

Simple Circuits

Q1.(2018)

B ✓

Q2.(2018)

C ✓

Q3.a(2018)

Correct symbols used for cell and lamps ✓

Complete working circuit with two lamps and one cell ✓

Lamps are in parallel ✓

3

1.2

ALLOW 

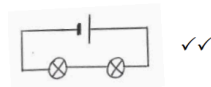
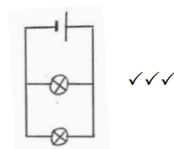
2.2

ALLOW switches, voltmeters and ammeters if connected correctly.

ALLOW very small gaps in the circuit

2.2

ALLOW For example:



Q3.b(2018)

2 or 3 points correctly plotted ✓

OR

4 points correctly plotted ✓✓

Appropriate single line of best fit drawn through all of **their** points ✓

3

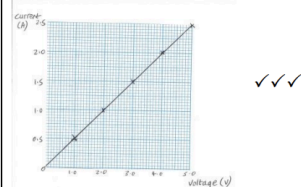
3 x 2.2

IGNORE any extrapolation

ALLOW a good freehand straight line through all of their points

DO NOT ALLOW feathered lines

For example:



Q3.c(2018)

As voltage increases current increases / constant resistance / V and I (directly) proportional ✓	1	3.1b	IGNORE positive correlation / linear relationship / constant gradient / stronger current
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Q3.d(2018)

FIRST CHECK THE ANSWER ON THE ANSWER LINE If answer = 2 (ohms) award 2 marks.	2		
1 ÷ 0.5 OR 2 ÷ 1 OR 3 ÷ 1.5 OR 4 ÷ 2 OR 5 ÷ 2.5 ✓		2.2	ALLOW ECF from incorrect straight line of best fit
= 2 (ohms) ✓		2.2	

Q4.(2019)

A

Q5.(2019)

B

Q6.(2019)

B

Q7.(2019)

<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5-6 marks) Describes and explains in detail the similarities AND differences using ideas about current and resistance.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3-4 marks) Describes and explains the similarities OR differences using ideas about current or resistance.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1-2 marks) Describes basic similarities OR differences between circuits.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks No response or no response worthy of credit.</p>	6	<p>3×2.2 3.1a 2×3.2b</p>	<p>AO2.2 Applies knowledge and understanding of circuits</p> <ul style="list-style-type: none"> • A has lower current than B • A series and B parallel • resistance of circuit A higher than B / OR A • because current in B is larger / OR A • p.d. is shared between each resistor in series • full p.d. across each resistor in parallel • current before and after resistors in both circuits is the same • circuit A or B current is same in each resistor • current splits (between resistors) in B and current doesn't split (between resistors) in A <p>AO3 Analyses information and ideas to interpret and draw conclusions about the two circuits</p> <ul style="list-style-type: none"> • A has resistors in a row / B has resistors in different loops / branches / AW • resistance of circuit A = 4 × resistance of circuit B • the current in A is a quarter of the current in B • total current in circuit B is double that for each resistor
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Q8.a(2019)

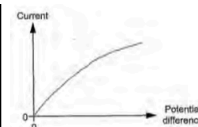
OCR [Physics] | Foundation
Topic [1]: [Electricity and Magnetism]

