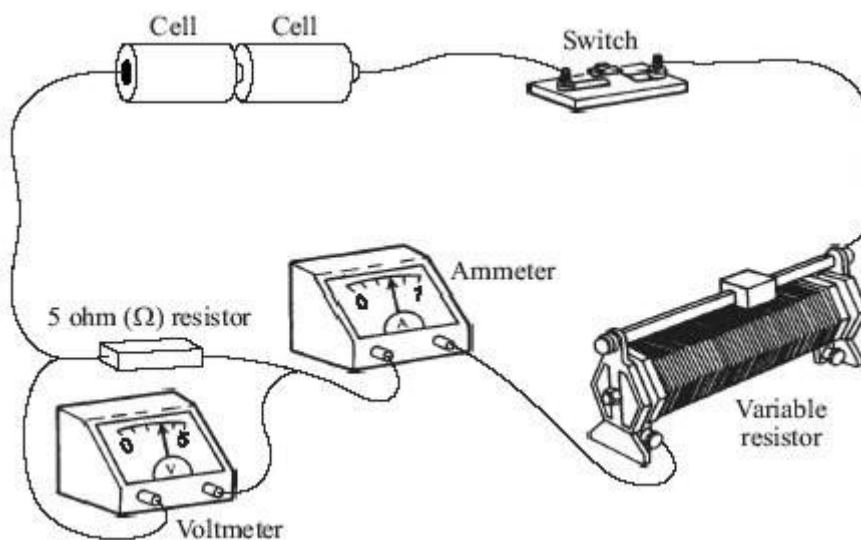


Q1. The drawing shows the circuit used to investigate how the current through a 5 ohm (Ω) resistor changes as the potential difference (voltage) across the resistor changes.



- (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)

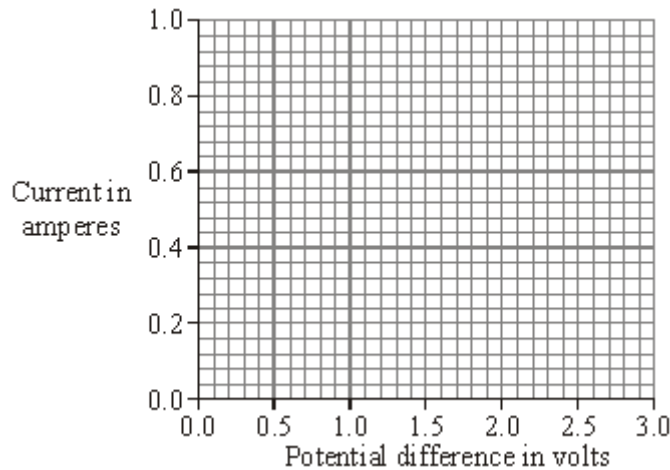
- (ii) Calculate the potential difference across the 5 ohm (Ω) resistor when the current through the resistor equals 0.4 A. Show clearly how you work out your final answer.

.....

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?

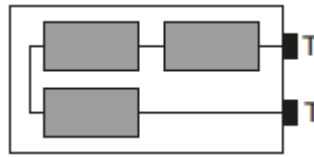
.....

(1)

(Total 8 marks)

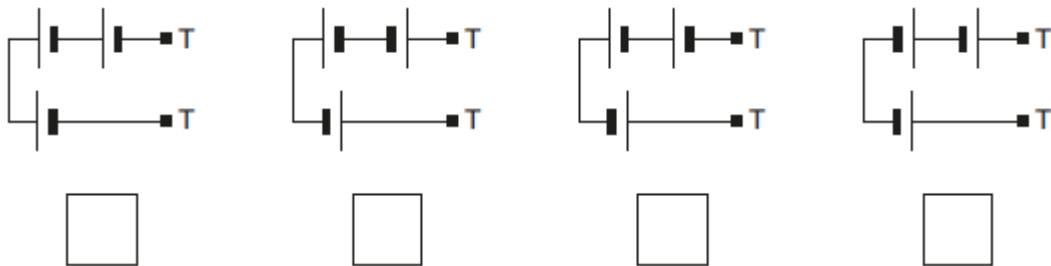
Q2.(a) **Figure 1** shows the inside of a battery pack designed to hold three identical 1.5 V cells.

Figure 1



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

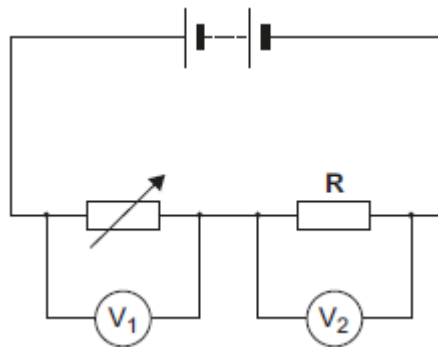
Figure 2



(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.

