

Electricity Equations Worksheet

Level: GCSE / A-Level | Difficulty: Intermediate | Topic: Electricity & Magnetism

Practice the core electricity equations with 10 problems covering Ohm's law, electrical power, charge, and energy. Full solutions included.

Equations you will need

$V = IR$	Ohm's law: voltage = current x resistance
$P = IV$	Electrical power = current x voltage
$P = I^2R$	Power dissipated in a resistor
$Q = It$	Charge = current x time
$E = QV$	Energy = charge x voltage
$E = Pt$	Energy = power x time

Symbol key

Symbol	Quantity	Unit
V	voltage / potential difference	V (volts)
I	current	A (amperes)
R	resistance	Ohm (ohms)
P	power	W
Q	charge	C (coulombs)
E	energy	J
t	time	s

Practice problems

1. A 12 V battery drives 2 A through a resistor. Find the resistance.
2. A 240 V appliance has resistance 60 Ohm. Find the current.
3. Find the power of a device drawing 3 A from a 230 V supply.
4. A 100 Ohm resistor carries 0.5 A. Find the power dissipated.
5. Find the charge flow when 2 A flows for 30 s.

6. How much energy does a 60 W bulb use in 5 minutes?
7. A current of 0.4 A flows through a 25 Ohm resistor for 10 s. Find the energy dissipated.
8. A 2 kW kettle runs for 3 minutes. Find the energy used in kJ.
9. Two resistors of 6 Ohm and 12 Ohm are connected in series across 18 V. Find the current.
10. A 9 V battery is connected to a 3 Ohm resistor. Find the current, power, and charge passed in 1 minute.

Answer key

Full worked solutions for each problem.

1. $R = V/I = 12/2 = 6 \text{ Ohm}$
2. $I = V/R = 240/60 = 4 \text{ A}$
3. $P = IV = 3 \times 230 = 690 \text{ W}$
4. $P = I^2R = (0.25)(100) = 25 \text{ W}$
5. $Q = It = 2 \times 30 = 60 \text{ C}$
6. $E = Pt = 60 \times 300 = 18,000 \text{ J}$
7. $V = IR = 10 \text{ V}$; $E = VIt = 10(0.4)(10) = 40 \text{ J}$
8. $E = Pt = 2000 \times 180 = 360,000 \text{ J} = 360 \text{ kJ}$
9. $R_{\text{total}} = 18 \text{ Ohm}$; $I = V/R = 18/18 = 1 \text{ A}$
10. $I = 3 \text{ A}$; $P = 27 \text{ W}$; $Q = 180 \text{ C}$