AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



EXAM QUESTION PACK

4.2.2 SERIES AND PARALLEL CIRCUITS (PACK 2)

SCORE	PERCENTAGE
/73	%

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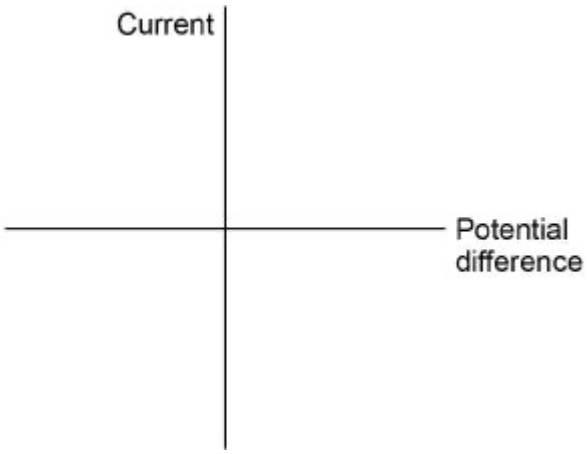
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Q1.

A student built a circuit using filament lamps.

(a) Sketch a current potential difference graph for a filament lamp on **Figure 1**

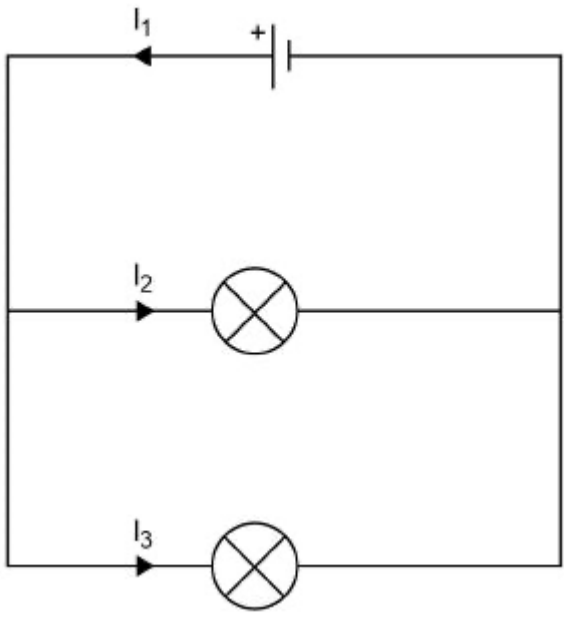
Figure 1



(2)

Figure 2 shows the circuit with two identical filament lamps.

Figure 2



(b) Compare the currents I_1, I_2 and I_3

_____

_____

_____

(2)

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(c) Calculate the charge that flows through the cell in 1 minute.

Each filament lamp has a power of 3 W and a resistance of 12 Ω

Write any equations that you use.

Give the unit.

Charge = _____

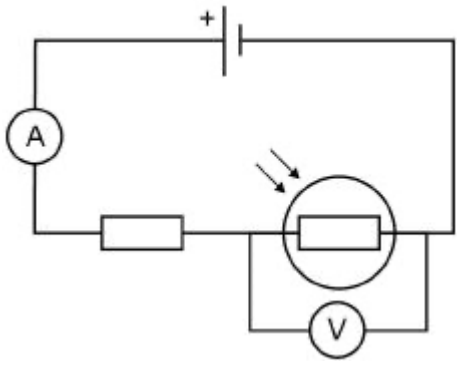
Unit = _____

(6)

(d) The student builds a different circuit.

Figure 3 shows the circuit.

Figure 3



Explain how the readings on both meters change when the environmental conditions change.

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_____

_____

_____

_____

_____

_____

(6)

(Total 16 marks)

Q2.

A light dependent resistor (LDR) is connected in a circuit.

(a) Draw the circuit symbol for an LDR.

(1)

(b) A student investigated the relationship between current and potential difference for an LDR.

How should the student have connected the ammeter and voltmeter in the circuit?

Tick **one** box.

