

4.2 Electrical quantities

Name: _____ Class: _____ Date: _____

Total: 11 marks

Objective

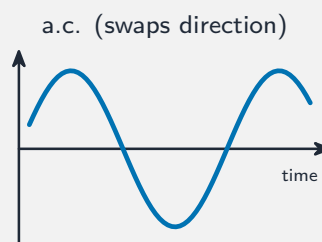
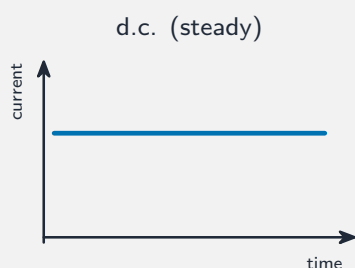
Build the skills to answer exam questions on **electrical quantities** 电学量—**current** 电流 ($I = \frac{Q}{t}$), **e.m.f./p.d.** 电动势/电势差, **resistance** 电阻 ($R = \frac{V}{I}$), and **electrical power** 电功率 ($P = IV$).

You must be able to:

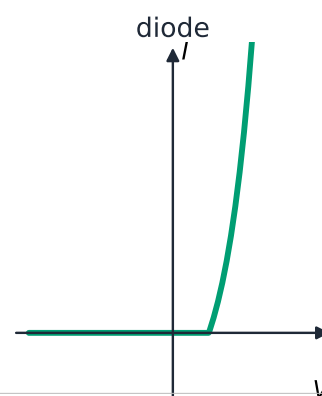
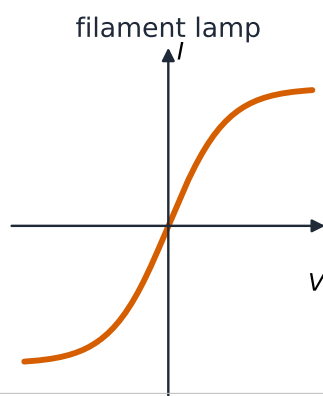
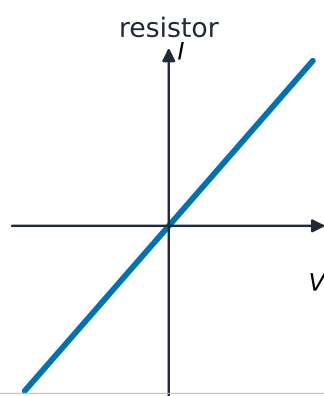
- use $I = \frac{Q}{t}$ and $Q = It$
- use $R = \frac{V}{I}$ and $P = IV$, $E = IVt$
- interpret current–voltage graphs

1 Worked examples

■ Charge, resistance, power



d.c. flows one way; a.c. keeps reversing — current $I = \frac{Q}{t}$ either way



3.0 A for 20 s: $Q = It = 3.0 \times 20 = 60 \text{ C}$.

12 V drives 0.50 A: $R = \frac{V}{I} = \frac{12}{0.50} = 24 \text{ } \Omega$; $P = IV = 0.50 \times 12 = 6.0 \text{ W}$.

2 Practice

2.1 A current of 2.0 A flows for 15 s. Find the charge that passes. [2]

2.2 State the equation linking power, current and voltage. [1]

3 Exam-style questions

3.1 The resistance of a component carrying 0.40 A at 6.0 V is: [1]

- A $2.4 \text{ } \Omega$
- B $15 \text{ } \Omega$
- C $0.067 \text{ } \Omega$
- D $24 \text{ } \Omega$

3.2 A lamp is rated 240 V, 60 W.

(a) Find the current through it. [2]

(b) Find the energy it transfers in 5.0 minutes. [3]

3.3 A cell does 36 J of work driving 9.0 C of charge round a circuit. Find its e.m.f. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **4.2 Electrical quantities** past-paper sheet in the Library, or try these in **Practice mode**:

- 0625/21 N25 —Q25 (charge)
- 0625/21 N25 —Q26 (e.m.f.)
- 0625/21 N25 —Q27 (current and charge)

Solutions

2.1 $Q = It = 2.0 \times 15 = 30 \text{ C}.$

2.2 $P = IV.$

3.1 B. $R = \frac{V}{I} = \frac{6.0}{0.40} = 15 \text{ } \Omega.$

3.2 (a) $I = \frac{P}{V} = \frac{60}{240} = 0.25 \text{ A}.$

(b) $t = 5.0 \times 60 = 300 \text{ s}; E = Pt = 60 \times 300 = 18\,000 \text{ J}.$

3.3 $E = \frac{W}{Q} = \frac{36}{9.0} = 4.0 \text{ V}.$