Solutions

Each answer shows the steps, then the **result**.

2.1

- series: $R = 4\ \Omega + 6\ \Omega = \mathbf{10}\ \Omega$

2.2

- the current is the same at every point

2.3

- parallel: $1/R = 1/R_1 + 1/R_2$

$$\frac{1}{R} = \frac{1}{6\ \Omega} + \frac{1}{6\ \Omega} = \frac{2}{6\ \Omega} \Rightarrow R = \mathbf{3}\ \Omega$$

2.4

- it is the same as the supply p.d. (each branch has the full p.d.)

3.1 B

- two resistors in parallel give a total smaller than the smaller one

3.2

(a) series: $R = 4\ \Omega + 8\ \Omega = 12\ \Omega$

- $I = V/R$

$$I = \frac{12\ \text{V}}{12\ \Omega} = \mathbf{1.0}\ \text{A}$$

(b) $V = IR$

$$V = (1.0\ \text{A})(8\ \Omega) = \mathbf{8.0}\ \text{V}$$

3.3

- parallel: $1/R = 1/R_1 + 1/R_2$

$$\frac{1}{R} = \frac{1}{6\ \Omega} + \frac{1}{12\ \Omega} = \frac{1}{4\ \Omega} \Rightarrow R = 4\ \Omega$$

- $I = V/R$

$$I = \frac{6\ \text{V}}{4\ \Omega} = \mathbf{1.5}\ \text{A}$$

3.4

- series: $R = R_1 + R_2$

$$R = 2.0\ \text{k}\Omega + 4.0\ \text{k}\Omega = 6.0\ \text{k}\Omega$$

- the p.d. divides in the ratio of the resistances: $V_2 = \dfrac{R_2}{R_1 + R_2} \times V$

$$V_2 = \frac{4.0\ \text{k}\Omega}{6.0\ \text{k}\Omega} \times 9.0\ \text{V} = \mathbf{6.0}\ \text{V}$$

3.5

- the p.d. across the thermistor **decreases**
- its share of the total resistance is smaller, so it takes a smaller share of the 9.0 V