science:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \qquad \text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

**E.g. 1** The volume of a solid object is 5 cm<sup>3</sup> and its mass is 50 g. Calculate the density of the material, giving the correct units for your answer..

**E.g. 2** A cube of side 4 cm applies a pressure of 10 Nm<sup>-2</sup> to the table it is resting on. Calculate the weight of the cube

**Working:** The weight of the cube is the “force” in the formula.  
Area = 4<sup>2</sup> = 16 cm<sup>2</sup>  
Pressure =  $\frac{\text{Force}}{\text{Area}}$ :      10 =  $\frac{\text{Weight}}{16}$   
Weight = 10 × 16 = 160 N  
The weight of the cube is 160 N.

**E.g. 3** A solid cuboid of dimensions 3 cm by 4 cm by 5 cm is made of metal of density 10 g/cm<sup>3</sup>. Calculate the mass of the cuboid, giving your answer in kg.

**Working:** Density =  $\frac{\text{Mass}}{\text{Volume}}$ :      10 =  $\frac{\text{Mass}}{3 \times 4 \times 5}$   
Mass = 10 × 60 = 600 g  
The mass of the cuboid is 0.6 kg

**E.g. 4** A certain plastic has a density of 3 g/cm<sup>3</sup>. Convert the density into kg/m<sup>3</sup>.

**E.g. 5** The population of the UK is about 66.7 million and land area is about 240000 km<sup>2</sup>. Work out the population density, stating your units clearly and giving your answer to the nearest integer.

**E.g. 6\*** Zahra mixes 150 g of metal A and 150 g of metal B to make 300 g of an alloy. Metal A has a density of 19.3 g/cm<sup>3</sup> and metal B has a density of 8.9 g/cm<sup>3</sup>. Work out the density of the alloy to 3 s.f., stating the units clearly.

Video: [Density](#)  
Video: [Pressure](#)  
Video: [Converting between metric units of area](#)  
Video: [Converting between metric units of volume](#)

[Solutions to Starter and E.g.s](#)

### Exercise

9-1 class textbook: p313 M10.4 Qu 1-15  
A\*-G class textbook: p276 M10.4 Qu 1-14  
9-1 homework book: p105 M10.4 Qu 1-12  
A\*-G homework book: p77 M10.4 Qu 1-10

### Summary

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$