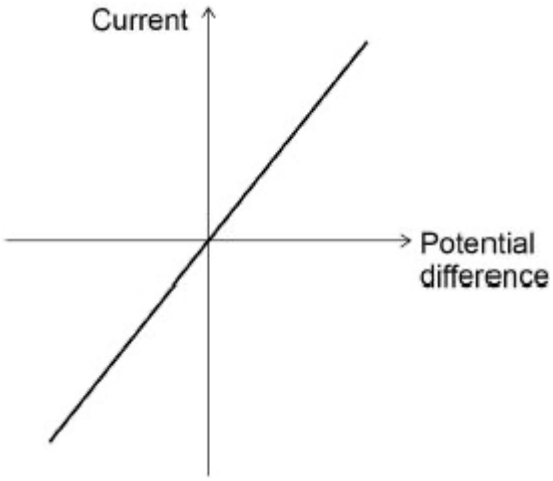
Ammeter	**Voltmeter**	
in parallel with LDR	in parallel with LDR	☐
in parallel with LDR	in series with LDR	☐
in series with LDR	in parallel with LDR	☐
in series with LDR	in series with LDR	☐

(1)

The diagram below shows a sketch graph of the student's results.

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The LDR was in a constant bright light.



(c) The student concluded that the current in the LDR is inversely proportional to the potential difference across the LDR.

Explain why the student's conclusion is incorrect.

(2)

(d) The student repeated the investigation with the LDR in constant dark conditions.

Sketch on the diagram above the graph for the LDR in constant dark conditions.

(2)

The LDR was placed near a light source.

The following results were recorded:

potential difference = 5.50 V

current = 12.5 mA

(e) Write down the equation that links current, potential difference and resistance.

(1)

(f) Calculate the resistance of the LDR.

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_____

_____

Resistance = _____ Ω

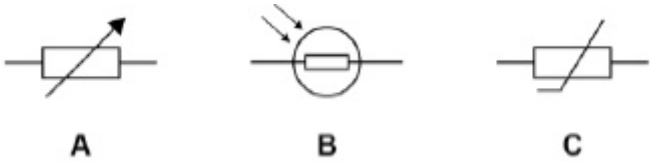
(4)

(Total 11 marks)

Q3.

Figure 1 shows the circuit symbol for three different components.

Figure 1



(a) Which component is a variable resistor?

Tick **one** box.

A ☐ **B** ☐ **C** ☐

(1)

(b) Which component is a thermistor?

Tick **one** box.

A ☐ **B** ☐ **C** ☐

(1)

(c) In which component will the resistance decrease when the temperature increases?

Tick **one** box.

A ☐ **B** ☐ **C** ☐

(1)

(d) In which component will the resistance decrease when the light intensity increases?

Tick **one** box.

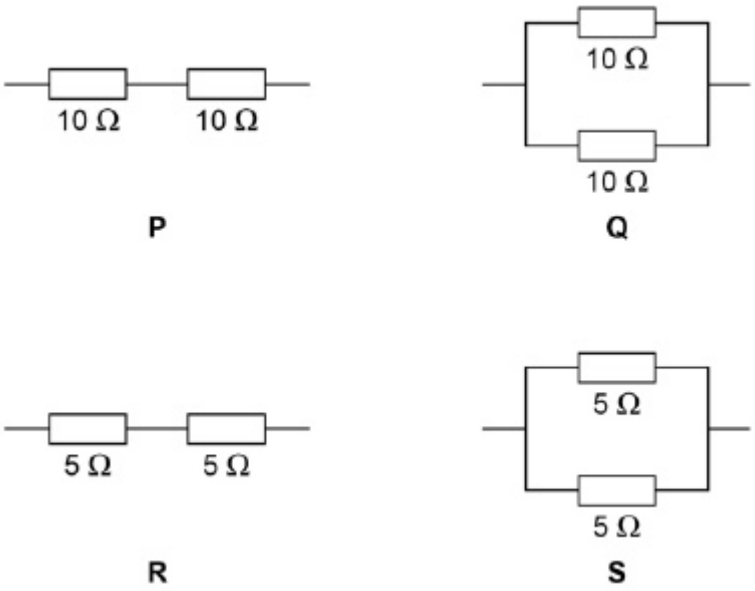
A ☐ **B** ☐ **C** ☐

(1)

Figure 2 shows four different arrangements of resistors.

