

Density: why things float or sink

Grade 6 science (Year 7 · Class 6) · Test answers (mark scheme)

Award marks as shown, and accept equivalent correct methods. For explanations, give a mark for each correct scientific idea; do not penalise spelling if the meaning is clear.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-2

Question 1 Define density (2 marks)

Density is the mass per unit volume of a material. $\rho = m \div V$, where ρ is density, m is mass and V is volume.

Marking: 1 mark for the definition, 1 mark for the formula with symbols explained.

Question 2 Unknown metal block (3 marks)

- a. $10.0 \times 3.0 \times 2.0 = 60 \text{ cm}^3$.
- b. $162 \div 60 = 2.7 \text{ g/cm}^3$.
- c. **Aluminium.**

Marking: 1 mark each.

Question 3 Mass of sea water (2 marks)

$m = \rho \times V = 1.03 \times 400 = 412 \text{ g}$.

Marking: 1 mark for the correct formula and substitution, 1 mark for the answer with unit.

Question 4 Bar chart (3 marks)

- a. **Pine and ice.**
- b. **11.3 g/cm^3 .**
- c. $11.3 \div 2.7 = 4.2 \text{ times}$.

Marking: 1 mark each.

Question 5 Steel ship (3 marks)

The hull is hollow and holds a large volume of air. The ship's mass is spread over a large volume, so its **average density is below that of water**, and it floats.

Marking: 1 mark for the hollow shape or air, 1 mark for average density, 1 mark for comparing with water.

Question 6 Sealed metal box (3 marks)

- a. $480 \div 600 = \mathbf{0.80 \text{ g/cm}^3}$.
- b. 0.80 is less than 1.00, so it **floats**.
- c. $0.80 \div 1.00 = \mathbf{80 \%}$.

Marking: 1 mark each.

Question 7 Density units (2 marks)

- a. $13.6 \times 1000 = \mathbf{13\ 600 \text{ kg/m}^3}$.
- b. $1.2 \div 1000 = \mathbf{0.0012 \text{ g/cm}^3}$.

Marking: 1 mark each.

Question 8 Salt and the egg (2 marks)

Dissolving salt increases the **density of the water**. When the water becomes denser than the egg, the egg floats.

Marking: 1 mark for the density of the liquid rising, 1 mark for comparing it with the egg.