# Foundation Check In - 10.01 Units and measurement

1. The maximum speed on UK roads is 70 mph.

Convert this speed into km/h using 1 mile  1.6 km.

1. Convert a density of 2.5 kg/m3 into g/cm3.
2. An average speed is given as km/h. What is this in m/s?
3. This is the formula for pressure.



A cuboid with a base area of 85 cm2 applies a force of 170 N to the floor. What is the pressure that the floor is under in N/cm2?

1. The density of the air around us is 1.3 kg/m3. What is the volume of a balloon that can hold 4.55 g of air?
2. A map has a scale of 1 : 25 000, and a road marked on this map is 7 cm long. The same road is marked on a different map and measures 3.5 cm long. Explain how you could use this information to work out the scale on the second map.
3. Platinum has a density of 21.4 g/cm3 and silver has a density of 10.5 g/cm3.

Without calculating their weights explain which is heavier, 50 cm3 of platinum or 100 cm3 of silver.

1. It takes a snail one week to travel 1 kilometre. Calculate the approximate speed at which the snail is travelling and justify your choice of units.
2. A cuboid block of concrete applies a force of 4500 N to a table so the pressure exerted on the table is 90 N/cm2. One side of the base of the cuboid block is 5 cm. What is the length of the other side of the base? *(Note: you may use the formula provided in question 4)*
3. A map has a scale of 1 : 10 000. On the map, a post office is directly north of a school and a museum is directly east of the same school. The buildings are linked by three straight roads. Ahmed measures these roads on his map. The distance between the post office and the museum is 15 cm, and the distance between the post office and the school is 9 cm. How far is it from the school to the museum in kilometres?

**Extension**

A crane needs to lift a steel joist.

The joist is a cuboid with dimensions 2.5 m by 0.2 m by 0.2 m.

Steel has a density of 8.05 g/cm3.

The crane can lift a maximum load of 1.5 tonnes.

Can the crane be used to lift the joist? Show your working.

## Answers

1. 112 km/h
2. 0.0025 g/cm3
3. m/s
4. 2 N/cm2
5. 0.0035 m3
6. The road is half as long on the new map so the scale must be double, or 1 : 50 000
7. The platinum is heavier; it has half the volume, but more than double the density.
8. 0.165 cm/s or 9.92 cm/min. The most commonly used unit for speed, km/h, would be too large a unit for the answer to be meaningful; even m/s is slightly too large for the numerical values given.
9. 10 cm
10. 1.2 km

**Extension**

Volume of joist m3

Mass of joist  density  volume; density is g/cm3 so need to convert to kg/m3, 8.05 g/cm3 kg/m3

Mass of joist kg

1.5 tonne kg

Yes, the crane can lift the joist.

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
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| AO1 | 1 | Convert simple compound units (speed) |  |  |  |  | AO1 | 1 | Convert simple compound units (speed) |  |  |  |
| AO1 | 2 | Convert other compound units (density) |  |  |  |  | AO1 | 2 | Convert other compound units (density) |  |  |  |
| AO1 | 3 | Convert compound units in an algebraic context (speed) |  |  |  |  | AO1 | 3 | Convert compound units in an algebraic context (speed) |  |  |  |
| AO1 | 4 | Use compound units |  |  |  |  | AO1 | 4 | Use compound units |  |  |  |
| AO1 | 5 | Know and apply densitymass ÷ volume |  |  |  |  | AO1 | 5 | Know and apply densitymass ÷ volume |  |  |  |
| AO2 | 6 | Use the scale of a map |  |  |  |  | AO2 | 6 | Use the scale of a map |  |  |  |
| AO2 | 7 | Apply knowledge of densitymass ÷ volume |  |  |  |  | AO2 | 7 | Apply knowledge of densitymass ÷ volume |  |  |  |
| AO2 | 8 | Use and convert standard units or simple compound units (speed) |  |  |  |  | AO2 | 8 | Use and convert standard units or simple compound units (speed) |  |  |  |
| AO3 | 9 | Solve a problem using densitymass ÷ volume |  |  |  |  | AO3 | 9 | Solve a problem using densitymass ÷ volume |  |  |  |
| AO3 | 10 | Use the scale of a map to solve a problem |  |  |  |  | AO3 | 10 | Use the scale of a map to solve a problem |  |  |  |
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