11 Current, resistance, and power – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
Electric current			
Resistance			
Ohm's law			
Electric power			

Recall

You have built simple circuits before:

- A battery pushes a current around a loop to light a bulb.
- More voltage pushes more current; more resistance holds it back.
- You have wired components in a line and side by side.

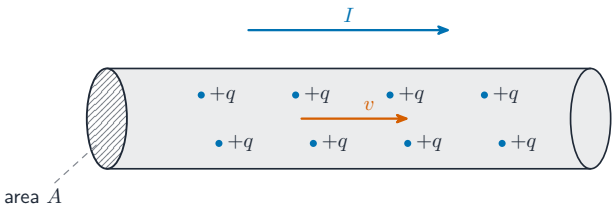
This sheet lines these up with formulas. Each idea has a worked example.

New ideas

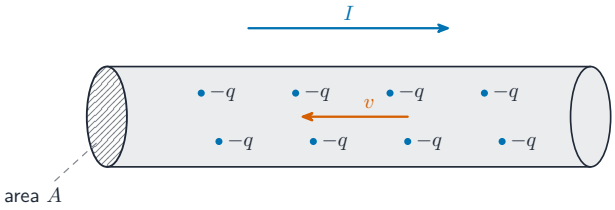
■ 1 Electric current

Electric current is the rate at which charge flows past a point, measured in amperes (A):

$$I = \frac{\Delta q}{\Delta t}.$$



(a) positive carriers drift with I



(b) electrons drift against I

Worked example. If 6.0 C flows past a point in 3.0 s, the current is $I = \dfrac{6.0}{3.0} = 2.0$ A.

■ 2 Resistance and Ohm's law

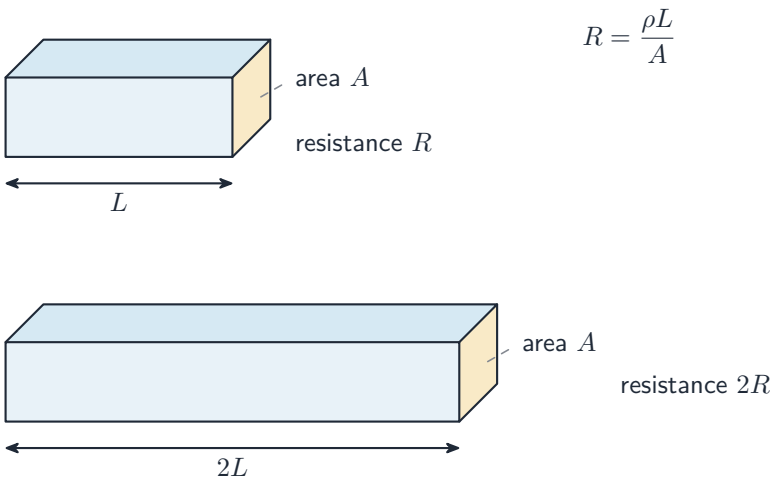
Resistance R opposes the current. **Ohm's law** links voltage, current, and resistance:

$$V = IR.$$

Worked example. A 2.0 A current through a 6.0 Ω resistor needs $V = IR = 2.0 \times 6.0 = 12$ V.

■ 3 What sets the resistance

A wire's resistance grows with its **length** and shrinks with its **thickness** (cross-section).



4 Electric power

Electric power is how fast a component uses energy: $P = IV = I^2R$.

Watch out: in a **series** circuit the current is the same everywhere; in a **parallel** circuit the voltage is the same across each branch. Mixing these up is the most common circuit mistake.

Practice

Try these in order. The methods are all above.

2.1 A charge of 10 C flows past a point in 5.0 s. Find the current. [2]

2.2 A 3.0 A current flows through a 4.0 Ω resistor. Find the voltage across it. [2]

2.3 State how a wire's resistance depends on its length and thickness. [2]

2.4 A resistor carries 0.50 A with 6.0 V across it. Find the power it uses. [2]

2.5 State what is the same for every component in a series circuit. [1]