

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - COMBINED SCIENCE

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P2 - TEST 6  
ELECTRICITY  
Advanced

## Mark schemes

1.

(a) (i) 0.25 (A)

1

(ii) 75

*allow 1 mark for converting 5 minutes to 300 seconds*

*or allow 1 mark for correct substitution*

*ie  $0.25 \times 300$*

*allow 1 mark for an answer 1.25*

*allow 1 mark only for their (a)(i)  $\times 300$  correctly calculated*

2

coulombs or C

*do not accept c*

1

(b) any **two** from:

- fault not repaired  
*accept if a fault was to occur*
- larger current will (still) flow
- aluminium foil will not melt (if a fault)  
*accept aluminium foil needs a higher current / charge to melt*
- wiring will overheat / (may) cause a fire  
*accept idea of fire hazard*  
*do not accept explode etc*

2

[6]

2.

(a) (i) potential difference = current  $\times$  resistance

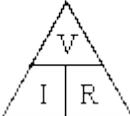
*accept voltage or pd for potential difference*

*accept  $V = I \times R$*

*accept correct transformation*

*do not accept  $V = C \times R$*

*do not accept  $V = A \times R$*

accept  provided

*subsequent use of  $\Delta$  correct*

*do not accept an equation expressed in units*

1

(ii) 46

*credit correct transformation for 1 mark*

*allow 1 mark for use of 11.5 V or division of final resistance by 20*

*a final answer of 920 gains 2 marks only*

3

ohm(s)

*accept symbol  $\Omega$*

*do **not** accept  $\Omega$  s*

*unit / symbol mark can be awarded in (iii) provided unit / symbol is omitted in (ii)*

1

(iii) 920 (ohms) **or** their (a)(ii)  $\times$  20

1

(b) as temperature increases, resistance increases

*accept hotter for temperature increase*

*do **not** accept a reference to resistance only i.e. it / resistance goes up*

1

[7]

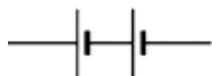
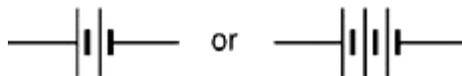
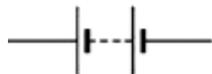
3.

(a) (i) ammeter and battery **in series** with the **gauge**

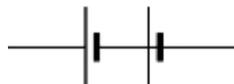
*symbols must be correct*

*ignore a voltmeter drawn in series*

**accept**



**not**



*or cells reversed to cancel out*

1

voltmeter in parallel with the gauge  
symbol must be correct  
accept a freestanding circuit  
diagram provided strain gauge is labelled or a resistor symbol used  
for the strain gauge

1

(ii) d.c. flows only in one direction  
a.c. changes direction is insufficient

1

(b) (i) 75  
this answer only  
allow 1 mark for correct substitution **and** transformation,  
ie resistance =  $\frac{3.0}{0.040}$

2

(ii) increases

1

(iii) elastic / strain potential  
do **not** accept potential

1

[7]

4.

(a) Formula mark  
 $P = V \times I$   
accept  $P = VI$  **or**  $W = V I$  **or** any transformation

1

Substitution mark  $I = 900 \div 230$

1

Calculation mark 3.9  
accept 3.9 **or** 3.91 **or** 4 for three marks with no working

1

(b)  $900 + 1300 = 2200 \div 230 = 9.6$   
accept 9.57 to 9.6 **or** 10 for both marks with no working

2

(c)  $1.2 + 0.45 = 1.65$

1

$\times 0.5 = 0.825$   
accept 0.8 **or** 0.83 for both marks with no working

1

(d) any **one** from

use less energy (to cook something)

*accept fewer energy losses **or** use less electricity*

cook faster

*do not credit a cost argument about buying two different ovens*

1

[8]

5.

(a) (i) 1.7

1

(ii) 51

**or**

30 × their (i) correctly calculated

*allow 1 mark for correct substitution i.e.  $1.7 = \frac{Q}{30}$*

*or their (i) =  $\frac{Q}{30}$*

2

coulomb / C

*do **not** accept c*

1

(iii) 612

**or**

their (ii) × 12 correctly calculated

**or**

their (i) × 360 correctly calculated

*allow 1 mark for correct substitution i.e.  $E = 12 \times 51$*

*or  $12 \times$  their (ii)*

*or their (i) × 360*

2

- (b) ions vibrate faster  
**or**  
 ions vibrate with a bigger amplitude  
*accept atoms for ions throughout*  
*accept ions gain energy*  
*accept ions vibrate more*  
*ions start to vibrate is insufficient*

1

- electrons collide more (frequently) with the ions  
**or**  
 (drift) velocity of electrons decreases  
*electrons start to collide is insufficient*  
*there are more collisions is insufficient, unless both electrons and ions are implied*

1

[8]

6.

