

Solutions

2.1 (a) ammeter. (b) variable resistor. (c) diode. (d) LDR / light-dependent resistor.

2.2 The circuit must be closed (a complete loop) and include a source of potential difference.

2.3 Convert: $4.0 \text{ min} = 240 \text{ s}$ (C1).

$$Q = It = 2.0 \text{ A} \times 240 \text{ s} = \mathbf{480 \text{ C}}$$

(answer with unit B1.)

3.1 (a) Known: charge 2.0 C and time 0.40 s ; current is charge per unit time.

$$I = \frac{Q}{t} = \frac{2.0 \text{ C}}{0.40 \text{ s}} = \mathbf{5.0 \text{ A}}$$

(rearrangement C1, substitution C1, answer with unit A1.) (b) Less charge would flow before it melts: a larger fault current moves the same charge (needed to heat and melt the wire) in a shorter time, because $Q = It$ and $t = Q/I$.

3.2 (a) 0.31 A : in a series loop the current has the same value at every point – charge is not used up. (b) 0 A : the circuit is now open, so there is no complete path – no charge can flow even though the cell still supplies a potential difference.