

MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P2 - TEST 3
ELECTRICITY
Intermediate

Mark schemes

1.

(a) 0.093 A

1

(b) 0.093 A

1

(c) (increasing the resistance) decreases the current

1

therefore (the lamp will be) dimmer

1

(d) potential difference = current \times resistance

accept correct rearrangement with R as subject

1

(e) $3.3 = 0.15 \times R$

1

$$R = 3.3 / 0.15 (\Omega)$$

1

$$R = 22 (\Omega)$$

1

allow 22 (Ω) without working shown for 3 marks

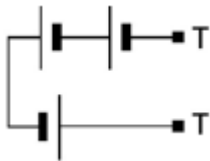
(f) line drawn from the origin with a decreasing gradient.

1

[9]

2.

(a) 3rd box from the left ticked



1

(b) correct symbol drawn in series with other components

symbol must have upper case A

1

(c) (i) $9 + 3 = 12V$

reason only scores if this mark scored

1

pd of battery is shared between the variable resistor and fixed resistor

accept $V_1 + V_2 = \text{pd of the battery}$

accept p.d. is shared in a series circuit

accept voltage for p.d.

1

(ii) 600

reason only scores if this mark scored

1

p.d. of supply shared equally when resistors have the same value

or

ratio of the p.d. is the same as the ratio of the resistance

1

(iii) 0.015

or

their (c)(i) \div (their (c)(ii) + 200) correctly calculated

allow 2 marks for correct substitution ie $12 = I \times 800$

or

their (c)(i) = $I \times$ (their (c)(ii) + 200)

allow 1 mark for total resistance = 800 (Ω) or their (c)(ii) + 200

or

allow 1 mark for a substitution of $12 = I \times 200$

or

their (c)(i) = $I \times 200$

or

alternative method using the graph

$V = 3 V$ (1)

$3 = I \times 200$ (1)

3

[9]

3.

(a) (i) p.d. is (directly) proportional to current

or

gradient / slope is constant

or

the lines show constant resistance

accept lines are straight / diagonal

1

(ii) C

reason only scores if C is chosen

1

for the same p.d. the current is the smallest

*accept lowest gradient **and** the gradient = $1 / R$*

1

(b) (i) ohm

accept correct symbol Ω

accept an answer written in the table if not given in answer space

1

(ii) K and L

reason only scores if both K and L are chosen

1

only length varies

accept type of metal and the diameter are the same

1

(iii) measure the resistance of more wires made from different metals

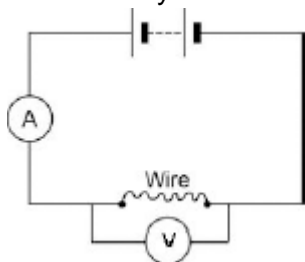
accept test more (types of) metals

measure the resistance of more wires is insufficient

they only use two metals is insufficient

1

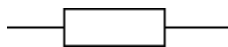
(c) (i) voltmeter symbol correct and drawn in parallel with the wire



accept voltmeter symbol correct and drawn in parallel with the battery

1

(ii) correct symbol drawn



symbol must be rectangular

1

[9]

4.

(a) brown

1

(b) outside / case is plastic / an insulator

accept is double insulated

accept non-conductor for plastic

do not accept it / hairdryer is plastic

1

- (c) (i) (1) S_1
and no other 1
- (2) S_1 and S_3
both required, either order 1
- (ii) S_1 must be ON (for either heater to work)
*do **not** accept reference to 'fan' switch* 1
- S_1 switches the fan on 1
- (d) 1495
allow 1 mark for correct substitution
ie, 6.5×230 2
- watt(s) or W
an answer of 1.495 kW gains 3 marks
although the unit is an independent mark for full credit
the unit and numerical value must be consistent
accept joules per second or J/s 1

[9]

5.

- (a) A = battery (of cells)/cells/cell
 B = thermistor/temperature dependent resistor
 C = transistor
 D = LED/light emitting diode
 E, F, G = resistors
each for 1 mark 5
- (b) *ideas that* (resistance) falls from 3000 to 200 units – ohms/ Ω – referred to at least once
each for 1 mark
(credit quickly at first then more slowly with 2 marks) (max 4 for part (b)) 4
- (c) any figure in the range 22 – 26 (inclusive)
gains 1 mark
but 24
gains 2 marks 2

[11]

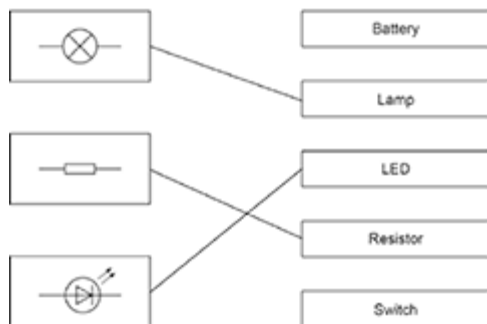
6.	(a) ammeter	1
	voltmeter	
	<i>must be in the correct order</i>	1
	(b) 0.300 (m)	1
	there is the smallest spread about the mean	1
	(c) to reduce the effect of random errors	1
	(d) potential difference = current \times resistance	
	<i>allow $V = I \times R$</i>	1
	(e) $R = V / I$	1
	$R = 2.1 / 0.30$	1
	$R = 7.0 \Omega$	
	<i>an answer of 7.0 Ω scores 3 marks</i>	1
	(f) length in m	1
	resistance in Ω	
	<i>must be in the correct order</i>	
	<i>allow other correct labelling eg</i>	
	<i>length / m</i>	
	<i>length (m)</i>	
	<i>allow 1 mark if units are omitted</i>	1
	(g) resistance is directly proportional to length	1
		[12]

7.

(a) electrons

1

(b)



extra lines from a symbol negate the mark

3

(c) the total power = 7360 watts

1

$$\text{current} = 7360 \div 230$$

1

$$= 32 \text{ A}$$

allow 32 with no working shown for 3 marks

1

so the current is greater than 30 A

1

(d) to increase the voltage (across the cables) or to decrease the current (through the cables)

1

reducing energy losses (in the cables)

do not allow electricity for energy

do not allow no energy loss

1

increasing the efficiency of transmission

1

(e) to decrease the potential difference for domestic use

1

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

1

(g) 405 / 900

1

$$= 0.45$$

accept 45%

1

allow 0.45 or 45% with no working shown for 2 marks

[15]