

5.1 Electrical circuits

Name: _____ Class: _____ Date: _____ Total: 19 marks

Objective

Cover electrical circuits (3.5.1): charge flow $I = Q/t$, voltage and $V = E/Q$, circuit symbols, $V = IR$ with the V-I characteristics of a resistor, lamp, diode, (P) thermistor and LDR, and series/parallel rules. Original OxfordAQA practice.

1 Key knowledge and worked examples

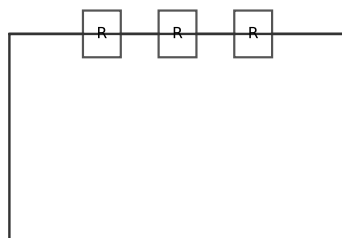
■ The three circuit equations

$$I = Q/t \quad V = E/Q \quad V = IR$$

Worked check. A 6 V battery drives 0.3 A through a lamp: $R = 6/0.3 = 20 \, \Omega$; in 5 minutes the charge flow is $Q = 0.3 \times 300 = 90 \, \text{C}$ and the energy $E = 6 \times 90 = 540 \, \text{J}$.

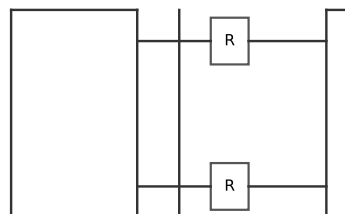
■ Component shapes and connection rules

series: one loop

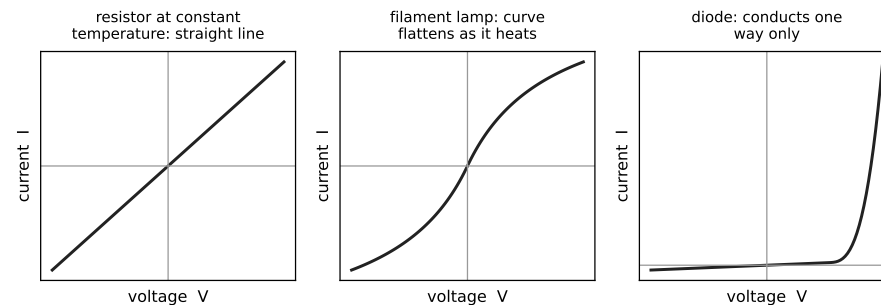


same current; p.d.s add; $R = R_1 + R_2$

parallel: branches



same p.d.; currents add; R less than either



2 Practice

2.1 Calculate the charge flow for 0.4 A over 50 s. [2]

2.2 Calculate R if 9 V drives 0.15 A. [2]

2.3 State the p.d. rule for components in parallel. [1]

2.4 (P) What does an LDR do as light intensity increases? [1]

2.5 Why does a filament lamp's resistance rise as it brightens? [2]

3 Exam-style questions

3.1 A 12 V supply feeds 4 Ω and 2 Ω resistors in series. Calculate the circuit current and each resistor's p.d. [4]

3.2 The same resistors are now in parallel across 12 V. Calculate each branch current and the supply current. [4]

3.3 (P) Explain how a thermistor and a fixed resistor could switch a heating system on when temperature falls. [3]
