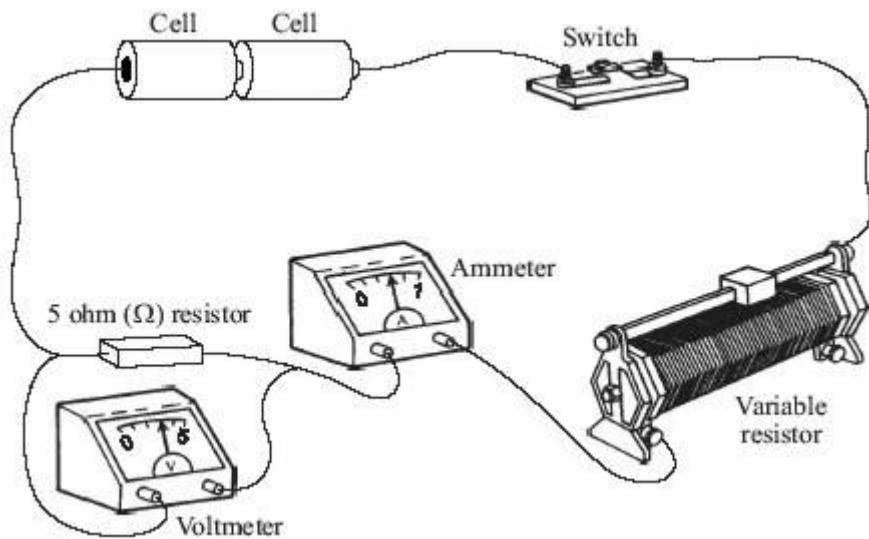


- Q1.** The drawing shows the circuit used to investigate how the current through a 5 ohm (Ω) resistor changes as the potential difference (voltage) across the resistor changes.



- (a) Draw, in the space below, a circuit diagram of this circuit. Use the correct symbols for each part of the circuit.

(2)

- (b) (i) Write down the equation that links current, potential difference and resistance.

.....

(1)

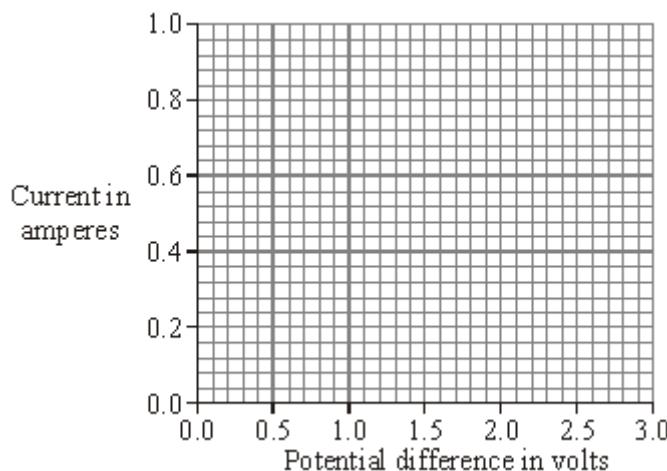
- (ii) Calculate the potential difference across the 5 ohm (Ω) resistor when the current through the resistor equals 0.4 A. Show clearly how you work out your final answer.

.....
.....

potential difference = volts

(2)

- (iii) Complete the graph to show how the current through the resistor changes as the potential difference across the resistor increases from 0 V to 3 V. Assume the resistor stays at a constant temperature.



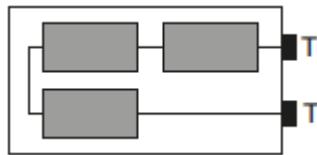
(2)

- (c) The resistor is replaced by a 3 V filament lamp. The resistance of the lamp increases as the potential difference across it increases. Why?

