

Review and Test Prep

Everything in Booklet 1, and then the practice test.

N5 Physics and Electronics (S3)



Daily Review

Booklet p.13-15 — Combining Resistors 2

- 1 Write the relationship for parallel branches of different values.
- 2 A $20\ \Omega$ and a $30\ \Omega$ resistor in parallel. Find R_T .
- 3 In a combination circuit, which block do you work out first?
- 4 Two $50\ \Omega$ resistors in parallel, then $25\ \Omega$ in series. Find R_T .
- 5 Can a parallel total be bigger than its smallest branch?

PART 1

What You Already Know

Six lessons in one booklet. This is the check that none of it slipped.

By the end of this part...

- 1 I can give the symbol and function of every component in the booklet
- 2 I can state the definitions of current, voltage and resistance
- 3 I can state the current and voltage rules for series and parallel

Before anything else

Booklet p.15 — Review

Go through the booklet from page 2.
Find every blank table and unfinished
practical.

Booklet p.15, Review

Show me – the symbols

SHOW ME BOARDS

- 1 Draw the circuit symbol for a cell.
- 2 Draw the circuit symbol for a battery.
- 3 Draw the circuit symbol for a lamp.
- 4 Draw the circuit symbol for a switch.
- 5 Draw the symbols for an ammeter and an ohmmeter.

Show me – the symbols

SHOW ME BOARDS

EXTRA PRACTICE

- 1 Draw the circuit symbol for a voltmeter.
- 2 Draw the circuit symbol for a motor.
- 3 Draw the circuit symbol for a fixed resistor.
- 4 Draw the circuit symbol for a variable resistor.
- 5 Draw the symbols for a microphone, a loudspeaker and a photovoltaic cell.

Show me – the definitions

SHOW ME BOARDS

- 1 Define potential difference.
- 2 Define current.
- 3 Define resistance.
- 4 What is one volt, in joules and coulombs?
- 5 What does an ohmmeter measure, and how is it connected?

Show me – the definitions

SHOW ME BOARDS

EXTRA PRACTICE

- 1 State the symbol and unit for voltage.
- 2 State the symbol and unit for current.
- 3 State the symbol and unit for resistance.
- 4 What does a photovoltaic cell do?
- 5 What does a variable resistor do?

Show me – the circuit rules

SHOW ME BOARDS

- 1 What happens to the current in a series circuit?
- 2 What happens to the voltage in a series circuit?
- 3 What happens to the current in a parallel circuit?
- 4 What happens to the voltage in a parallel circuit?
- 5 Why is home lighting wired in parallel, not in series?

Show me – the circuit rules

SHOW ME BOARDS

EXTRA PRACTICE

- 1 Where must an ammeter be connected?
- 2 Where must a voltmeter be connected?
- 3 Two lamps are in series and one breaks. What happens?
- 4 Two lamps are in parallel and one breaks. What happens?
- 5 Write the relationship for resistors in series.

Show me – the colour code

SHOW ME BOARDS

- 1 A resistor is Brown, Green, Brown, Silver. What is its quoted value?
- 2 What is its tolerance?
- 3 What is its maximum resistance?
- 4 What is its minimum resistance?
- 5 The resistor measures $168\ \Omega$. Is it within tolerance?

Show me – the colour code: answers

ANSWERS

Booklet p.6, Task 3

- Brown = 1, Green = 5 $\rightarrow$ 15; Brown = $\times 10 \rightarrow 150 \Omega$
- Silver = $\pm 10\%$
- 10% of 150 = 15 $\Omega \rightarrow 165 \Omega$
- 150 – 15 = 135 Ω
- No – 168 Ω is above the 165 Ω maximum

Show me — V-I graphs

SHOW ME BOARDS

- 1 You plot V against I for a fixed resistor. What shape is the graph?
- 2 What does the gradient of that graph tell you?
- 3 A resistor's line passes through 8.0 V at 2.0 A . What is its resistance?
- 4 A second resistor's line is steeper. Is its resistance higher or lower?
- 5 You plot the same graph for a filament lamp. What shape is it, and why?

