2 – Electricity

Total mark – 18

Question: 1

1. A student investigated how the current in a series circuit varied with the resistance of a variable resistor.

Figure 1 shows the circuit used.

Figure 1

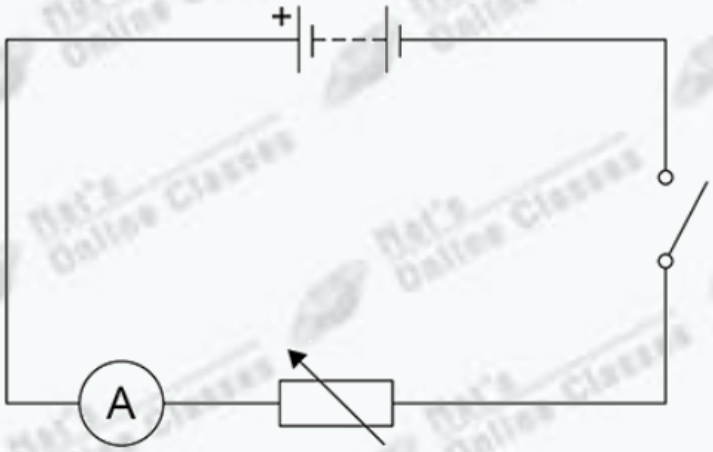
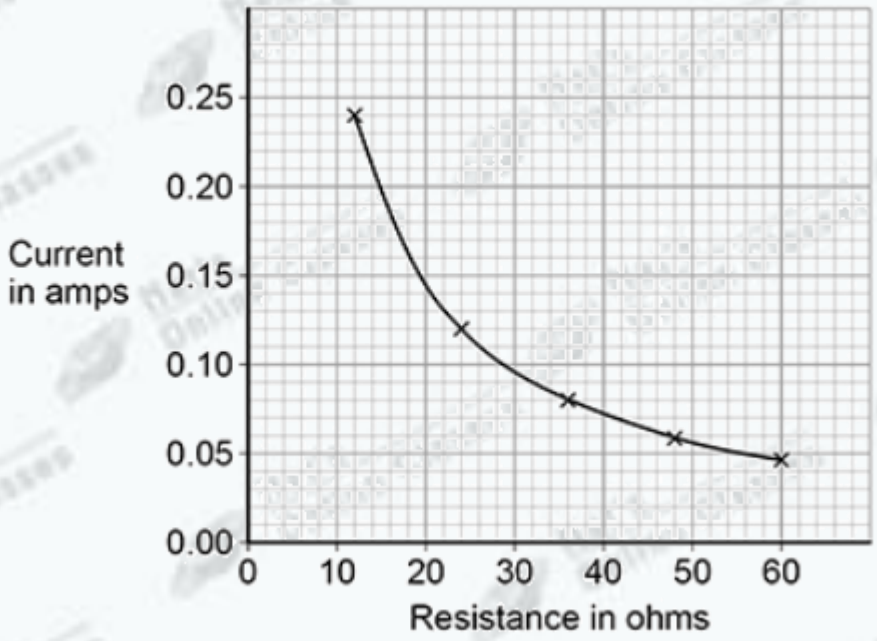


Figure 2 shows the results.

Figure 2



(a) The battery had a power output of 230 mW when the resistance of the variable resistor was 36 Ω.

Determine the potential difference across the battery.

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Potential difference = _____ V

(4)

(b) The student concluded:

'the current in the circuit was inversely proportional to the resistance of the variable resistor.'

Explain how **Figure 2** shows that the student is correct.

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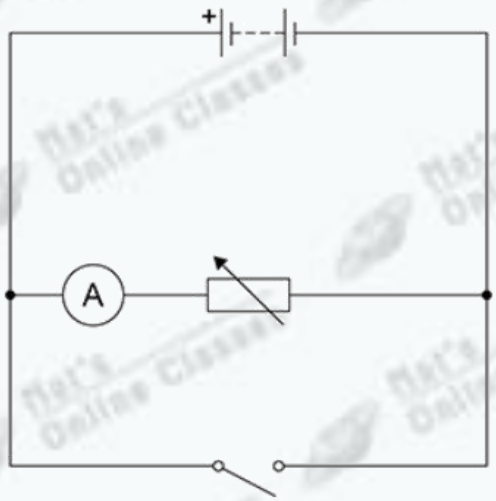
(2)

(c) **Figure 3** shows a circuit with a switch connected incorrectly.