<p>Connect one terminal of cell/battery to A / AW ✓ BUT Lamp only lights if A is connected to positive (terminal) ✓✓</p> <p>Connect other terminal of cell/battery to B / AW ✓</p>	3	3×3.3a	<p>IGNORE lamps does not light if B is connected to positive (terminal)</p> <p>ALLOW idea of putting cell/battery between A and B in words or drawn on the diagram ✓✓</p> <p>ALLOW add a cell/battery (to the series circuit) if no other mark awarded</p>
<p>Q8.b(2019) Any two from:</p> <p>Not a straight line ✓</p> <p>(not a straight line) through 0 ✓</p> <p>No current in reverse direction/reverse bias/when p.d. is negative / AW ✓</p> <p>no current until p.d. reaches threshold/0.5 (V) ✓</p>	2	2×1.1	<p>p.d. and voltage are interchangeable throughout this question but ignore references to resistance</p> <p>ALLOW gradient changes / gradient not constant ALLOW graph does not obey Ohm's Law ALLOW the graph is a curve ALLOW (p.d and current) not proportional</p> <p>BUT (p.d and current) not directly proportional ✓✓</p> <p>ALLOW the current only flows in one/positive direction</p> <p>ALLOW the current increases after 0.5 (V) IGNORE just 'it' begins at 0.5 (V)</p>
<p>Q8.c(2019) FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 40 (Ω) award 4 marks</p> <p>(R =) p.d ÷ Current ✓</p> <p>From graph, (I =) 0.02 (A) ✓</p> <p>0.8 / 0.02 ✓</p> <p>= 40 (Ω) ✓</p>	4		<p>1.2 ALLOW 0.8 ÷ current</p> <p>2.2 ALLOW answer from graph in region 0.017 (A) to 0.023 (A)</p> <p>2.1 ALLOW ecf from candidate's reading for current from graph</p> <p>2.1 If reading of current from 0.017 (A) to 0.023 (A) then allow answer from 34.78 (Ω) to 47.06 (Ω) for 4 marks e.g. a current of 0.018 gives the answer of 44.4 (Ω)</p>
<p>Q8.d(2019) Any two from:</p> <p>Current becomes (too) large/increases (too much) ✓</p> <p>Resistance of diode decreases (rapidly) ✓</p> <p>Diode can be damaged/blow/break ✓</p>	2	2×3.2b	<p>ALLOW any answer that implies the current has increased e.g. current would be too high/too much IGNORE too strong</p> <p>ALLOW the diode can explode / overheat / AW IGNORE it would be dangerous / heat up / blows the circuit / damages the circuit / just diode stops / short circuit / breaks the circuit / blows the fuse</p>
<p>Q8.e(2019)</p>			

Graph starting at 0 with positive and decreasing slope ✓

1

1.2



IGNORE initial straight line / leveling off / any part of the graph outside the axes

Q9.(2020)

C

Q10.(2020)

D

Q11.a(2020)

$A_1 = 1(0) \text{ (A)} \checkmark$
 $A_3 = 0.5 \text{ (A)} \checkmark$

2

2×2.2

ALLOW 1000 (A) and 500 (A) for one mark maximum (incorrect conversion of mA to A)

Q11.b(2020)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 10 (C) award 2 marks

2

(Q =) $0.5 \times 20 \checkmark$
(Q =) 10 (C) ✓

Q12.(2021)

A ✓

Q13.(2021)

C ✓

Q14.(2021)

D ✓

Q15.a(2021)

Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.

Level 3 (5–6 marks)

Detailed description of experiment.

AND

A description of how resistance can be calculated from the results.

There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.

Level 2 (3–4 marks)

Detailed description of experiment.

OR

A basic description of experiment.

AND

A simple description of how resistance can be calculated.

There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.

Level 1 (1–2 marks)

Basic description of experiment.

OR

A simple description of how resistance can be calculated.

There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.

0 marks

No response or no response worthy of credit.

6

2 × 1.1
2 × 1.2
2 × 3.3a

AO1.1 – Demonstrates knowledge that current depends on resistance and p.d. and resistance can change as current changes

- Use the current and p.d. to calculate resistance
- Resistance = p.d. / current or gradient of V against I graph
- If resistance changes with current, then graph of p.d. against current will be curved / ORA

AO3.3a – Analyses information to develop experiment to measure resistance

- Use a variable resistor / rheostat / potential divider (to change the current)
- Take readings at different values of current (and p.d.)
- Plot a graph of p.d. against current

AO1.2 – Demonstrates knowledge and understanding of how to build circuits

- Appropriate circuit diagram
- Voltmeter in parallel with wire
- Ammeter in series with wire
- Ammeter measures current
- Voltmeter measures p.d.

