

2.2 Circuits and resistance

Name: _____ Class: _____ Date: _____

Total: 20 marks

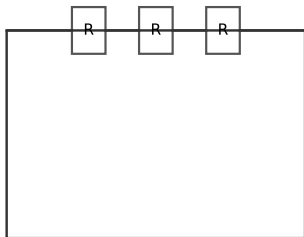
Objective

Cover energy and voltage in circuits (2.7–2.21): series vs parallel, I–V characteristics, LDRs and thermistors, $V = IR$, $Q = It$, $E = QV$ and series resistance calculations. Original IGCSE-level practice.

1 Key knowledge and worked examples

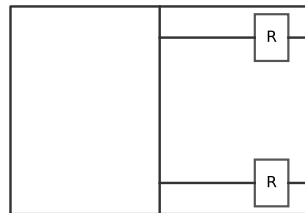
■ Same current or same voltage

series: one loop, same current



one loop: same current everywhere; voltages add

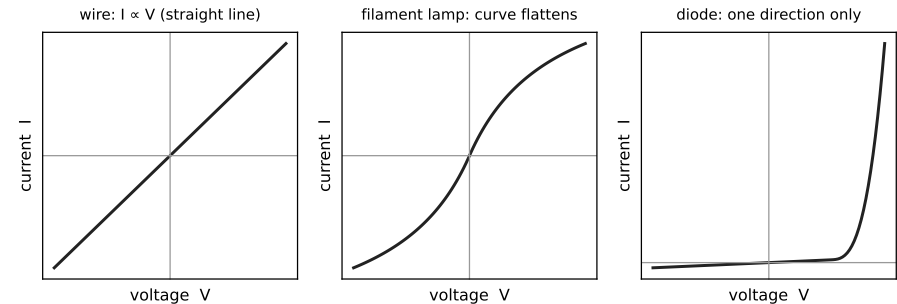
parallel: branches, same voltage



voltage the same on each branch; currents add

Series: $R = R_1 + R_2$; the current is the same everywhere; voltages add to the supply.
 Parallel: each branch gets the full supply voltage; currents add at junctions (charge conserved); combined resistance is less than either resistor.

■ Three curves to know



Wire: straight line (ohmic). Lamp: S-curve – resistance rises as the filament heats. Diode: conducts only forwards. LDR resistance falls with light; thermistor resistance falls as temperature rises.

2 Practice

2.1 Give two reasons domestic lighting is wired in parallel. [2]

2.2 State the current rule at a junction. [1]

2.3 A $12\ \Omega$ resistor carries 0.5 A. Calculate the voltage across it. [2]

2.4 Calculate the combined resistance of $4\ \Omega$ and $6\ \Omega$ in series, and state the current when 10 V is applied. [3]

2.5 State what happens to a thermistor's resistance when it is cooled. [1]

3 Exam-style questions

3.1 A $4\ \Omega$ and a $6\ \Omega$ resistor are in series across a $10\ \text{V}$ supply. Calculate the circuit current and the voltage across each resistor. [4]

3.2 Describe how the resistance of a filament lamp changes as the voltage rises, and explain why. [3]

3.3 A charge of $45\ \text{C}$ flows through a lamp in $30\ \text{s}$. Calculate the current and, if the lamp is $6\ \text{V}$, the energy transferred. [4]
