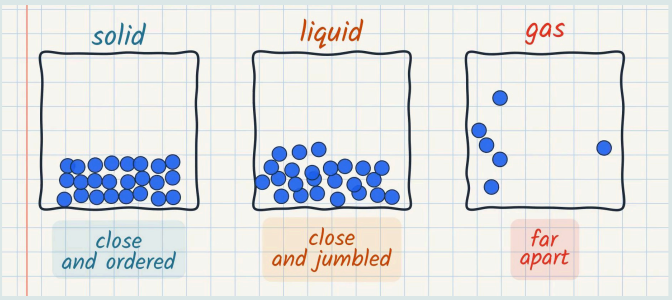
Density and the particle model

Why is a small steel ball 'heavier' than a big balloon?

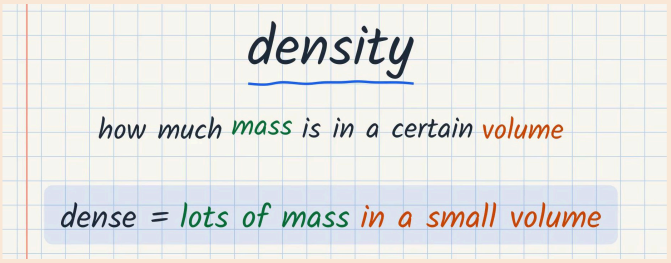
sansara academy
Summary sheet

1 The particle model



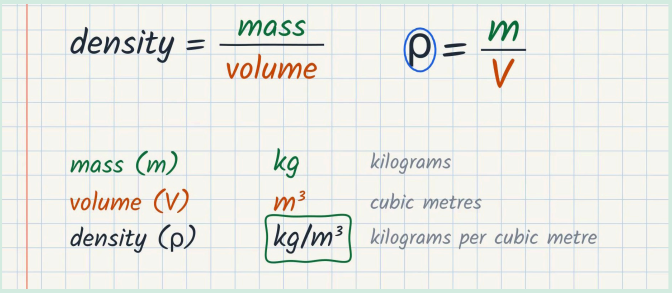
- **Solid:** particles close, in a regular pattern, vibrating in place. **Liquid:** close but random, sliding past each other. **Gas:** far apart, moving fast in random directions.
- Model limits: real gaps in a gas are much bigger than any drawing, and particles stay **the same size** in every state.

2 What density means



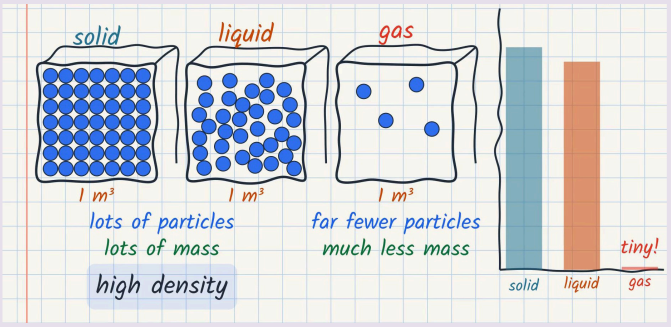
- **Density** is how much **mass** there is in a certain **volume**.
- A dense material has lots of mass in a small volume: a steel ball bearing is denser than the gas in a balloon.

3 The equation and units



- ρ = m / V: mass in **kg**, volume in **m³**, density in **kg/m³**. Example: 0.54 ÷ 0.0002 = 2700 kg/m³ (aluminium).
- Lab units: g/cm³ × **1000** = kg/m³. Water is about 1 g/cm³ = 1000 kg/m³.

4 Density and states



- Solids and liquids: particles close, so lots of mass in each m³ (**high density**). Gases: particles far apart, so much less mass (**low density**).
- Most solids are a little denser than their liquid, but **ice is less dense than water**, so ice floats.

ρ = m / V

density = mass ÷ volume

ρ	density	kg/m³
m	mass	kg
V	volume	m³

Know it by heart (also on the equation sheet)

Exam tip

Explaining a density difference? Talk about the particles: say how they're arranged and how close they are. Don't only name the states.

Check yourself

1. A stone has a mass of 3 kg and a volume of 0.001 m³. What is its density?
2. Why is a gas less dense than a solid?

Answers: 1. 3 ÷ 0.001 = 3000 kg/m³ 2. Its particles are much further apart, so less mass in the same volume.