ALLOW marks to be awarded from a circuit diagram.

Q15.b(2021)

Hazard 1: Wire will get hot / AW

OR

Hazard 2: Using mains power supply (in lab) / AW ✓

1

3.3a

ALLOW idea of getting burnt

ALLOW idea of electrocution (from power supply)

Q15.c(2021)

Any one from:

Control 1: Use low voltages / low current / connect circuit for short time only ✓

Control 2: Keep power supply away from sinks/water ✓

1

Q16.(2022)

C ✓

Q17.(2022)

D ✓

Q18.a(2022)

To vary/control current ✓	1	1.2	ALLOW to increase/decrease current ALLOW (idea of) to enable different p.d. and/or current readings to be taken
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Q18.b(2022)

0.1 (A) ✓

Q18.c(2022)

All 5 points plotted to within $\pm \frac{1}{2}$ square ✓	2	2 × 2.2	DO NOT ALLOW 'blobs' with radius more than half a square
Thin, straight line through points and origin ✓			ALLOW a very good freehand line ALLOW if no points plotted, line of best fit must go through the origin and (4, 80) ECF line of best fit through candidate's plotted points IGNORE the line of best fit after (4, 80)

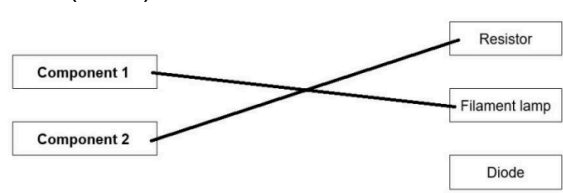
Q18.d(2022)

3.2 ± 0.1 (V) ✓	1	3.2b	ECF from intersection of candidate's line of best fit and line for component 1
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Q18.e(2022)

Same current (when resistance is the same) ✓	1	2.1	ALLOW (idea of) where the lines cross
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Q18.f(2022)

 <p>One mark for each line ✓✓</p>	2	2 × 1.1	DO NOT ALLOW more than one complete line from component 1 or component 2
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Q19.a(2022)

10 (Ω) ✓

Q19.b(2022)

FIRST CHECK THE ANSWER ON ANSWER LINE
If answer = 0.5 (A) award 3 marks

Current = p.d. $\div$ resistance ✓

Current = $4 \div 8$ ✓

Current = 0.5 (A) ✓

3

1.2

ALLOW symbol equation / equation in any form

2.1

2.1

If no other mark awarded

ALLOW for 1 mark

$4 \div 2$ or $4 \div 10$

or

$4 \div$ answer in (a)

Q19.c(2022)

5 (V) ✓

1

2.2

ECF from (b) applying $V=IR$ to left resistor add to 4 (V) by $((b) \times 2) + 4$ e.g.

0.4 (A) in (b) = 4.8 (V)

2 (A) in (b) = 8 (V)

or

ECF from (b) using proportion i.e.

answer in (b) $\times 10$

or

answer in (b) $\times$ answer in (a)

Q20.(2023)

D

Q21.(2023)

Circuit component

Symbol

✓✓

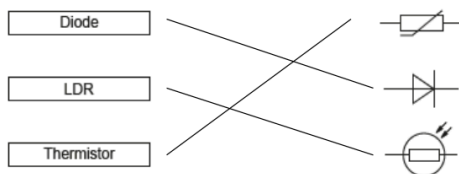
2

2 $\times$ 1.1

All 3 correct = 2 marks

1 or 2 correct = 1 mark

If **two** lines from **one** component and **one** is incorrect = 0 marks for that component



Q22.(2023)

Increases

AND

Decreases ✓

Decreases ✓

2

Q23.a(2023)

	2	2 × 1.2	ALLOW incorrect but recognisable symbols for ammeter/voltmeter/resistor
Ammeter in series with resistor ✓			ALLOW ammeter in either gap for 1 mark DO NOT ALLOW ammeter in cell or resistor
Voltmeter in parallel with resistor ✓			ALLOW voltmeter in parallel with cell for 1 mark