Show me — V-I graphs: answers

ANSWERS

Booklet p.9-10, Practicals 1 and 2

- A straight line through the origin
- The resistance of the resistor — $R = V \div I$
- $R = V \div I = 8.0 \div 2.0 = 4.0 \, \Omega$
- Higher — a steeper line means more volts for each amp
- A curve that steepens — resistance rises as the filament heats (non-ohmic)

The three definitions

Booklet p.4 and p.6 — the SQA-accepted wording

Voltage (p.d.)

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

Current

the amount of
charge passing a
point every second

Resistance

a measure of how
difficult it is for
charge to flow
through a material

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

Symbols and units

Booklet p.4 and p.6

Quantity	Symbol	Unit
Potential difference (voltage)	V	volt (V)
Current	I	ampere (A)
Resistance	R	ohm (Ω)

The circuit rules

Booklet p.5 – Task 2

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

The four relationships

Booklet p.8 and p.13

Ohm's Law

$$V = I R$$

In series

$$R_T = R_1 + R_2 + \dots$$

Parallel, same value

$$R_T = R_1 / \text{number of branches}$$

Parallel, different values

$$1/R_T = 1/R_1 + 1/R_2 + \dots$$

Watch out – measuring

THE MISTAKE

- Connecting the ammeter in parallel
- Connecting the voltmeter in series
- Reading a current with the dial on DCV

THE CORRECT ANSWER

- In series – it measures what passes through
- In parallel – across the component
- Move the dial to DCA, and the red lead too

Watch out – Ohm's Law

THE MISTAKE

- Putting 250 mA straight into $V = IR$
- Writing $R = I \div V$
- Writing the answer as 36

THE CORRECT ANSWER

- Convert to 0.25 A first, then substitute
- $R = V \div I$ — rearrange, then substitute
- 36 Ω — the unit is part of the answer

Watch out – combining resistors

THE MISTAKE

- Adding the branches up in parallel
- Stopping the answer at $1/R_T$
- Dividing by the branches when they differ

THE CORRECT ANSWER

- In parallel the total goes DOWN
- Invert it to get R_T
- That rule needs equal branches

Daily Review

Booklet p.2-15 — the whole booklet

- 1 State the three definitions in your own words.
- 2 What is the unit of resistance?
- 3 Where does the red lead go to measure a resistance?
- 4 What shape is the V–I graph for a fixed resistor?
- 5 What happens to a lamp's resistance as it gets hotter?

PART 2

Calculations and the Test

Set every calculation out the way the marking instructions do.

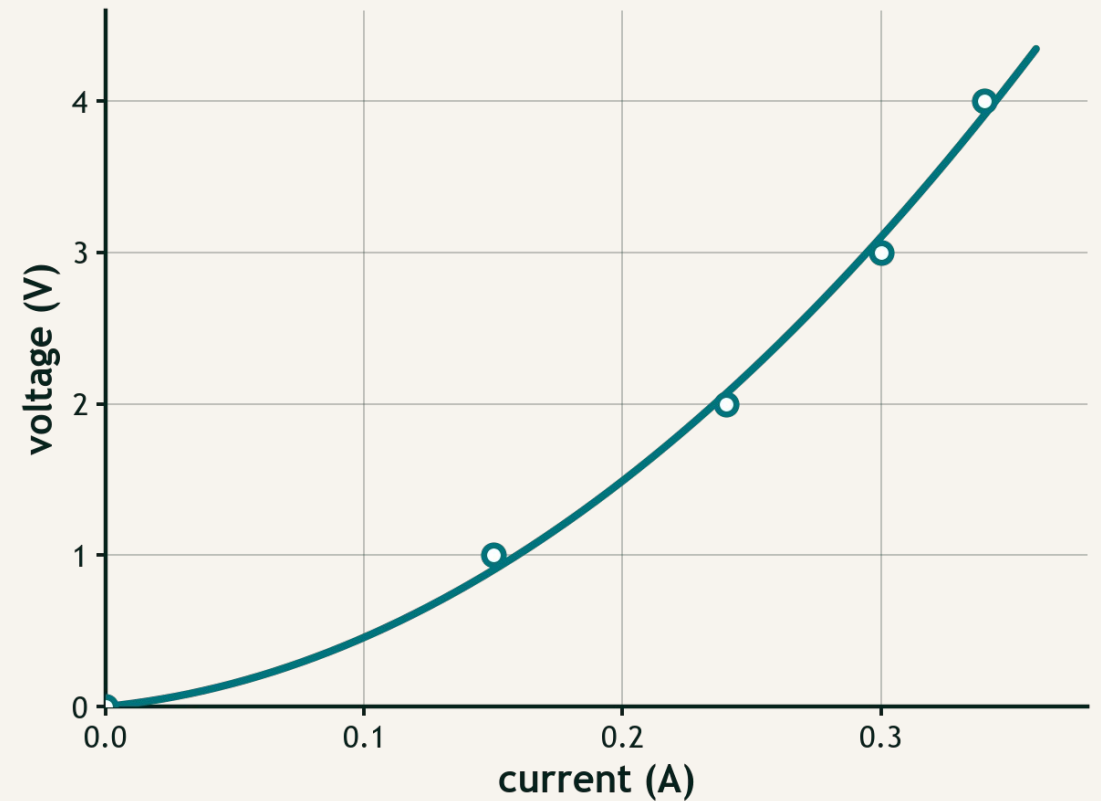
By the end of this part...

