

MARK SCHEME

GCSE

PHYSICS

AQA - COMBINED SCIENCE

P2 - TEST 4
ELECTRICITY
Intermediate

Mark schemes

- 1.** (i) power = current \times voltage
or any correctly transposed version
accept watts = amps \times volts
accept $P = IV$
do not credit $P = CV$
accept p.d. for voltage triangle acceptable only if used correctly in (ii)
1
- (ii) 2 000 000 (1)
2000 kilowatts/kW (2)
accept KW
watts/W (1)
2 megawatts/MW (2)
do not credit mW (1) if correct method is clearly shown but answer is numerically incorrect or unit is absent or incorrect
do not credit any working from an incorrect equation in (d)(i) but an appropriate unit should be credited
2
- [3]**
- 2.** (a) (i) also double
increases is insufficient
1
- (ii) variable resistor
accept rheostat / potentiometer
1
- (b) (i) the data / results / variables are continuous
accept data / results / variables are not categoric / discrete
1
- (ii) misreading the ammeter
do not accept misreading the meter / results
do not accept misreading the ammeter and / or voltmeter reading / human error is insufficient
1
- (iii) straight line from the origin drawn passing close / through points at 1 V, 5 V, 6 V and ignoring anomalous point
do not accept line drawn 'dot-to-dot'
1

(iv) yes

mark is for the reason

supports prediction

or

(straight) line passes through the origin

accept a mathematical argument, eg when p.d. went from 2 to 4 the current went from 0.3 to 0.6

it's directly proportional is insufficient

1

[6]

3.

(a) • diode

• voltmeter

• ammeter

for 1 mark each

3

(b) *idea that*

• current increases or goes up (with voltage)

gains 1 mark

• 'It' refers to current

but current increases steadily (with voltage)

gains 2 marks

• (allow in proportion) – but not simply a description of the shape of the graph

gains 1 mark

• no current at first

but no current until voltage is more than 0.3 (volts)

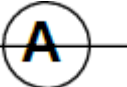
gains 2 marks

4

[7]

4.

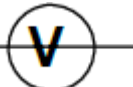
(a) (i) ammeter symbol correct and drawn in series

accept 

do not accept lower case a

1

voltmeter symbol correct and drawn in parallel with the material

do not accept 

1

(ii) adjust / use the variable resistor
accept change the resistance

or

change the number of cells

accept battery for cell

accept change the pd / accept change the voltage

accept increase / decrease for change

1

(b) (i) 37.5 (Ω)

accept answer between 36 and 39 inclusive

1

(ii) 5.6(25) **or** their (b)(i) \times 0.15

*allow 1 mark for correct substitution ie 37.5 **or** their (b)(i) \times 0.15
provided no subsequent step shown*

2

(c) (i) the thickerer the putty the lowerer the resistance

answer must be comparative

accept the converse

1

(ii) any **one** from:

- measuring length incorrectly
accept may be different length
- measuring current incorrectly
*do **not** accept different currents*
- measuring voltage incorrectly
*do **not** accept different voltage*
- ammeter / voltmeter incorrectly calibrated
- thickness of putty not uniform
*do **not** accept pieces of putty not the same unless qualified*
- meter has a zero error
*do **not** accept systematic / random error
accept any sensible source of error eg putty at different temperatures
do **not** accept human error without an explanation
do **not** accept amount of putty not same*

1

[8]

5. (a) 0.9 1
- 1.1
- accept the value of $A_4 + 0.2$* 1
- (b) $V = I R$ or $12 = 0.6 R$ or $\frac{12}{0.6} = ?$
- accept $V = A R$*
- $V = I \times \text{ohm's sign}$*
- do not credit Ohm's law triangle* 2
- R = 20
- correct numerical answer earns both marks*
- ohms 1
- (c) $A_3 = 0.3$
- $A_4 = 0.3$
- accept the same numeric value as A_3*
- $A_5 = 0.5$
- accept the value of $A_4 + 0.2$* 3

[8]

6. (a) mains electricity is an alternating current (ac) which is constantly changing direction 1
- a battery supplies a direct current (dc) which flows in one direction only 1
- (b) one watt = one volt \times one amp 1
- (c) green and yellow - brown - blue 1

(d) the potential of the live wire is 230 V

1

a person's potential is 0 V

1

(so) there is a large potential difference between live wire and a person

1

and so the charge / current passes through the person's body

allow would result in an electric shock

1

[8]

7. (a) filament bulb

1

(b) (i) 6 V

1

(ii) 3 Ω or their $\frac{(i)}{2}$ correctly calculated
allow 1 mark for correct substitution ie
 $6 = 2 \times R$
or their (i) = 2 × R

2

(iii) 1 A

1

(iv) 6 Ω or their (i) / their (iii) correctly calculated

1

(v)

Decrease	Stay the same	Increase
	✓	
✓		
✓		

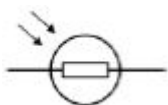
1

1

1

[9]

8. (a)



1

(b) in series with LDR in parallel with LDR 1

(c) (graph shows) direct proportion 1

(because) it is a straight line through the origin
allow inverse proportion would show a curve with a negative gradient 1

(d) straight line through the origin with a positive gradient 1

current is always of smaller magnitude than line already plotted for a given potential difference
this mark only scores if first mark is awarded 1
allow for 2 marks a straight horizontal line along the x-axis

(e) potential difference = current × resistance
allow $V = IR$ 1

(f) 12.5 mA = 0.0125 A 1

5.50 = 0.0125 × R
this mark may be awarded if current is incorrectly / not converted 1

$(R =) \frac{5.50}{0.0125}$
this mark may be awarded if current is incorrectly / not converted 1

(R =) 440 (Ω)
allow an answer consistent with incorrectly / not converted current 1
an answer of 440 (Ω) scores 4 marks
an answer of 0.44 (Ω) scores 3 marks

[11]

9.

(a) 17.8
accept 17.7 or 17.9 1

- (b) potential difference = current \times resistance
accept $V = IR$ 1
- (c) $3.22 = 2.18 \times R$ 1
- $R = 3.22/2.18$ 1
- $R = 1.477(064\dots) \Omega$ 1
- $R = 1.48 (\Omega)$
an answer of 1.48 (Ω) scores 4 marks
an answer that rounds to 1.48 (Ω) scores 3 marks 1
- (d) temperature of wire will increase during experiment
allow description of this in terms of energy being dissipated, $P = I^2R$ 1
- if constantan is used, this will not have a significant effect on results 1
- (e) 50.0 cm
allow other ways of indicating the anomalous result in the table (eg ringing 5.26) 1
- (f) the ammeter gave a reading that was too low 1
- [10]**