

9. Electricity

Starter Quiz · 课前小测

A-Level Physics

Name: _____ Score: _____

1. Conventional current points in the direction that:

- ☐ positive charge would flow
- ☐ electrons actually flow
- ☐ the wire is thickest
- ☐ no charge flows

2. Potential difference is the energy transferred per unit:

- ☐ charge
- ☐ time
- ☐ current
- ☐ length

3. A component has 12 V across it and 3.0 A through it. What is its resistance?

_____ Ω

4. The smallest free unit of charge is the _____ charge, $e = 1.6 \times 10^{-19}$ C.

5. One volt equals one joule per _____.

6. An ohmic conductor at constant temperature has:

- ☐ current proportional to p.d.
- ☐ current proportional to resistance
- ☐ a constant current whatever the p.d.
- ☐ zero resistance

7. A current of 2.0 A flows for 5.0 s. How much charge passes?

_____ C

8. Both e.m.f. and potential difference are measured in volts.

- ☐ True
- ☐ False

9. A filament lamp's resistance rises at higher voltage because:

- ☐ the filament heats up

☐ the voltage falls

☐ the electrons run out

☐ it obeys Ohm's law

10. The charge that has flowed equals the area under an $I-t$ graph.

- ☐ True
- ☐ False

1. **positive charge would flow**

Conventional current is the flow of positive charge — opposite to the electron drift in a metal wire.

2. **charge**

$V = \frac{W}{Q}$ — energy per unit charge, in joules per coulomb (volts).

3. **4 Ω**

$R = \frac{V}{I} = \frac{12}{3.0} = 4.0 \, \Omega$.

4. **elementary**

All free charges are whole-number multiples of the elementary charge e .

5. **coulomb**

1 V = 1 $\frac{\text{J}}{\text{C}}$ — one joule of energy moved per coulomb of charge.

6. **current proportional to p.d.**

Ohm's law: $I \propto V$, so $R = \frac{V}{I}$ is constant and the I – V graph is a straight line through the origin.

7. **10 C**

$Q = It = 2.0 \times 5.0 = 10 \, \text{C}$.

8. **True**

Yes — both are energy per unit charge (J/C). The difference is whether energy is given to, or taken from, the charge.

9. **the filament heats up**

More current heats the filament; in a metal, more lattice vibration scatters electrons, so R increases.

10. **True**

Yes — current is the rate of flow of charge, so the area (current $\times$ time) gives the total charge.