

Current and Voltage

What goes round the circuit, and what pushes it.

N5 Physics and Electronics (S3)



Daily Review

Booklet p.2-3 — Circuit Symbols

- 1 Draw the circuit symbol for a cell.
- 2 Draw the circuit symbol for a lamp.
- 3 What does a switch do?
- 4 Which component converts electrical energy to sound energy?
- 5 How is a battery different from a cell?

PART 1

Current

Charge, moving. And a meter that has to go IN the circuit.

By the end of this part...

- 1 I can define current, and give its symbol and unit
- 2 I can connect an ammeter correctly
- 3 I can apply the current rules for series and parallel circuits

What current is

Booklet p.4

The definition

the amount of
charge passing a
point every second

Symbol

I

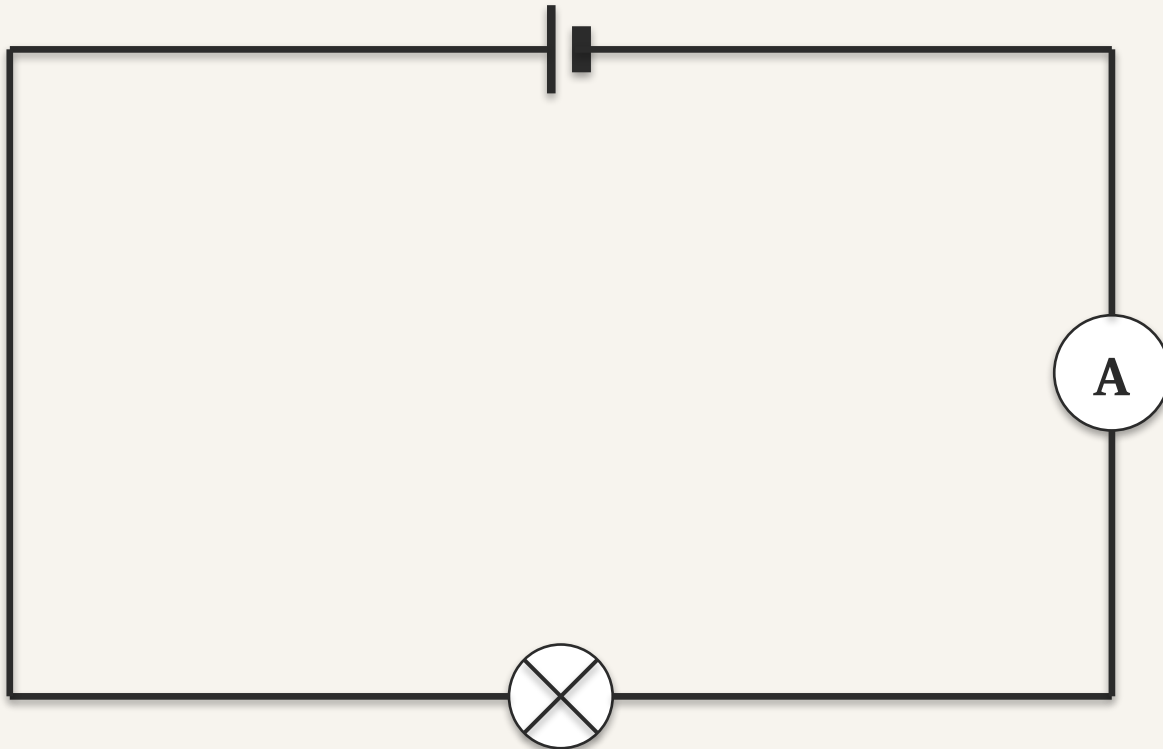
Unit

ampere (A)

Charge is not used up going round — the same charge keeps moving.

