

Name of the Student: \_\_\_\_\_

Max. Marks : 21 Marks

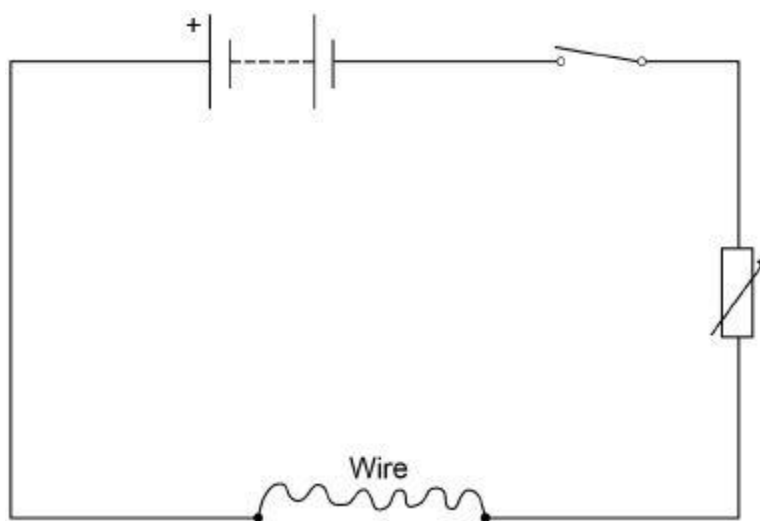
Time : 21 Minutes

**Q1.**

A student investigated how the resistance of a piece of nichrome wire varies with length.

**Figure 1** shows part of the circuit the student used.

**Figure 1**



(a) Complete **Figure 1** by adding an ammeter and a voltmeter.

Use the correct circuit symbols.

(3)

(b) Describe how the student would obtain the data needed for the investigation.

Your answer should include a risk assessment for **one** hazard in the investigation.

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(6)

(c) Why would switching off the circuit between readings have improved the accuracy of the student's investigation?

Tick **one** box.

The charge flow through the wire would not change.

The potential difference of the battery would not increase.

The power output of the battery would not increase.

The temperature of the wire would not change.

(1)

(d) The student used crocodile clips to make connections to the wire.

They could have used a piece of equipment called a 'jockey'.

**Figure 2** shows a crocodile clip and a jockey in contact with a wire.

**Figure 2**



**Crocodile clip**



**Jockey**

How would using the jockey have affected the accuracy and resolution of the student's results compared to using the crocodile clip?

Tick **two** boxes.

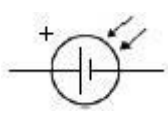
The accuracy of the student's results would be higher.

- The accuracy of the student's results would be lower.
- The accuracy of the student's results would be the same.
- The resolution of the length measurement would be higher.
- The resolution of the length measurement would be lower.
- The resolution of the length measurement would be the same.

(2)  
(Total 12 marks)

**Q2.**

Solar cells produce electricity using light from the Sun.



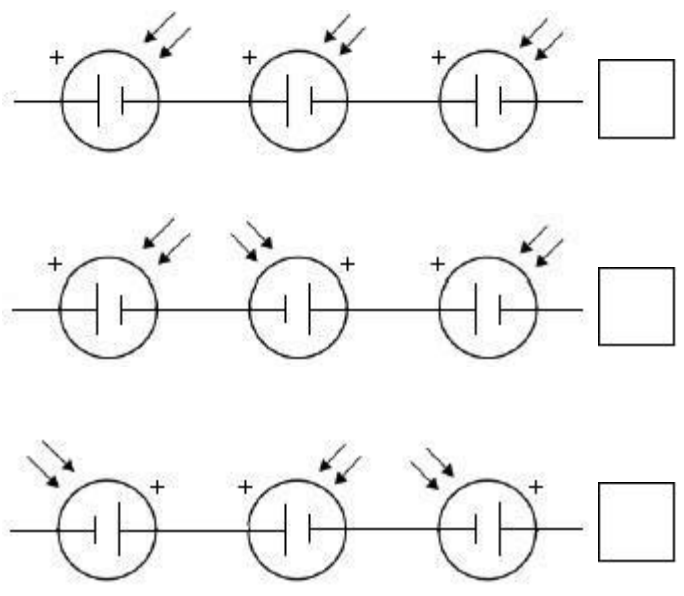
The symbol for a solar cell is:

A householder has three solar cells.