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Figure 2



(e) Two of the arrangements are in series and two are in parallel.

Describe the difference between a series and a parallel arrangement.

_____

_____

_____

_____

(2)

(f) Which arrangement has a resistance of 10 Ω?

Tick **one** box.

P ☐ **Q** ☐ **R** ☐ **S** ☐

(1)

(g) Which arrangement has the highest resistance?

Tick **one** box.

P ☐ **Q** ☐ **R** ☐ **S** ☐

(1)

(h) A student connects a resistor to a cell for 60 seconds.

The current through the resistor is 0.97 A

Calculate the charge flow.

Use the equation:

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charge flow = current × time

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

Charge flow = _____ C

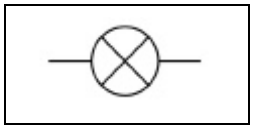
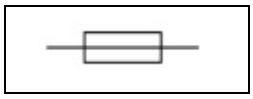
(3)

(Total 11 marks)

Q4.

Components can be connected in electrical circuits in different ways.

(a) Draw **one** line from each circuit symbol to the name of the component it represents.

Circuit symbol	**Name of component**
	cell
	diode
	fuse
	lamp
	variable resistor

(2)

(b) Complete the sentence.

Choose the answer from the box.

charge	**energy**	**potential difference**	**resistance**

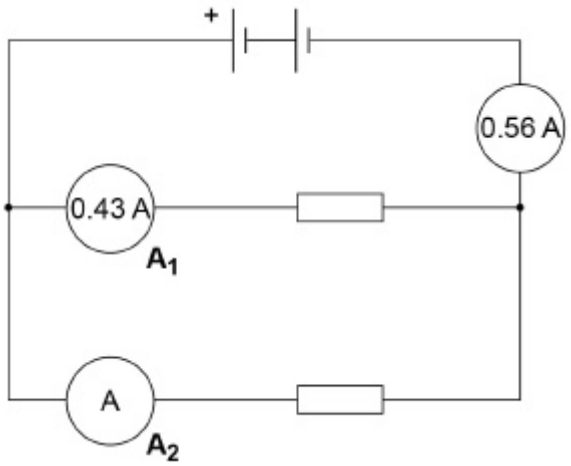
Electric current is the rate of flow of _____.

(1)

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Figure 1 shows a parallel circuit.

Figure 1



(c) Calculate the current measured by ammeter $\mathbf{A_2}$.

Current = _____ A

(1)

(d) The circuit is connected for 300 s

The total current in the circuit stays at 0.56 A

Calculate the total charge flow.

Use the equation:

charge flow = current × time

_____

_____

_____

_____

Charge flow = _____ C

(2)

(e) The potential difference supplied by the battery is 4.5 V

Calculate the total energy transferred in 300 s

Use the equation:

energy transferred = charge flow × potential difference

Use your answer to part (d).

_____

_____

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_____

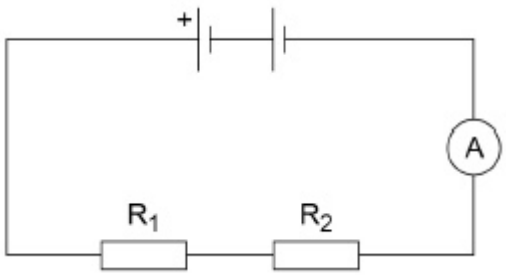
_____

Energy transferred = _____ J

(2)

(f) **Figure 2** shows a series circuit.

Figure 2



Resistor **R_2** breaks.