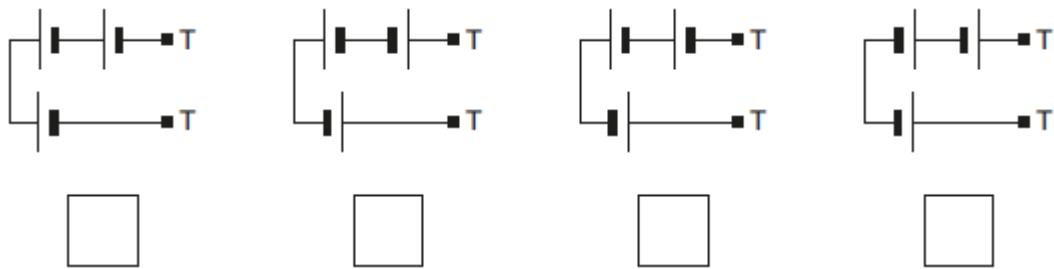
.....
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(1)
(Total 8 marks)

- Q2.(a)** **Figure 1** shows the inside of a battery pack designed to hold three identical 1.5 V cells.

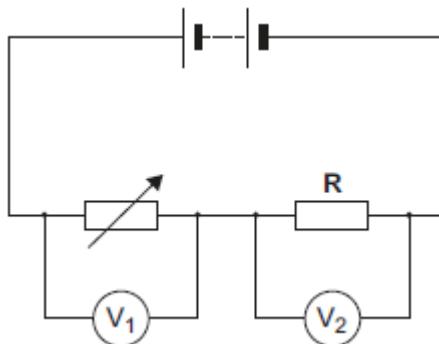
Figure 1

Which **one** of the arrangements shown in **Figure 2** would give a 4.5 V output across the battery pack terminals **T**?

Figure 2

(1)

- (b)** **Figure 3** shows a variable resistor and a fixed value resistor connected in series in a circuit.

Figure 3

Complete **Figure 3** to show how an ammeter would be connected to measure the current through the circuit.

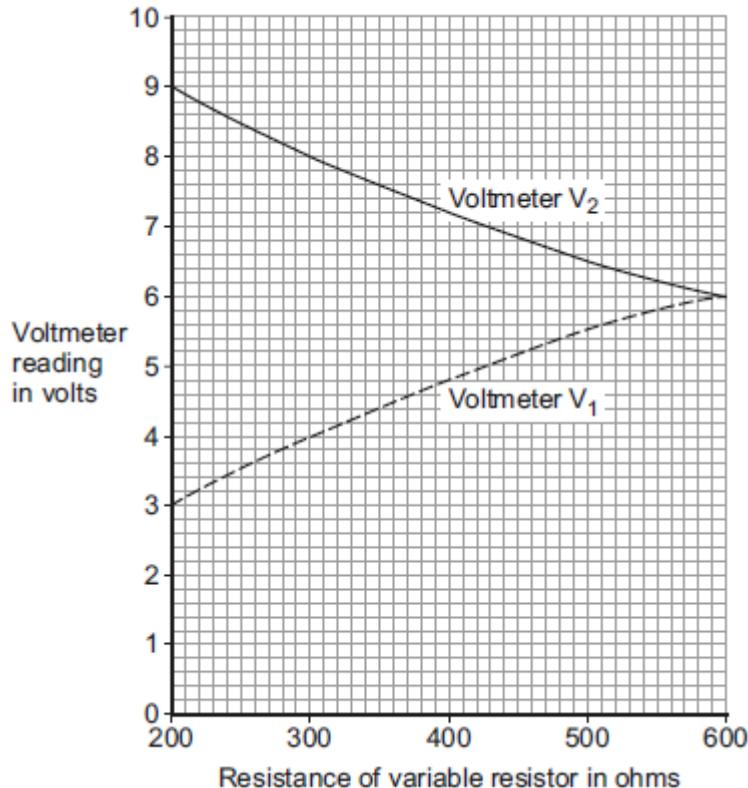
Use the correct circuit symbol for an ammeter.

(1)

- (c) The variable resistor can be adjusted to have any value from 200 ohms to 600 ohms.

Figure 4 shows how the reading on voltmeter V_1 and the reading on voltmeter V_2 change as the resistance of the variable resistor changes.

Figure 4



- (i) How could the potential difference of the battery be calculated from **Figure 4**?

Tick (\checkmark) one box.