- 1 I can use $V = IR$ in any of its three forms
- 2 I can find the total resistance of a series, parallel or combination circuit
- 3 I can mark my own test against the solutions and record what to go back over

Three marks for the drawing

Booklet p.9-10

- Axes labelled with the quantity and its unit, sensible scale
- Points plotted accurately
- Best-fit line or curve — not a dot-to-dot
- Either way up is fine, as long as both axes are labelled



Watch out – drawing the graph

THE MISTAKE

- Axes labelled just V and I
- Joining the points dot-to-dot
- Plotting 250 on an axis marked (A)

THE CORRECT ANSWER

- Label the quantity AND the unit
- One smooth best-fit line or curve
- $250 \text{ mA} = 0.250 \text{ A}$ – or label the axis mA

Show me – mixed calculations

SHOW ME BOARDS

- 1 A $15\ \Omega$ resistor carries $0.40\ \text{A}$. Calculate the voltage across it.
- 2 A $24\ \text{V}$ supply drives $2.0\ \text{A}$ through a component. Find its resistance.
- 3 A $47\ \Omega$ and a $53\ \Omega$ resistor in series. Find R_T .
- 4 Four $60\ \Omega$ resistors in parallel. Find R_T .
- 5 A $12\ \Omega$ and a $4\ \Omega$ resistor in parallel. Find R_T .

