

Resistance and how Ohm linked v, i and r

Grade 8 science (Year 9 · Class 8) · Test answers (mark scheme)

Marks are shown in each model answer. Accept equivalent wording and give error-carried-forward credit if a correct method follows an earlier slip.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS2-3

Question 1 Meters (2 marks)

- a. In **series**.
- b. In **parallel** across the component.

Marking: 1 mark each.

Question 2 Find the current (3 marks)

- a. $I = V \div R = 9.0 \div 45 = \mathbf{0.20\ A}$.
- b. $R = 90\ \Omega$, so $I = 9.0 \div 90 = \mathbf{0.10\ A}$.

Marking: 1 mark for the formula and substitution, 1 for 0.20 A; 1 for 0.10 A.

Question 3 Unit conversion (2 marks)

- a. **0.33 A**.
- b. **2200 Ω** .

Marking: 1 mark each.

Question 4 Reading a graph (3 marks)

- a. $R = V \div I = 10.0 \div 0.40 = \mathbf{25\ \Omega}$.
- b. $I = 6.0 \div 25 = \mathbf{0.24\ A}$.

Marking: 1 mark for substitution, 1 for 25 Ω ; 1 mark for 0.24 A (accept 0.23 to 0.25 A from graph).

Question 5 Filament lamp (3 marks)

- a. As the current increases the filament gets **hotter**. The metal atoms vibrate more, so the moving charges collide with them more often. The **resistance rises** with temperature, so the current grows more slowly than the voltage and the graph bends.

Marking: 1 mark filament heats up; 1 mark atoms vibrate/more collisions; 1 mark resistance increases so line curves.

Question 6 An LED resistor (3 marks)

a. $6.0 - 2.0 = \mathbf{4.0\ V}$.

b. $R = V \div I = 4.0 \div 0.020 = \mathbf{200\ \Omega}$.

Marking: 1 mark for 4.0 V; 1 mark for the substitution, 1 for 200 Ω .

Question 7 Wet hands (2 marks)

- a. Wet skin has a much **lower resistance**, so for the same voltage the current is much larger ($I = V \div R$), and a large current through the body can be fatal.

Marking: 1 mark lower resistance; 1 mark larger current for the same voltage.

Question 8 Wire resistance (2 marks)

- a. Use a **shorter wire** and a **thicker wire**. (Also accept a metal such as copper, or a lower temperature.)

Marking: 1 mark each.