

4 Electric circuits – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
electric current	_____	_____	_____
circuits	_____	_____	_____
amperes	_____	_____	_____
volts	_____	_____	_____
current	_____	_____	_____
ammeter	_____	_____	_____
voltage	_____	_____	_____
voltmeter	_____	_____	_____
resistance	_____	_____	_____
ohms	_____	_____	_____
Power	_____	_____	_____
watts	_____	_____	_____
series	_____	_____	_____
parallel	_____	_____	_____

Recall

From Part 1 you know charge can flow through a conductor. A flow of charge is an **electric current**. Here we look at simple **circuits** and the key electrical quantities.

- Current is measured in **amperes** (A).
- Voltage is measured in **volts** (V).

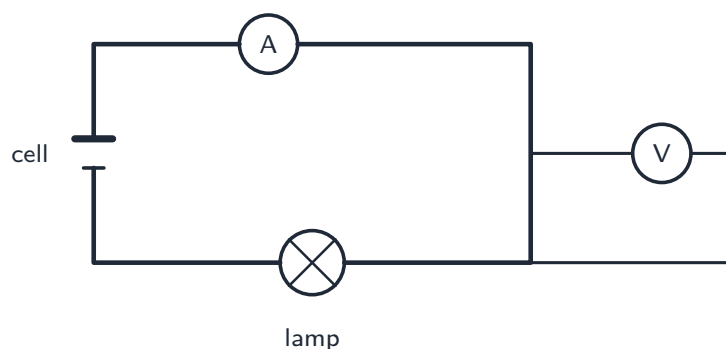
Nothing here is hard — it just adds three equations.

New ideas

Read these first, then do the Practice.

■ 1 Current, voltage and resistance

- **current** (I) is the charge that passes each second: $I = \frac{Q}{t}$. Measured with an **ammeter** (in series).
- **voltage** (V) is the energy given to each unit of charge. Measured with a **volt-meter** (in parallel).
- **resistance** (R) is how hard it is for current to flow: $R = \frac{V}{I}$ (in **ohms**, Ω).



Worked example. A 12 V battery drives 0.50 A through a lamp: $R = V/I = 12/0.50 = 24 \Omega$.

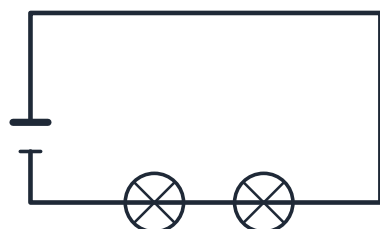
■ 2 Electrical power

Power is the energy transferred each second (in **watts**, W):

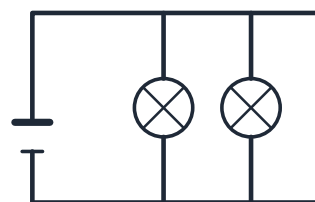
$$P = IV$$

■ 3 Series and parallel

- in a **series** circuit (one loop): the current is the **same** everywhere; the voltage is **shared**; resistances **add up**.
- in a **parallel** circuit (separate branches): each branch gets the **full** voltage; the current **splits**.



series



parallel

Home lamps are wired in **parallel**, so each gets full voltage and one can fail without the others going off.

Watch out: an **ammeter** goes *in series* (it measures the current passing through); a **voltmeter** goes *in parallel*, across the component. In a series circuit the current is the same everywhere — it only **splits** in parallel.

Practice

Try these in order.

4.1 Write the equation linking current, charge and time. [1]

4.2 A current of 3.0 A flows for 20 s. Calculate the charge that passes. [2]

4.3 A 6.0 V supply drives 0.30 A through a resistor. Calculate its resistance. [2]

4.4 A lamp runs at 12 V and 2.0 A. Calculate its power. [2]

4.5 In a series circuit, what is true about the current at every point? [1]

4.6 Why are the lamps in a house wired in parallel? [2]

4.7 Challenge. A 230 V hairdryer has a power of 1150 W. Calculate the current it draws. [2]