Show me – mixed calculations

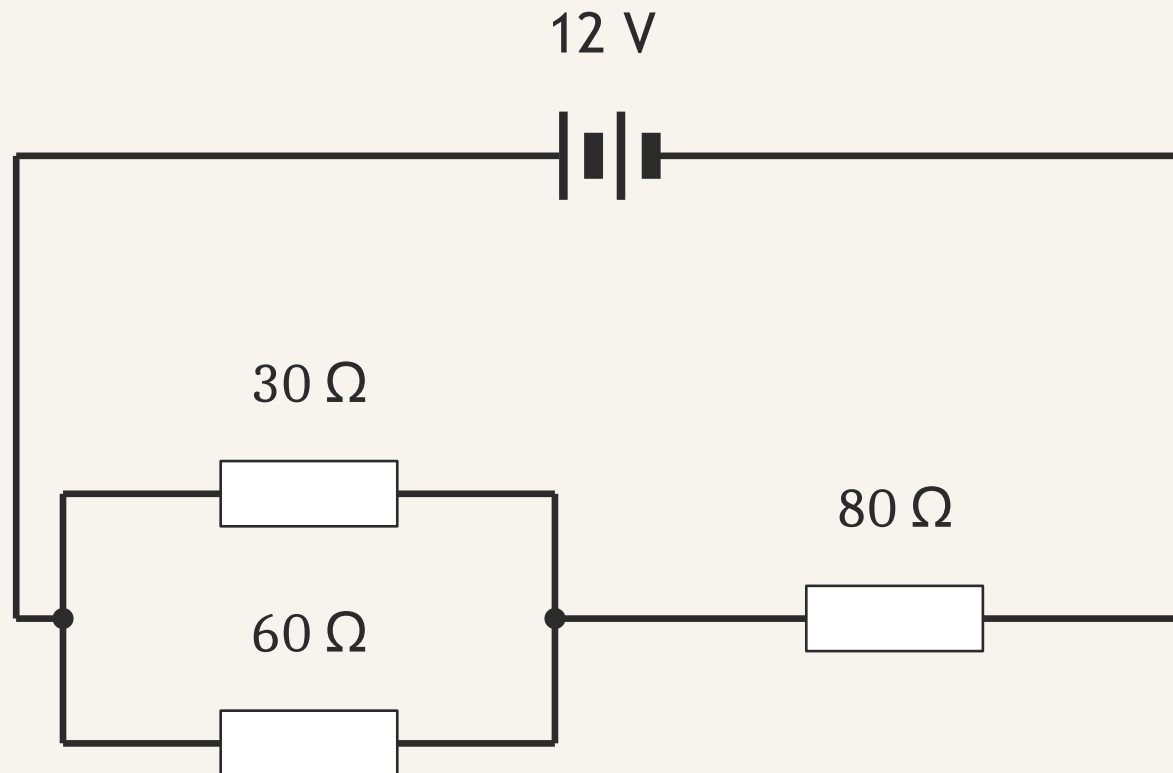
SHOW ME BOARDS

EXTRA PRACTICE

- 1 A $220\ \Omega$ resistor has $11\ \text{V}$ across it. Calculate the current.
- 2 A current of $0.25\ \text{A}$ passes through $40\ \Omega$. Find the voltage.
- 3 A $120\ \Omega$ and an $80\ \Omega$ resistor in series. Find R_T .
- 4 Five $250\ \Omega$ resistors in parallel. Find R_T .
- 5 A $9\ \Omega$ and an $18\ \Omega$ resistor in parallel. Find R_T .

One last combination

The circuit for the worked example



Step 1 – the parallel block

Calculate the resistance of the 30 Ω and 60 Ω parallel block.

$$R_1 = 30 \Omega$$

$$R_2 = 60 \Omega$$

$$R_p = ?$$

$$1/R_p = 1/R_1 + 1/R_2$$

$$1/R_p = 1/30 + 1/60$$

$$1/R_p = 0.05$$

$$\underline{R_p = 20 \Omega}$$

Step 2 – the total resistance

The $20\ \Omega$ block is **in series** with the $80\ \Omega$ resistor – find R_T .

$$R_P = 20\ \Omega$$

$$R_2 = 80\ \Omega$$

$$R_T = ?$$

$$R_T = R_P + R_2$$

$$R_T = 20 + 80$$

$$\underline{R_T = 100\ \Omega}$$

Step 3 – the current from the supply

The $100\ \Omega$ circuit is across a $12\ \text{V}$ supply – find the current.

$$V = 12\ \text{V}$$

$$R_T = 100\ \Omega$$

$$I = ?$$

$$V = I R_T$$

$$I = V/R_T$$

$$I = 12/100$$

$$\underline{I = 0.12\ \text{A}}$$

The practice test

Booklet p.15 – Review

Sit the test closed-book and time yourself.
Only open the booklet once you have finished.

Booklet p.15 – Electricity practice test 1

Your teacher will tell you which paper to sit.

Marking your own test

Booklet p.15 – Self-mark

- The number on its own is not the answer – the unit is part of it.
- A right answer with no working scores less than the working alone.
- Where you lost a mark, write the correct line out in full.

The learning log

Booklet p.15

Fill in your learning log from the test.
Name the topic, not the question number.

Booklet p.15 – Learning Log

Check tests

One per topic, with solutions

- 1 CT 2 — Potential Difference
- 2 CT 3 — Ohm's Law
- 3 CT 4 — Practical Electrical and Electronic Circuits

Yellow Books p.40-41 and p.42-49.

Exam practice

Voltage, Ohm's Law and Circuits, 2022-2025

- 1 2025 Paper 1 — questions 13 and 14
- 2 2024 Paper 1 — questions 11, 12 and 13
- 3 2023 Paper 1 — questions 11, 12 and 13
- 4 2022 Paper 1 — questions 12, 13 and 14

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LOOKING AHEAD

Block 2 — Electronics

Potential dividers, LEDs and a soldering iron.