

# 11 Current, resistance, and power – Part 1

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

| English          | 中文   | Write it 3 times (English) |
|------------------|------|----------------------------|
| Electric current | 电流   | _____                      |
| Resistance       | 电阻   | _____                      |
| Ohm's law        | 欧姆定律 | _____                      |
| Electric power   | 电功率  | _____                      |

## 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.

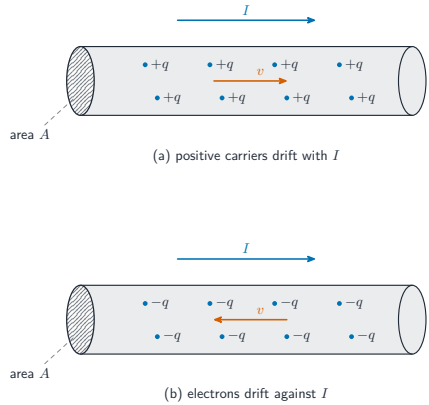
This sheet lines these up with formulas. Each idea has a worked example.

## New ideas

### ■ 1 Electric current

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

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



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

### ■ 2 Resistance and Ohm's law

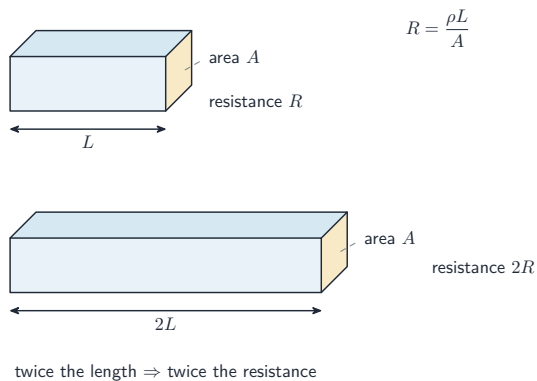
**Resistance** 电阻  $R$  opposes the current. **Ohm's law** 欧姆定律 links voltage, current, and resistance:

$$V = IR.$$

*Worked example.* A 2.0 A current through a  $6.0\ \Omega$  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** 电功率 is how fast a component uses energy:  $P = IV = I^2 R$ .

**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  $\Omega$  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]