Measuring current

Booklet p.4 – the ammeter

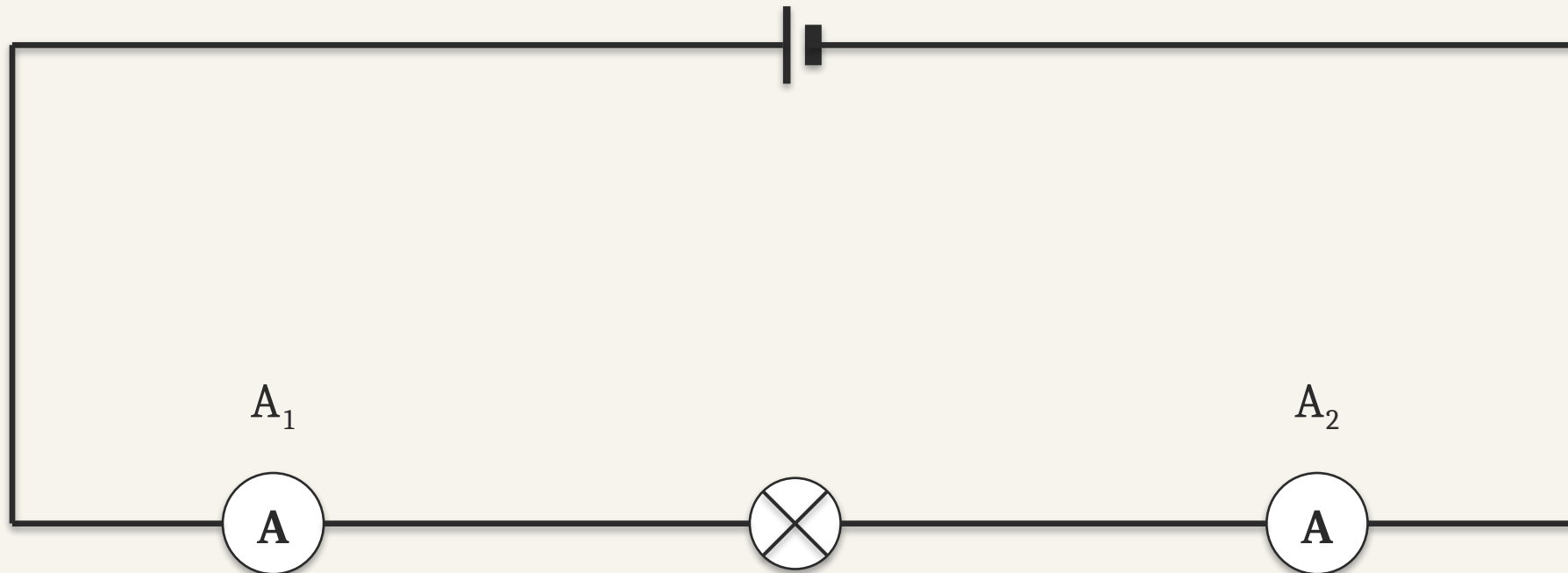


An ammeter goes IN the circuit – in series with the component.

Everything that passes the lamp has to pass through the meter.