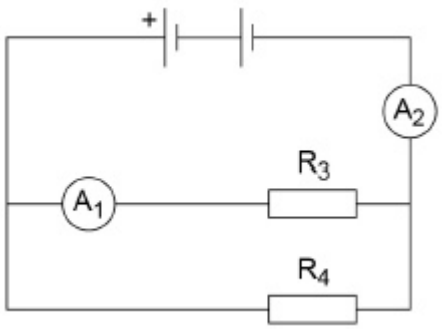
What happens to the reading on the ammeter?

_____

(1)

(g) **Figure 3** shows a parallel circuit.

Figure 3



Resistor **R_3** breaks.

What happens to the readings on the ammeter?

Ammeter **A_1** _____

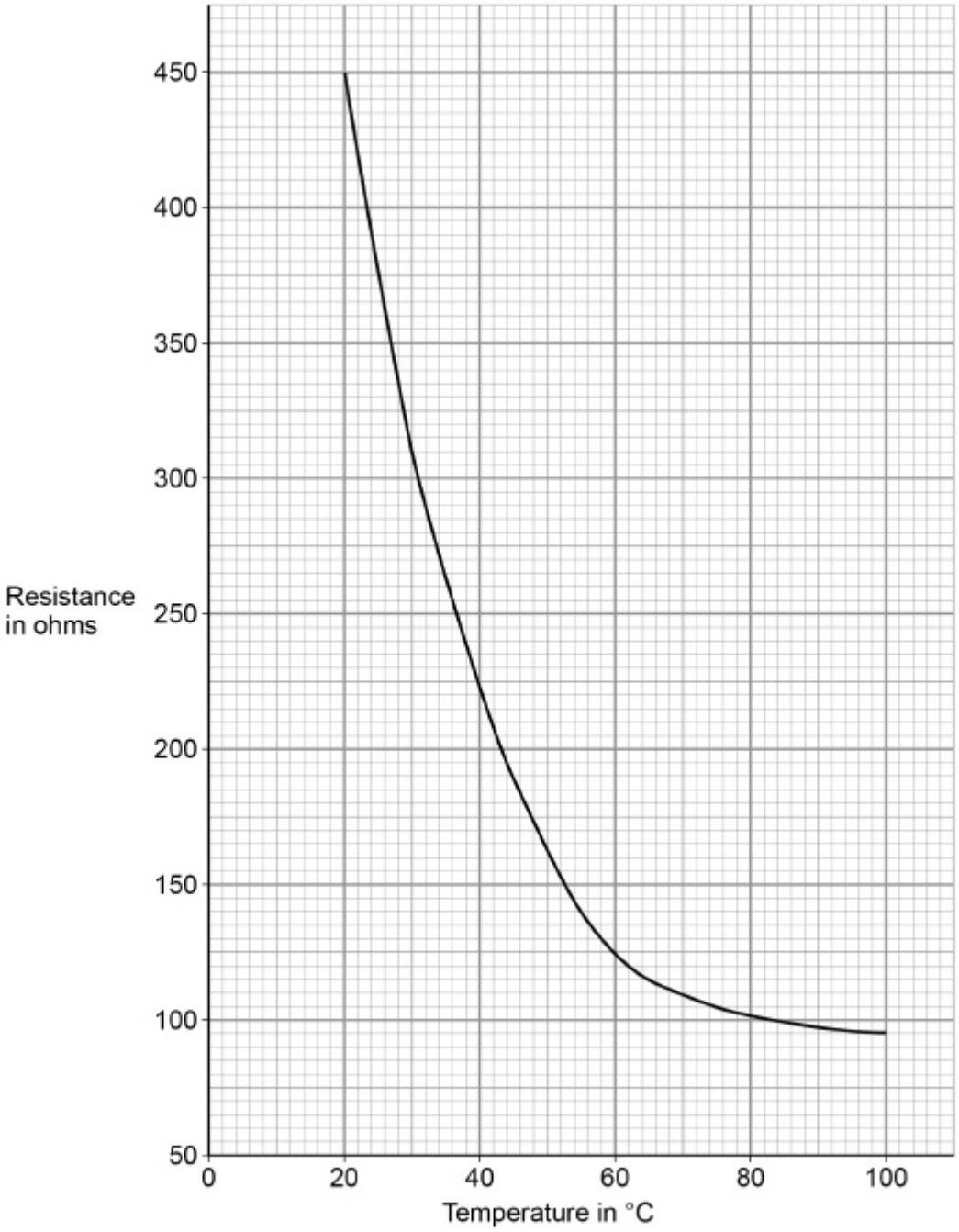
Ammeter **A_2** _____

(2)

Figure 4 shows how the resistance of a component varies with temperature.