$9 + 3 = 12 \text{ V}$

$9 - 3 = 6 \text{ V}$

$9 \div 3 = 3 \text{ V}$

Give the reason for your answer.

.....

.....

(2)

- (ii) Use **Figure 4** to determine the resistance of the fixed resistor, R .

Resistance of R = Ω

Give the reason for your answer.

.....
.....

(2)

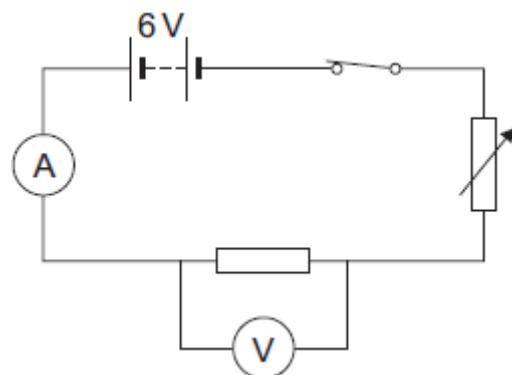
- (iii) Calculate the current through the circuit when the resistance of the variable resistor equals 200Ω .

.....
.....
.....

Current = A

(3)
(Total 9 marks)

Q3. The diagram shows the circuit set up by a student.



- (a) The student uses the circuit to test the following hypothesis:

'The current through a resistor is directly proportional to the potential difference across the resistor.'

- (i) If the hypothesis is correct, what should the student predict will happen to the current through the resistor when the potential difference across the resistor is doubled?

.....

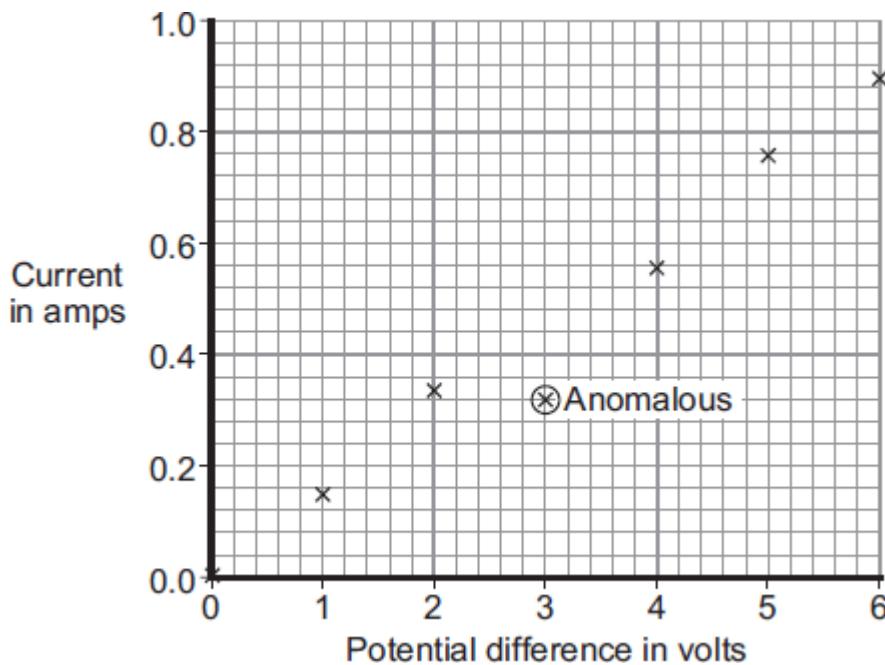
(1)

- (ii) Name the component in the circuit used to change the potential difference across the resistor.

.....

(1)

- (b) The student used the data obtained to plot the points for a graph of current against potential difference.



- (i) Why has the student plotted the points for a line graph and not drawn a bar chart?

.....

(1)

- (ii) One of the points has been identified by the student as being anomalous.

What is the most likely cause for this anomalous point?

.....

(1)

- (iii) Draw a line of best fit for these points.

(1)

- (iv) Does the data the student obtained support the hypothesis?

Give a reason for your answer.

.....

.....

(1)
(Total 6 marks)