Q23.b(2023)

First check the answer on answer line
If answer = 1.5 (A) award 3 marks

Rearrange: (current =) potential difference ÷ resistance ✓
(current =) $4.5 \div 3$ ✓
(current =) 1.5 (A) ✓

3		
	1.2	ALLOW equation in words or symbols
	2 × 2.1	

Q24.a(2023)

(Both) lamps go off / lamp B goes off ✓

Circuit is incomplete ✓

2	2 × 2.2	ALLOW answers for what happens and the reason on any line ALLOW no lamps light / lamp B does not light IGNORE lamp will go off IGNORE lamp B/lamps dim DO NOT ALLOW this mark if lamp B stays on ALLOW circuit is broken / there is a gap in the circuit / no current in circuit / circuit not connected / electrons cannot flow IGNORE circuit will not work / it is a series circuit / the lamps are in series
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Q24.b(2023)

Lamp B is/stays lit ✓

Circuit is (still) complete for lamp B / lamp B is in a separate branch ✓

2	2 × 2.2	ALLOW answers for what happens and the reason on any line ALLOW lamp B gets brighter / lamp B stays the same brightness DO NOT ALLOW this mark if lamp B goes off ALLOW there is (still) current in lamp B IGNORE lamp B is (connected) in parallel DO NOT ALLOW more current goes to lamp B
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Q24.c(2023)

The graph is linear when the potential difference is less than 4V ✓

The ratio of current : potential difference is unchanged from 0V to 5V ✓

2	2 × 3.2b	If 3 boxes ticked and 1 or 2 correct = 1 mark If 4 or more boxes ticked = 0 marks
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Q25.(2024)

C

Q26.a(2024)

The circuit is incomplete / switch is open ✓	1	1.2	ALLOW it is not switched on / there is no current / circuit not connected / there is a gap in the circuit / open circuit
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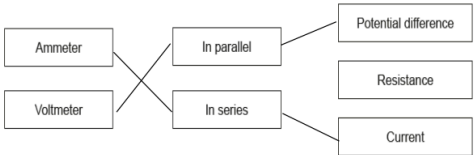
Q26.b(2024)

The diode/cell is the wrong way around / diode/cell is backwards / diode is in reverse bias / diode has a very high resistance / diode prevents current ✓	1	2.2	ALLOW diode only lets current in one direction ALLOW battery for cell
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Q26.c(2024)

No cell/battery/power supply/(source of) p.d./voltage ✓	1	1.2	IGNORE just power
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Q26.d(2024)

<p>Meter name</p> <p>The way the meter is connected</p> <p>The quantity it measures</p>  <p>Correct matching for ammeter ✓ Correct matching for voltmeter ✓</p>	2	2 × 1.2	<p>ALLOW if intention clear:</p> <p>One line from ammeter to in series AND another line from ammeter to current for 1 mark</p> <p>One line from voltmeter to in parallel AND another line from voltmeter to potential difference for 1 mark</p> <p>If no other mark awarded, ALLOW 1 mark maximum for lines drawn to clearly show: ammeter connected in series AND voltmeter connected in parallel</p> <p>If no other mark awarded, ALLOW 1 mark maximum for lines drawn to clearly show: ammeter measures current AND voltmeter measures potential difference.</p>
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Q26.e(2024)

Increases ✓	1	2.2	ALLOW increases circled or underlined but answer line takes precedence
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Q26.f(2024)

15 : 1 ✓	1	1.2	ALLOW any correct ratio e.g. 6 : 0.4, 30 : 2
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Q26.g(2024)

Linear ✓	1	1.1	ALLOW linear circled or underlined but answer line takes precedence
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Q27.(2024)

First check the answer on the answer line
If answer = 9 (V) award 2 marks

2

(V =) 0.6×15 ✓

(V =) 9 (V) ✓