

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 cm³ 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⁻² 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.
Since the pressure units are 10 Nm⁻² the area needs to be m².
Area = 0.04² = 0.0016 cm²
Pressure = $\frac{\text{Force}}{\text{Area}}$: 10 = $\frac{\text{Weight}}{0.0016}$
Weight = 10 × 0.0016 = 0.016 N
The weight of the cube is 0.016 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/cm³. 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/cm³. Convert the density into kg/m³.

E.g. 5 The population of the UK is about 66.7 million and land area is about 240000 km². 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/cm³ and metal B has a density of 8.9 g/cm³. 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

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

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