



QUESTION WORKBOOK

Circuits and Kirchhoff's laws

Electricity · Year 12

AQA 3.5.1.4 · CIE 9.2, 10.2 · OCR A 4.1.1, 4.2.5, 4.3.1

10 questions · 30 marks

PRINT EDITION

SECTION A · Warm-up

A1 State Kirchhoff's first law and the conservation principle it expresses. [2]

A2 Two resistors of $20\ \Omega$ and $30\ \Omega$ are connected in series. Calculate the total resistance. [2]

A3 Two $20\ \Omega$ resistors are connected in parallel. Calculate the total resistance. [2]

SECTION B · Standard

B1 A $6.0\ \Omega$ resistor and a $3.0\ \Omega$ resistor are connected in parallel across a $12\ \text{V}$ supply. Calculate (a) the total resistance and (b) the total current from the supply. [3]

- B2** A $4.0\ \Omega$ and an $8.0\ \Omega$ resistor are connected in series across a 12 V supply. Calculate (a) the current in the circuit and (b) the potential difference across each resistor. [4]

- B3** At a junction, currents of 3.0 A and 2.0 A flow in, and a single wire carries current out. Use Kirchhoff's first law to find the current in the output wire. [3]

- B4** A resistor of $5.0\ \Omega$ carries a current of 2.0 A. Calculate the power dissipated in it. [3]

SECTION C · Stretch

- C1** A $4.0\ \Omega$ resistor is connected in series with a parallel combination of a $6.0\ \Omega$ and a $3.0\ \Omega$ resistor, across a $12\ \text{V}$ supply. Calculate (a) the total resistance, (b) the total current and (c) the current in each of the parallel resistors. [4]

- C2** A $60\ \text{W}$ lamp is switched on for 5.0 minutes while connected to a $230\ \text{V}$ supply. Calculate (a) the energy it transfers and (b) the charge that flows through it. [4]

- C3** State Kirchhoff's second law and the conservation principle it expresses. [3]