

How particles explain solids, liquids and gases

Grade 7 science (Year 8 · Class 7) · Test answers (mark scheme)

The model answers give the full reasoning and the mark allocation for each part. Award marks only for correct science, not just for key words. Add up the marks to check the total of 20.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS1-1, MS-PS1-4

Question 1 Three states (2 marks)

- a. Solid.
- b. Gas.

Marking: 1 mark each.

Question 2 Reading the diagram (3 marks)

- a. Box P.
- b. They move fast in random directions and collide with each other and the walls.
- c. In Q most of the volume is empty space, so the particles can be pushed closer; in P the particles already touch.

Marking: 1 mark for each part.

Question 3 Pressure of a gas (2 marks)

The air particles are heated so they move faster. They hit the inside walls more often and with more force, so the pressure rises.

Marking: 1 mark for faster particles; 1 mark for more frequent or harder collisions.

Question 4 Diffusion (3 marks)

- a. Diffusion.
- b. Spice particles move randomly in all directions and collide with air particles, so they spread from the crowded kitchen to places with fewer of them.

Marking: 1 mark for diffusion; 1 mark for random motion; 1 mark for movement from crowded to less crowded.

Question 5 Spreading speed (3 marks)

- a. Speed = $4.5 \text{ cm} \div 90 \text{ s} = \mathbf{0.050 \text{ cm/s}}$.
- b. It decreases.

Marking: 1 mark for the substitution, 1 mark for 0.050 cm/s with unit, 1 mark for decrease.

Question 6 Changes of state (2 marks)

- a. Melting.
- b. Condensing.

Marking: 1 mark each.

Question 7 Plateau on a graph (3 marks)

The energy supplied goes into freeing the particles from their fixed positions, not into making them move faster. The speed of the particles stays the same, so the temperature does not rise until all the solid has melted.

Marking: 1 mark: energy is still being supplied; 1 mark: used to free or separate particles; 1 mark: temperature depends on particle speed, which is unchanged.

Question 8 Spot the mistake (2 marks)

The particles do not change size or kind. They move faster and further apart, but a water particle in steam is the same as in liquid water.

Marking: 1 mark for identifying the mistake; 1 mark for the correct statement.