Figure 4

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(h) What is the name of the component?

Tick **one** box.

LED ☐

LDR ☐

Resistor ☐

Thermistor ☐

(1)

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(i) What is the resistance of the component at a temperature of 50 °C?

Resistance = _____ Ω

(1)

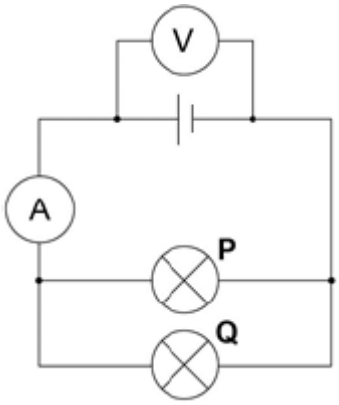
(Total 13 marks)

Q5.

Figure 1 shows a circuit diagram containing two identical lamps arranged in parallel.

The reading on the ammeter is 186 mA.

Figure 1



(a) Which statement about the current through the lamps is true?

Tick **one** box.

The current through both lamp **P** and lamp **Q** is **0.093 A** ☐

The current through both lamp **P** and lamp **Q** is **0.186 A** ☐

The current through both lamp **P** and lamp **Q** is **0.93 A** ☐

The current through both lamp **P** and lamp **Q** is **1.86 A** ☐

(1)

(b) One of the lamps breaks and is not replaced.

Which statement about the current in the other lamp is true?

Tick **one** box.

The current through the lamp is **0.093 A** ☐

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The current through the lamp is **0.186 A** ☐

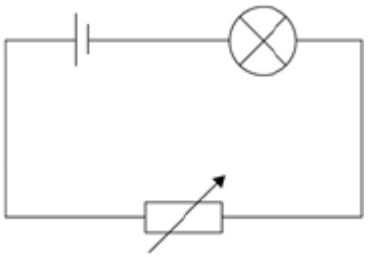
The current through the lamp is **0.93 A** ☐

The current through the lamp is **1.86 A** ☐

(1)

(c) **Figure 2** shows a circuit that can be used to alter the brightness of a lamp.

Figure 2



The resistance of the variable resistor is increased.

What effect will this have on the brightness of the lamp?

Explain your answer.

_____

_____

_____

_____

(2)

(d) When the potential difference across the lamp is 3.3 V, the current is 0.15 A.

Write down the equation that links current, potential difference and resistance.

Equation _____

(1)

(e) Calculate the resistance of the lamp.

_____

_____

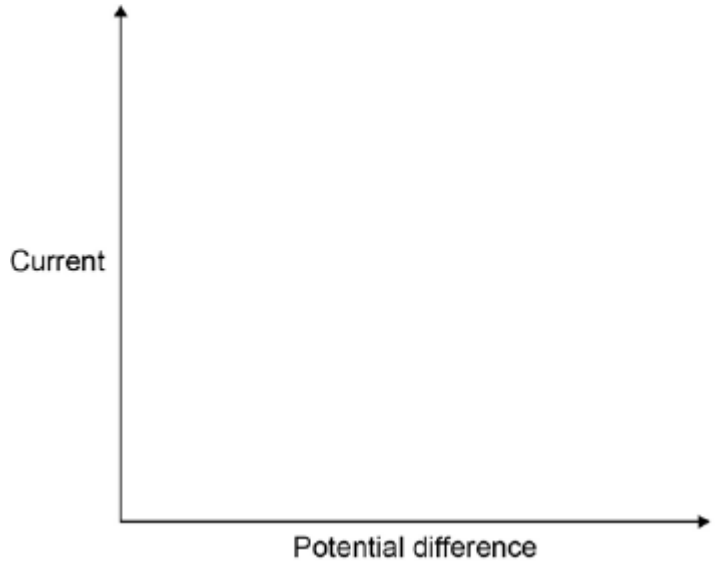
_____

Resistance = _____ Ω

(3)

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(f) Sketch a current–potential difference graph for a filament lamp.