Each solar cell has an output potential difference of 0.70 V

(a) Which arrangement of three solar cells will give a potential difference of 2.10 V?

Tick **one** box.



(1)

(b) A solar cell has a resistance of  $2.5 \Omega$  when the output potential difference is 0.70 V

Calculate the current through the solar cell.

Use the equation:

$$\text{current} = \frac{\text{potential difference}}{\text{resistance}}$$

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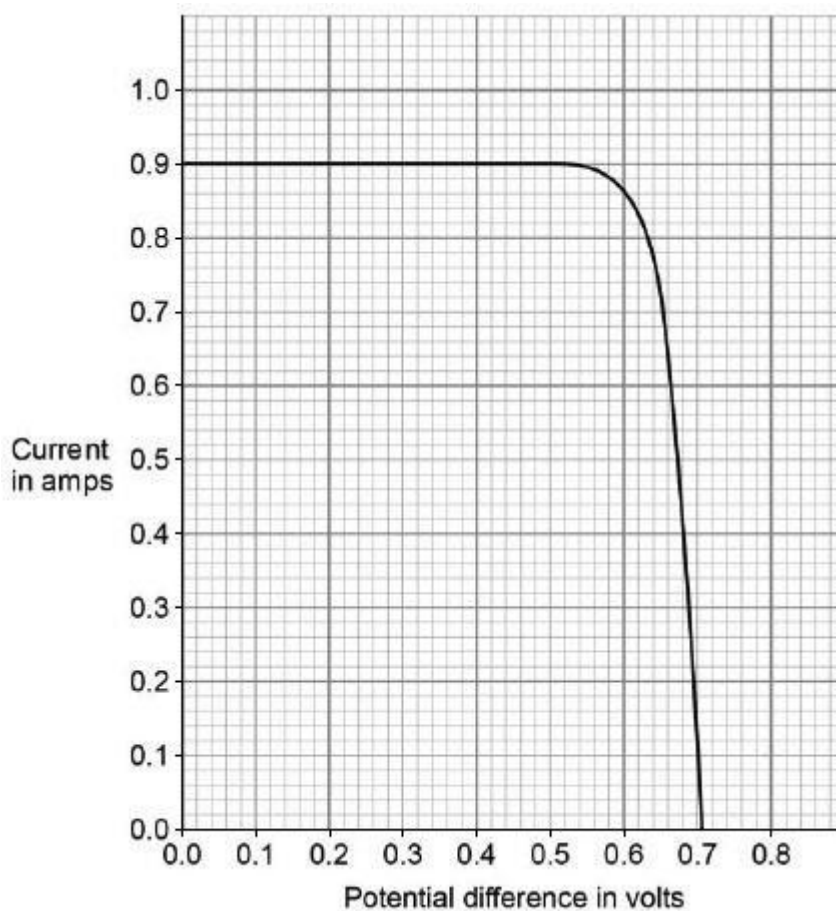
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Current = \_\_\_\_\_ A

(2)

The graph below shows a graph of current against potential difference for a different type of solar cell.



(c) The power output of the solar cell is calculated using the equation.

$$\text{power} = \text{current} \times \text{potential difference}$$

Which value of potential difference on the graph above gives the maximum power output of the solar cell?

Tick **one** box.

0.1 V

0.3 V

0.6 V

0.7 V

Give the reason for your answer.

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(2)

(d) Write down the equation that links efficiency, total power input and useful power output.

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(1)

(e) The total power input to the solar cell is 2.4 W when the efficiency is 0.20

Calculate the useful power output of the solar cell.

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Useful power output = \_\_\_\_\_ W

(3)

(Total 9 marks)