IGCSE PHYSICS • EXERCISE SHEET

4.3 Electric circuits

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

KEY WORDS series and parallel 串联与并联 • electric circuits 电路 • potential divider 分压器 • parallel 并联 • series 串联

Objective

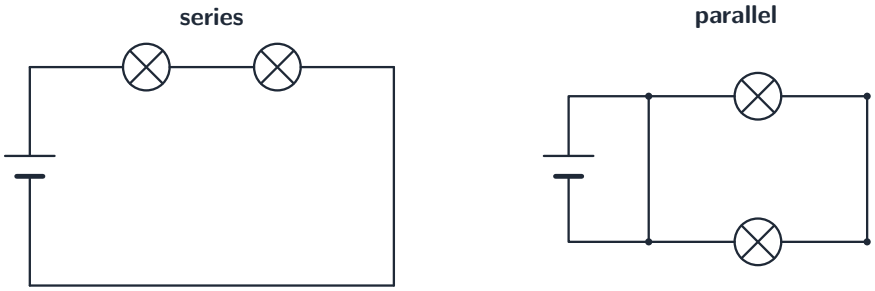
Build the skills to answer exam questions on **electric circuits** 电路 — **series and parallel** 串联与并联 rules, combining resistors, and **potential dividers** 分压器.

You must be able to:

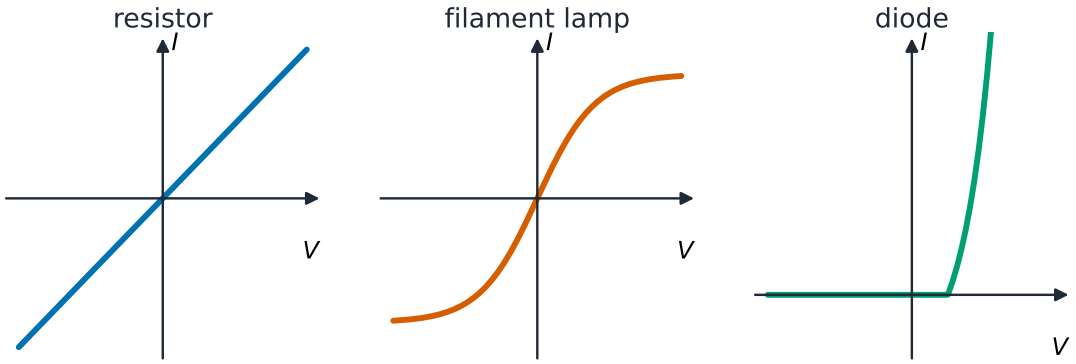
- use the current/p.d. rules for series and parallel circuits
- add series resistors and combine two parallel resistors
- use the potential-divider idea ($\frac{R_1}{R_2} = \frac{V_1}{V_2}$)

1 Worked examples

■ Combining resistors



Series: same current, shared p.d., $R_{total} = R_1 + R_2$. Parallel: same p.d., split current, smaller total R



resistor (ohmic): $V = IR$ straight · filament: resistance rises with heat · diode: one-way

A resistor gives a straight I–V line; a filament lamp curves as it heats

6 Ω and 3 Ω in parallel: $\frac{1}{R} = \frac{1}{6} + \frac{1}{3} = \frac{1}{2} \Rightarrow R = 2\ \Omega$.

2 Practice

2.1 Two resistors of 4 Ω and 6 Ω are in series. Find the total resistance. [1]

2.2 State how the current behaves at every point in a series circuit. [1]

3 Exam-style questions

3.1 Compared with the smallest single resistor, two resistors in parallel give a total resistance that is: [1]

- **A** larger
- **B** smaller
- **C** the same
- **D** zero

3.2 A 12 V supply is connected to a 4 Ω and an 8 Ω resistor in series.

(a) Find the total resistance and the current. [3]

(b) Find the p.d. across the 8 Ω resistor. [2]

3.3 A 6 Ω and a 12 Ω resistor are connected in parallel across a 6 V supply. Find the total resistance and the total current from the supply. [4]

Solutions

2.1 $R = 4 + 6 = 10\ \Omega$.

2.2 the current is the same at every point.

3.1 B. Two resistors in parallel give a total smaller than the smaller one.

3.2 (a) $R = 4 + 8 = 12\ \Omega$; $I = \dfrac{V}{R} = \dfrac{12}{12} = 1.0$ A.
(b) $V = IR = 1.0 \times 8 = 8.0$ V.

3.3 $\dfrac{1}{R} = \dfrac{1}{6} + \dfrac{1}{12} = \dfrac{3}{12} = \dfrac{1}{4} \Rightarrow R = 4\ \Omega$; $I = \dfrac{V}{R} = \dfrac{6}{4} = 1.5$ A.