

# Series and Parallel Circuits

## Mark Scheme

<b>Level</b>	GCSE (9-1)
<b>Subject</b>	Combined Science: Trilogy - Physics
<b>Exam Board</b>	AQA
<b>Topic</b>	6.2 Electricity
<b>Sub-Topic</b>	Series and Parallel Circuits
<b>Difficulty Level</b>	Gold Level
<b>Booklet</b>	Mark Scheme

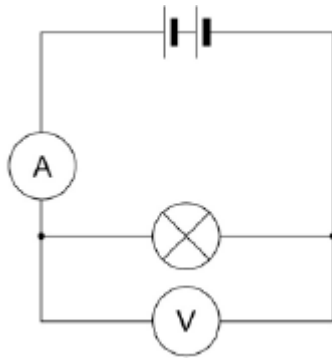
**Time Allowed:** 21 minutes

**Score:** /20

**Percentage:** /100

**Grade Boundaries:**

M1.(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) tangent to the curve drawn at 2.3 V

1

correct reading of  $\Delta y$  and  $\Delta x$  from graph

1

**either**

substitution of values into  $V = IR$  (1)

1

value of  $R$  calculated (1)

*accept values in the range 0.50 to 0.65*

1

**or**

calculation of gradient (1)

*allow ecf from incorrect readings of  $\Delta y$  and  $\Delta x$*

calculation of  $R = 1 / \text{gradient}$  (1)

*accept values in the range 0.50 to 0.65*

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**M2.(a)** 35

*an answer with more than 2 sig figs that rounds to 35 gains 2 marks*

*allow 2 marks for correct method, ie  $\frac{230}{6.5}$*

allow 1 mark for  $I = 6.5 \text{ (A)}$  **or**  $R = \frac{230}{26}$

an answer 8.8 gains 2 marks

an answer with more than 2 sig figs that rounds to 8.8 gains 1 mark

3

- (b) (maximum) current exceeds maximum safe current for a  $2.5 \text{ mm}^2$  wire  
accept power exceeds maximum safe power for a  $2.5 \text{ mm}^2$  wire

or (maximum) current exceeds 20 (A)  
(maximum) current = 26 (A) is insufficient

1

a  $2.5 \text{ mm}^2$  wire would overheat / melt  
accept socket for wire  
do **not** accept plug for wire

1

- (c) a.c. is constantly changing direction  
accept a.c. flows in two directions  
accept a.c. changes direction  
a.c. travels in different directions is insufficient

1

d.c. flows in one direction only

1

[7]