Current in a series circuit

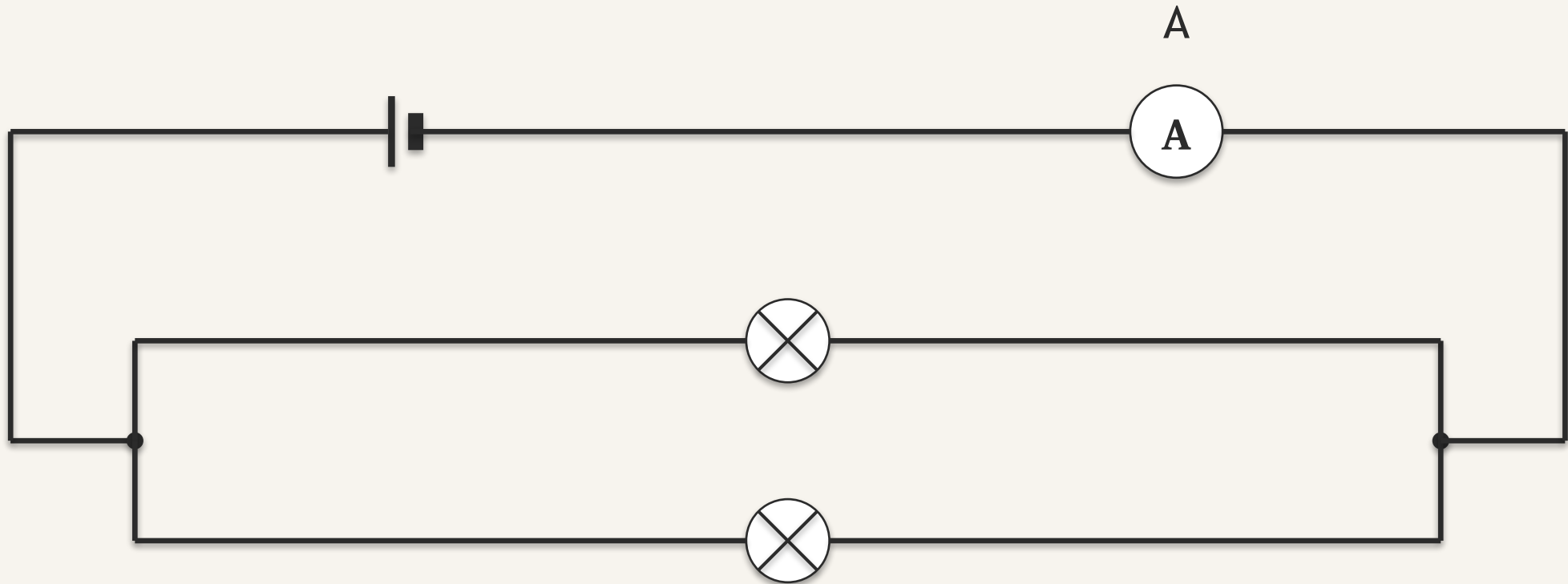
Booklet p.5



One path, so the current is the same everywhere.

Current in a parallel circuit

Booklet p.5



The current splits, and the branches add up to the supply.

Watch out

THE MISTAKE

- “The current gets used up”
- Connecting the ammeter in parallel
- Calling I “amps”

THE CORRECT ANSWER

- Energy is transferred; the charge keeps going
- In series — it short-circuits the component otherwise
- The unit is the ampere; I is the symbol

Show me – current

SHOW ME BOARDS

- 1 What is the definition of current?
- 2 What is the unit of current, and its symbol?
- 3 In a series circuit the first ammeter reads 0.4 A. What does the second read?
- 4 Two branches carry 0.3 A and 0.5 A. What does the supply ammeter read?
- 5 Where must an ammeter be connected?

Show me – current

SHOW ME BOARDS

EXTRA PRACTICE

- 1 What quantity does the letter I stand for?
- 2 A series circuit carries 1.2 A. What is the current at every point?
- 3 The supply carries 0.9 A into two branches. One takes 0.4 A. Find the other.
- 4 Why does an ammeter have to go in series?
- 5 Is current used up as it goes round a circuit?

Daily Review

Booklet p.4-5 — Current

- 1 Define current.
- 2 What is the unit of current?
- 3 Where must an ammeter be connected?
- 4 A series circuit carries 0.6 A. What is the current in every part?
- 5 Two branches carry 0.2 A and 0.7 A. What does the supply carry?

PART 2

Voltage

The energy each coulomb is given — and a meter that goes ACROSS.

By the end of this part...

- 1 I can define potential difference, and give its symbol and unit
- 2 I can connect a voltmeter correctly
- 3 I can apply the voltage rules for series and parallel circuits

