

Series and parallel circuit patterns

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

Model answers and the marking guide are given below. Award the mark for the correct science even if the wording differs. In explanations look for the idea of paths, branches or shared supply, and always check the unit for a voltage.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS2-3

Question 1 Define the circuits (3 marks)

- a) The components are connected one after another in a single loop, with one path for the current.
- b) The components are on separate branches, so there is more than one path.
- c) **Parallel.**

Marking: 1 mark each.

Question 2 Reading the circuit (4 marks)

- a) **L1** (SM and S1 are closed; S2 is open so L2 is off).
- b) **Neither lamp:** SM is open, so both branches are cut off.
- c) **SM, S1 and S2** all closed.
- d) L1 is on its own branch connected directly to the cell, so removing L2 does not break the L1 path.

Marking: 1 mark each part.

Question 3 Cells (2 marks)

- a) $4 \times 1.5 \text{ V} = \mathbf{6.0 \text{ V}}$.
- b) **1.5 V.**

Marking: 1 mark each; the unit is required.

Question 4 Brightness (3 marks)

- a) **Both bulbs are dimmer** than the single bulb was.
- b) The energy from the cell is shared between the two bulbs.
- c) **Both are as bright as the original single bulb.**

Marking: 1 mark each.

Question 5 Short circuits (3 marks)

- a) A short circuit is an easy path that bypasses the components and lets a very large current flow.
- b) The large current heats wires and cells and can cause burns or a fire.
- c) The thin wire in the fuse melts when the current is too large, which **breaks the circuit**.

Marking: 1 mark each.

Question 6 String of lights (2 marks)

- a) $8 \times 1.5 \text{ V} = \mathbf{12 \text{ V}}$.
- b) The series loop has one path. Removing a bulb breaks the loop, so no current flows through any bulb.

Marking: 1 mark for the calculation and unit; 1 mark for the broken loop.

Question 7 Two lamps, three switches (2 marks)

Connect the lamps in parallel, each on its own branch with its own switch in that branch. Put the third switch in the main wire, in series with the cell, so that it controls both branches.

Marking: 1 mark for parallel with a switch on each branch; 1 mark for the third switch in the main wire.

Question 8 Why parallel in homes (1 mark)

Each appliance works independently and gets the full supply voltage, so one appliance failing or being switched off does not stop the others.

Marking: 1 mark for independence or full voltage.