Figure 3



Explain how closing the switch would affect the current in the variable resistor.

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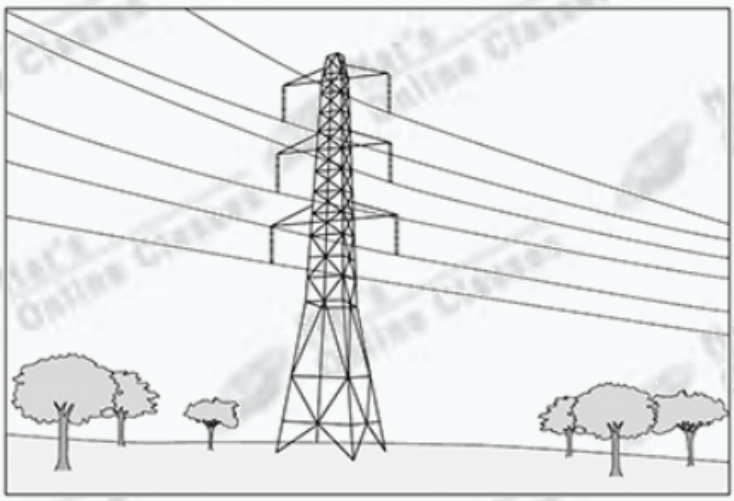
(2)

(Total 8 marks)

Question: 2

2. **Figure 1** shows some overhead power cables in the National Grid.

Figure 1



(a) Explain the advantage of transmitting electricity at a very high potential difference.

(3)

(b) It is dangerous for a person to fly a kite near an overhead power cable.

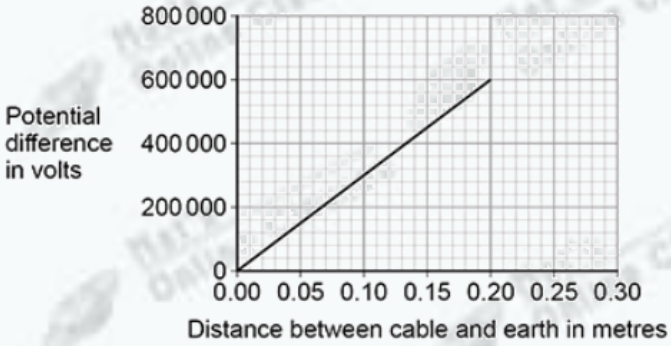
Figure 2 shows a person flying a kite.

Figure 2

The person could receive a fatal electric shock if the kite was very close to, but not touching the power cable.

Explain why.

(3)



(c) The data in **Figure 3** gives the relationship between potential difference and distance when the air is dry.

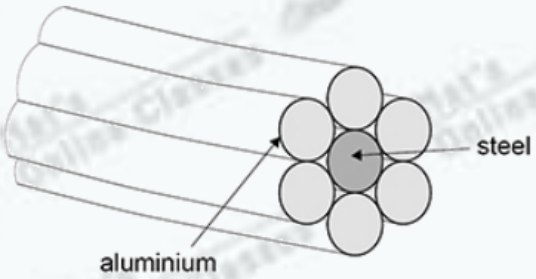
When the humidity of air increases the air becomes a better conductor of electricity.

Draw a line on **Figure 3** to show how the potential difference changes with distance if the humidity of the air increases.

(2)

(d) **Figure 4** shows a cross-section through a power cable.

Figure 4



A 1 metre length of a single aluminium wire is a better conductor than a 1 metre length of the steel wire.

The individual wires behave as if they are resistors connected in parallel.

Explain why the current in the steel wire is different to the current in a single aluminium wire.

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(2)

(Total 10 marks)