What potential difference is

Booklet p.4

The definition

the energy supplied
to each coulomb of
charge passing
through the supply

Symbol

V

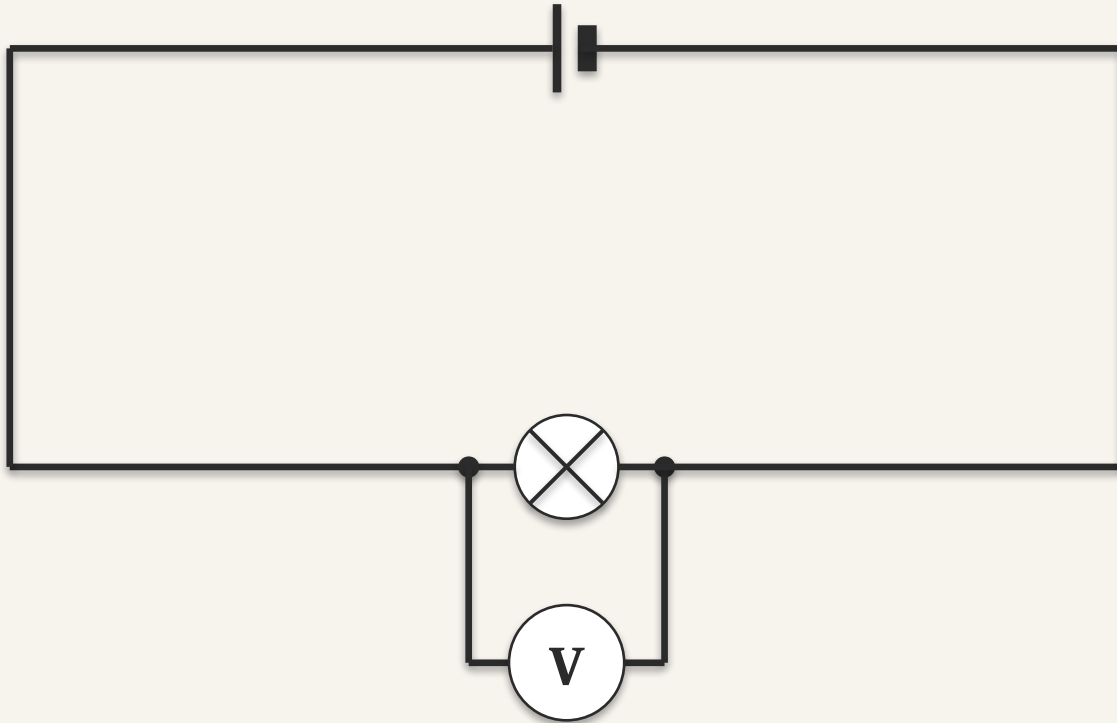
Unit

volt (V)

One volt is one joule of energy per coulomb of charge.

Measuring voltage

Booklet p.4 – the voltmeter

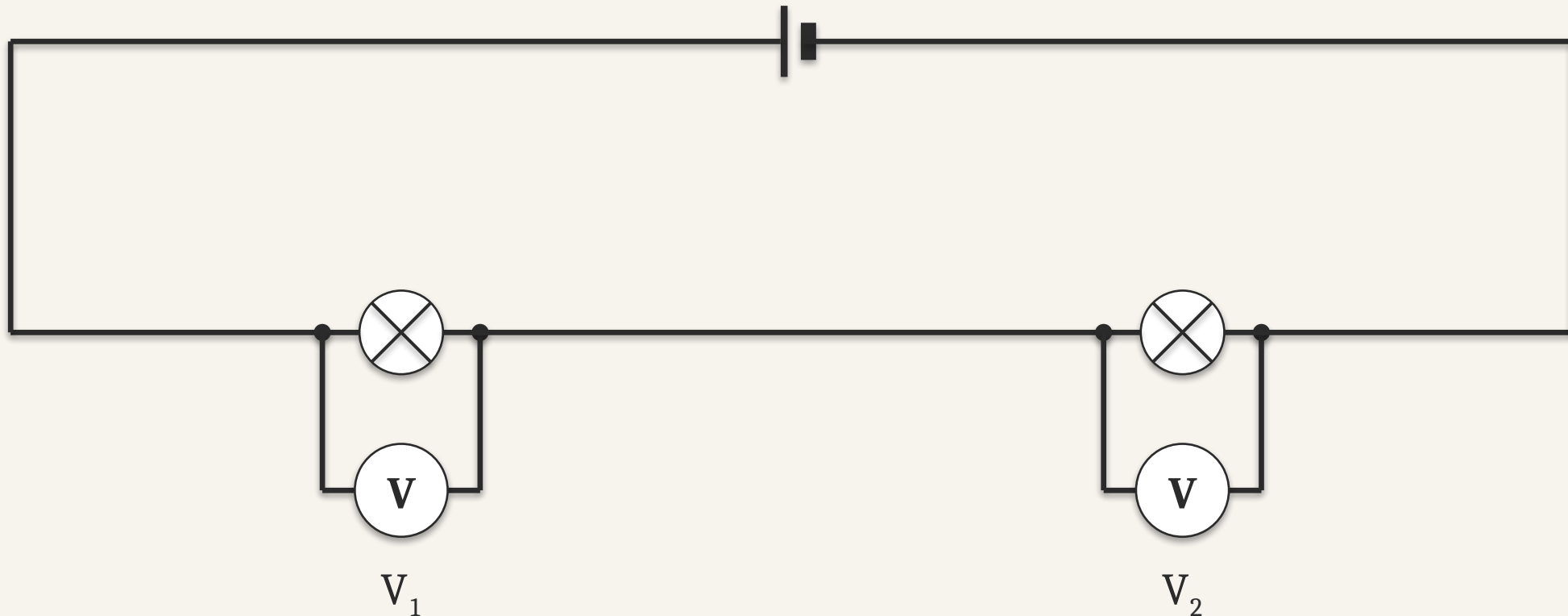


A voltmeter goes
ACROSS the component
– in parallel with it.

