



QUESTION WORKBOOK

Current-voltage characteristics

Electricity · Year 12

AQA 3.5.1.2 · CIE 9.3 · OCR A 4.2.3

10 questions · 30 marks

PRINT EDITION

SECTION A · Warm-up

A1 State Ohm's law. [2]

A2 A point on a component's I–V graph reads $V = 4.0 \text{ V}$ and $I = 0.20 \text{ A}$. Calculate the resistance at that point. [2]

A3 Sketch the current–voltage characteristic of an ohmic conductor at constant temperature. [2]

SECTION B · Standard

B1 Describe the shape of the I–V characteristic of a filament lamp and explain its shape. [3]

B2 Describe the I–V characteristic of a semiconductor diode. [3]

B3 A filament lamp gives the readings $V = 2.0\text{ V}$, $I = 0.40\text{ A}$ and $V = 8.0\text{ V}$, $I = 0.80\text{ A}$. Calculate the resistance at each point and comment on the change. [4]

B4 A component gives currents of 0.10 A , 0.20 A and 0.30 A at 2.0 V , 4.0 V and 6.0 V . Show that it is ohmic. [3]

SECTION C · Stretch

C1 Describe how the resistance of a negative temperature coefficient (NTC) thermistor changes with temperature, and explain this in terms of charge carriers. [4]

- C2** A filament lamp operates at 12 V with a current of 2.0 A. Calculate (a) its operating resistance and (b) its power. When barely lit it reads 1.0 V and 0.50 A; calculate its resistance then. [4]

- C3** Explain why a filament lamp does not obey Ohm's law. [3]