

Core Equations: $V = I \times R$ | $Q = I \times t$ | $E = Q \times V$ | $P = V \times I$ | $P = I^2 \times R$ | $E = P \times t$

Section A: Formula Recall & Units

1. Complete the table by writing the correct SI unit for each quantity.

Quantity	Symbol	SI Unit
Voltage	V	_____
Current	I	_____
Resistance	R	_____
Charge	Q	_____
Energy	E	_____
Power	P	_____
Time	t	_____

2. Complete the following equations:

- a) Voltage = Current $\times$ _____ ($V = I \times R$)
 b) Charge = Current $\times$ _____ ($Q = I \times t$)
 c) Energy transferred = Charge $\times$ _____ ($E = Q \times V$)
 d) Power = Voltage $\times$ _____ ($P = V \times I$)
 e) Power = Current² $\times$ _____ ($P = I^2 \times R$)
 f) Energy transferred = Power $\times$ _____ ($E = P \times t$)

Section B: Mixed Calculations

1. A 12 V power supply is connected to a resistor with a resistance of 24Ω .

- a) Calculate the current flowing through the resistor.

- b) If the current flows for 30 seconds, calculate the total charge that passes through the resistor.

- c) Calculate the energy transferred by the 15 C of charge as it passes through the 12 V power supply.

- d) Calculate the power dissipated by the resistor.

Section C: Multi-Step Challenges

1. An electric kettle operates at 230 V and draws a current of 10 A. It is used for 5 minutes to boil water.

a) Calculate the power of the electric kettle.

b) Calculate the total energy transferred by the kettle during the 5 minutes of operation.

2. A heating element has a resistance of $50\ \Omega$ and a current of 2 A flows through it.

a) Calculate the power dissipated by the heating element.

b) If the heating element is switched on for 1.5 hours, calculate the total energy transferred.