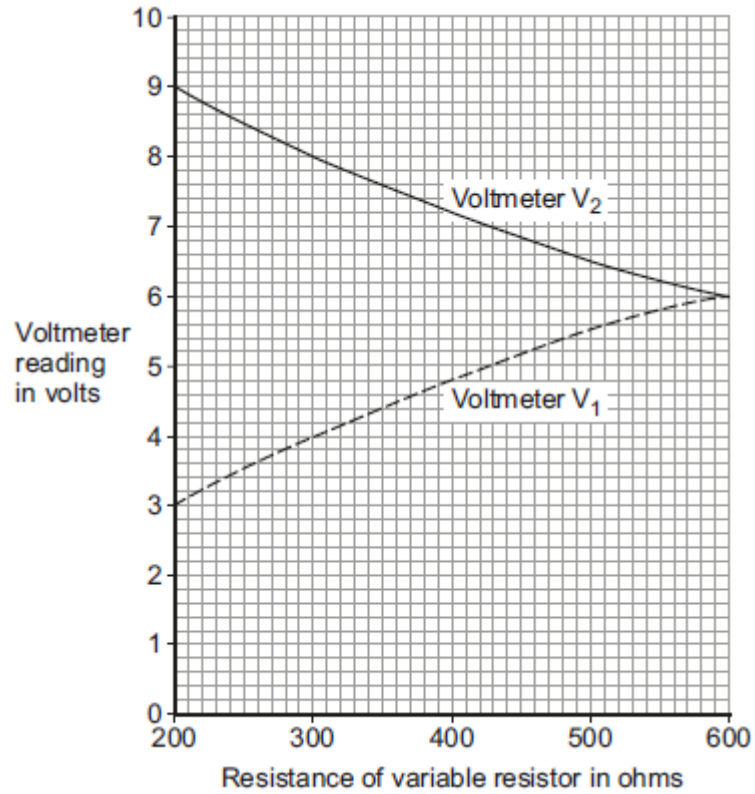
Use the correct circuit symbol for an ammeter.

(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 (✓) **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 .

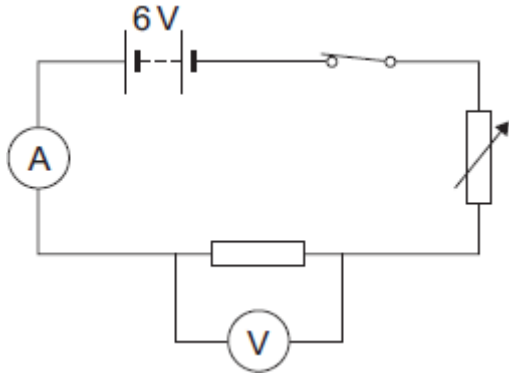
.....
.....
.....

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?

.....

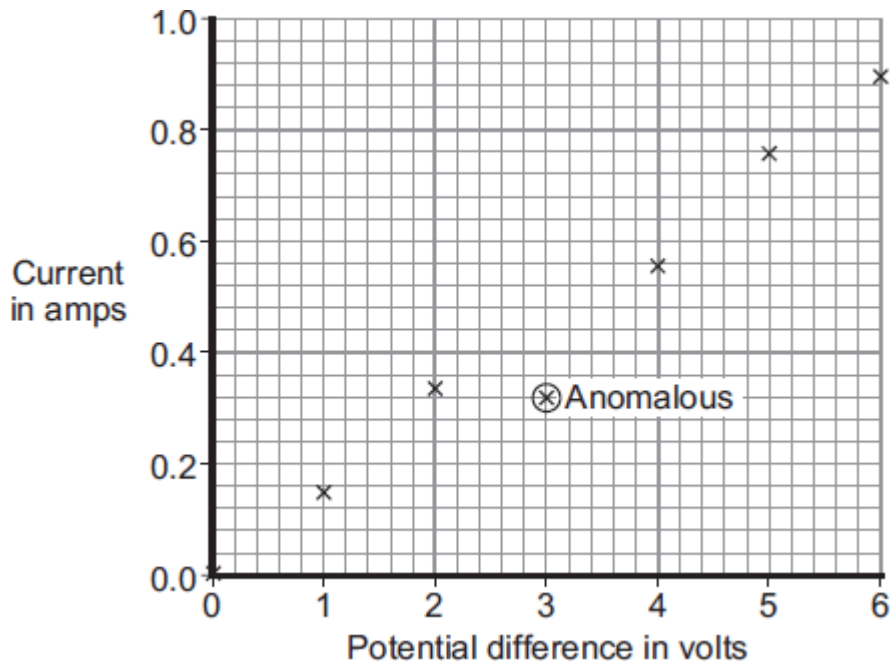
(1)

(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)