(1)

(Total 9 marks)

Q6.

A student is investigating some electrical components.

(a) Describe how the student could set up a circuit to find the resistance of a lamp.

You should include a circuit diagram in your answer.

(4)

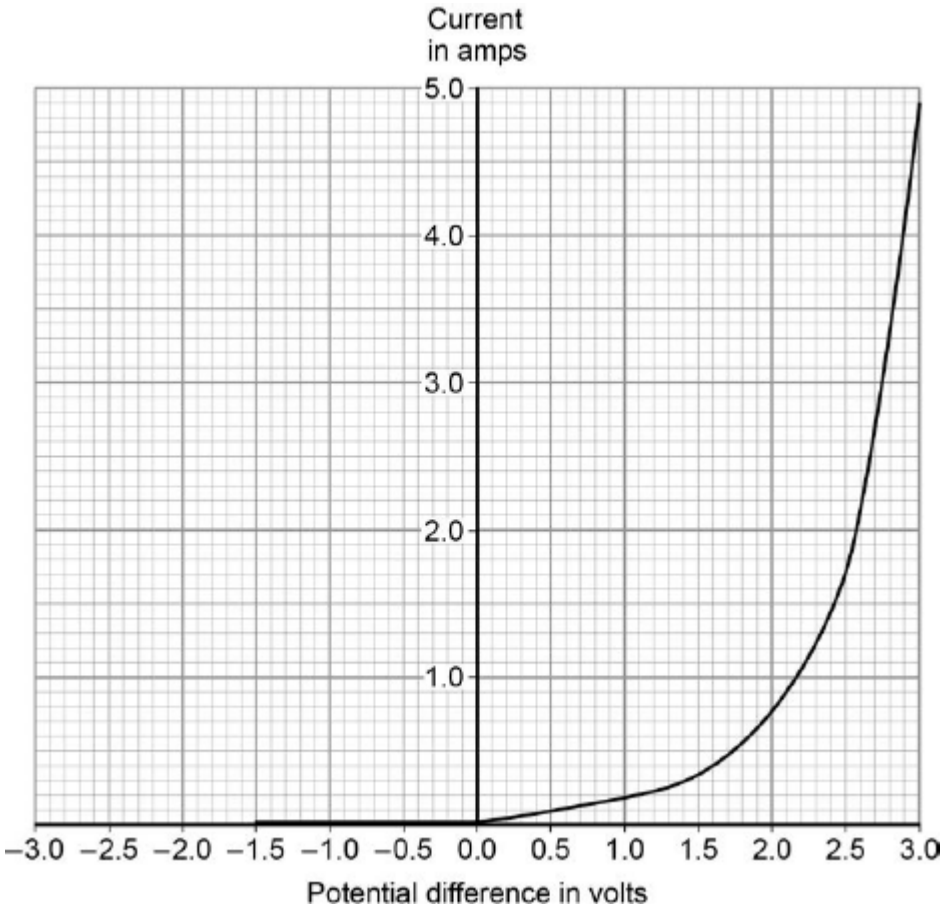
(b) The student is given an electrical component in a sealed box.

She has to find out what the electrical component is by experiment.

The student records the current and the potential difference for the component.

Her results are shown in the figure below.

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Explain how the student could know that the electrical component in the sealed box is **not** an ohmic conductor.

_____

_____

_____

_____

(2)

(c) What is the electrical component in the sealed box?

Explain your answer.

Component _____

_

Explanation _____

_

_____

_____

_____

(3)

(d) Use the graph to determine the resistance of the component at 2.3 V.

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Resistance = _____ Ω

(4)

(Total 13 marks)

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