It compares the energy
each coulomb has on
either side.

Voltage in a series circuit

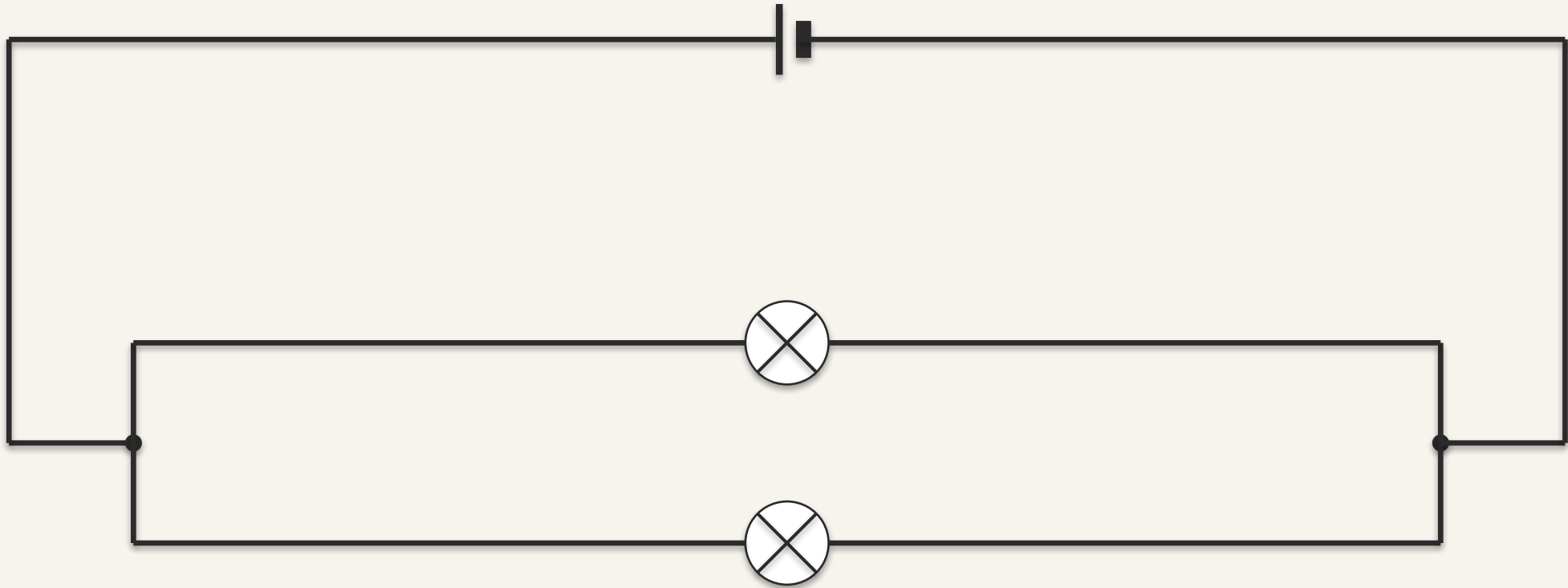
Booklet p.5



The supply voltage is shared between the components.

Voltage in a parallel circuit

Booklet p.5



Every branch gets the full supply voltage.

Watch out

THE MISTAKE

- Connecting the voltmeter in series
- Saying “the voltage through the lamp”
- “Voltage is the total energy”

THE CORRECT ANSWER

- In parallel, across the component
- Voltage is always ACROSS something
- It is the energy per coulomb

Show me – voltage

SHOW ME BOARDS

- 1 What is the definition of potential difference?
- 2 What is the unit of voltage, and its symbol?
- 3 Where must a voltmeter be connected?
- 4 A 6 V supply feeds two lamps in series. One has 2 V across it. Find the other.
- 5 Two lamps are in parallel across a 9 V supply. What is across each one?

Show me – voltage

SHOW ME BOARDS

EXTRA PRACTICE

- 1 What is one volt, in joules and coulombs?
- 2 Why is a voltmeter connected in parallel?
- 3 A 12 V supply feeds three identical lamps in series. Find the voltage across each.
- 4 Three lamps are in parallel across a 6 V supply. What is across each?
- 5 Should you say voltage “across” or “through” a component?