- (a) (i) light dependent resistor / LDR  
*accept ldr*
- (ii) 25 (kilohms)  
*accept 24 - 26 inclusive*  
*accept 25 000  $\Omega$*
- (iii) 5 (V) or their (a)(ii) correctly converted to ohms  $\times 0.0002$  correctly calculated  
*allow 1 mark for converting 25 k $\Omega$  / their (a)(ii) to ohms*  
**or**  
*allow 1 mark for correct substitution*  
*ie 0.0002  $\times$  25(000)*  
**or** 0.0002  $\times$  their (a)(ii)  
*allow an incorrect conversion from kilohms providing this is clearly shown*

1

1

2

- (b) (i) linear scale  
*using all of the available axis*  
*must cover the range 4 - 6 v*  
**or** their (a)(iii) - 6 v and lie within the range 0 - 15 inc.

1

- (ii) negative gradient line  
*do **not** allow lines with both positive and negative gradients*

1

passing through 20 lux and their (a)(iii)  
*only scores if the first mark is awarded*  
*only scores if line does not go above 6 volts*

1

(c) (i) 37.5 (k $\Omega$ ) or their (a)(ii) + 50 % (a)(ii) correctly calculated

1

(ii) light intensity value would be unreliable / not accurate

1

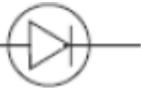
due to variation in resistance value  
*accept because resistance varies by  $\pm 50\%$*   
*accept tolerance of resistor is too great*  
*do **not** accept results are not accurate*

1

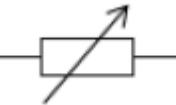
[10]

7.

(a) (i) symbol for a diode 

accept 

1

symbol for a variable resistor 

1

(ii) voltmeter is in series **or** voltmeter is not in parallel

1

ammeter is in parallel **or** ammeter is not in series  
*accept an answer in terms of how the circuit should be corrected*  
*voltmeter and ammeter are wrong way around is insufficient*

1

(b) (i) 0.2 (V)  
*accept any value between 0.20 and 0.21 inclusive*

1

(ii) 37.5  
*allow 1 mark for  $I = 0.008$*   
**or**  
*allow 2 marks for correct substitution, ie  $0.3 = 0.008 \times R$*   
**or**  
*allow 1 mark for a correct substitution using  $I = 0.8$  **or**  $I = 0.08$*   
**or**  $I = 0.009$   
**or**  
*allow 2 marks for answers of 0.375 **or** 3.75 **or** 33(.3)*

3

(c) (i) 25

*allow 1 mark for obtaining period = 0.04(s)*

2

(ii) diode has large resistance in reverse / one direction

1

so stops current flow in that / one direction

*allow diodes only let current flow one way / direction*

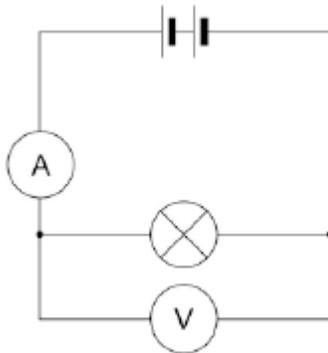
*allow 1 mark for the diode has half-rectified the (a.c. power) supply*

1

[12]

8.

(a)



*ammeter connected in series*

1

*voltmeter connected in parallel*

1

measure the potential difference across the lamp at known current

1

calculate resistance from measured values using  $V = IR$

1

(b) for ohmic conductors the current is directly proportional to the potential difference applied across it

1

this graph is curved so it is not an ohmic conductor

1

(c) diode

1

because it has a high resistance with negative potential differences

1

and a low resistance for positive potential differences.

1

*allow answers in terms of current*

(d)  $R = V/I$

1

$$R = 2.3 / 1.2$$

1

$$R = 1.92$$

1

*(an answer of 1.92 scores 3 marks)*

**[12]**