Daily Review

Booklet p.4-5 — Voltage

- 1 Define potential difference.
- 2 What is the unit of voltage?
- 3 Where must a voltmeter be connected?
- 4 A 6 V supply feeds two identical lamps in series. Find the voltage across each.
- 5 What is the voltage across each branch of a parallel circuit?

PART 3

Rules, Models and Uses

Four rules, one model that makes them make sense, and one real use.

By the end of this part...

- 1 I can state the current and voltage rules for series and parallel
- 2 I can use a model to describe current and voltage
- 3 I can describe practical applications of series and parallel circuits

The four rules

Booklet p.5 – Task 2

	Series	Parallel
Current	the same everywhere	splits between branches
Voltage	shared between components	the same across each branch

Task 1 – the definitions

Booklet p.4

Fill in the two definitions, with the symbol
and the unit.

Use the exact wording from the screen.

Booklet p.4, Task 1

Task 1 – Answers

ANSWERS

Booklet p.4 – the definitions

Term, symbol and unit	The definition
Potential difference – V, in volts (V)	the energy supplied to each coulomb of charge passing through the supply
Current – I, in amperes (A)	the amount of charge passing a point every second

Task 2 – the circuit rules

Booklet p.5

Fill in the four boxes: current and voltage,
in series and in parallel.

Booklet p.5, Task 2

Task 2 – Answers

ANSWERS

Booklet p.5 – the circuit rules

	Series	Parallel
Current	the same everywhere	splits between branches
Voltage	shared between components	the same across each branch

Models of a circuit

Booklet p.4-5 — Task 3

The rope loop

A loop of rope pulled round by hand. The rope is the charge, your hand is the supply, your grip is the resistance.

Why bother

You cannot see charge moving. A model gives you something to picture, and something to predict with.

Where parallel matters

Booklet p.5 – home lighting

- Every lamp gets the full mains voltage, so every lamp is full brightness.
- One lamp failing leaves the rest of them lit.
- Each lamp can be switched on its own.

Task 3 – three written questions

Booklet p.4-5

Answer all three in full sentences.
Question 3 asks you to use a model.

Booklet p.4-5, Task 3

Task 3 – Answers

ANSWERS

Booklet p.4-5 – model answers

	A good answer says...
1 home lighting	each lamp gets the full voltage; one failing leaves the others lit; each can be switched alone
2 why we model	you cannot see charge moving, so a model gives you something to picture and to predict with
3 using a model	the rope is the charge, the hand is the supply, the grip is the resistance

Practice and review

Booklet p.4-5

Work the circuit-rules questions in the
Yellow Book,
then scan the code for the review quiz.

Yellow Books p.40-41

N5 Physics Electricity - Circuits Re
view



Review quiz

Checkpoint

- 1 State the current rule and the voltage rule for a series circuit.
- 2 A 9 V supply feeds three identical lamps in parallel. What is across each one?
- 3 Why is home lighting wired in parallel rather than in series?

LOOKING AHEAD

Measuring Resistance

What slows the charge down, and how do we put a number on it?

Plenary

- 1 Define current, and give its unit.
- 2 Define potential difference, and give its unit.
- 3 Where does an ammeter go? Where does a voltmeter go?
- 4 What happens to the current at a junction in a parallel circuit?
- 5 What happens to the voltage across each branch of a parallel circuit?

Plenary

EXTRA PRACTICE

- 1 What does the letter I stand for, and what does V stand for?
- 2 A series circuit carries 0.8 A . What is the current in every part?
- 3 A 12 V supply feeds two identical lamps in series. Find each voltage.
- 4 Why can charge not be used up in a circuit?
- 5 Give one reason parallel wiring suits a house.

Extension

- 1 A parallel circuit has branch currents of 0.25 A, 0.35 A and 0.4 A. What does the supply ammeter read?
- 2 Two lamps in series share 6 V, but one is brighter. What does that tell you about the voltages across them?
- 3 Use the rope model to explain why current is the same all the way round a series circuit.

Extension

EXTRA PRACTICE

- 1 A 6 V supply feeds a lamp and a motor in series. The lamp has 2.5 V across it. Find the voltage across the motor.
- 2 Why would a fault in one branch of a parallel circuit not stop the others?
- 3 Explain why a model is useful even though it is not the real thing.

Check your understanding

Booklet p.4-5

Sit the check test closed-book.
Then mark it against the solutions.

N5 Electricity CT 2 – Potential Difference