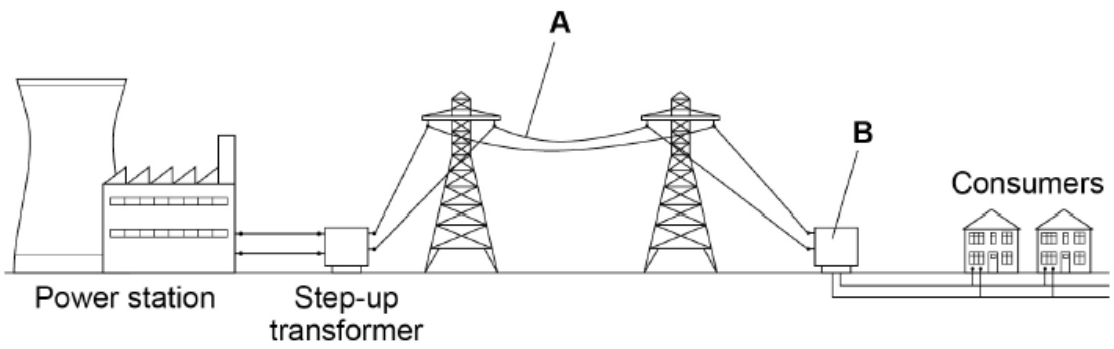
AQA - Electricity – GCSE Physics

1. June/2021/Paper_1F/No.2

0 2 **Figure 2** shows part of the National Grid linking a power station to consumers.

Figure 2



0 2 . 1 Name the parts of **Figure 2** labelled **A** and **B**.

[2 marks]

A _____

B _____

0 2 . 2 Electricity is transmitted through **A** at a very high potential difference.

What is the advantage of transmitting electricity at a very high potential difference?

[1 mark]

Tick (✓) **one** box.

A high potential difference is safer for consumers. ☐

Less thermal energy is transferred to the surroundings. ☐

Power transmission is faster. ☐

0 2 . 3 The power station generates electricity at a potential difference of 25 000 V.

The energy transferred by the power station in one second is 500 000 000 J.

Calculate the charge flow from the power station in one second.

Use the equation:

$$\text{charge flow} = \frac{\text{energy}}{\text{potential difference}}$$

[2 marks]

Charge flow in one second = _____ C

The electricity supply to a house has a potential difference of 230 V.

Table 1 shows the current in some appliances in the house.

Table 1

Appliance	Current in amps
Dishwasher	6.50
DVD player	0.10
Lamp	0.40
TV	0.20

0 2 . 4 Calculate the total power of all the appliances in **Table 1**.

Use the equation:

power = potential difference × current

[3 marks]

Total power = _____ W

0 2 . 5 Each appliance in **Table 1** is switched on for 2 hours.

Which appliance will transfer the most energy?

Give a reason for your answer.

[2 marks]

Appliance _____

Reason _____

_____

_____

0 2 . 6 The average energy transferred from the National Grid every second for each person in the UK is 600 J.

There are 32 000 000 seconds in one year.

Calculate the average energy transferred each year from the National Grid for each person in the UK.

[2 marks]

_____

_____

_____

Average energy transferred = _____ J

2. June/2021/Paper_1F/No.4

0 4 A student investigated how the current in a circuit varied with the number of lamps connected in parallel in the circuit.

Figure 4 shows the circuit with three identical lamps connected in parallel.

Figure 4

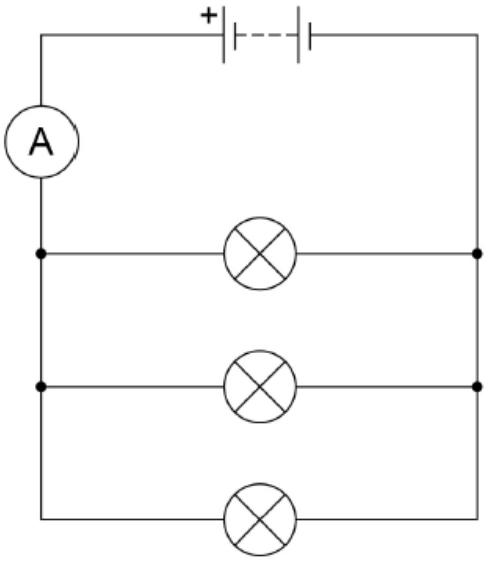
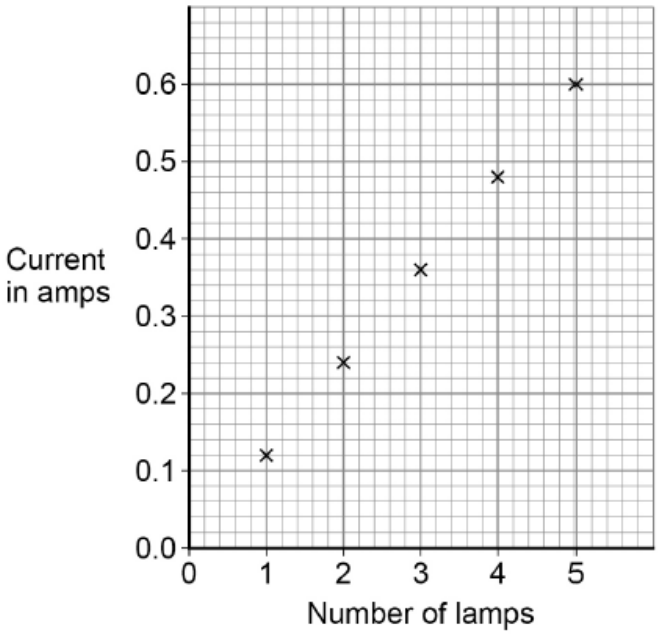


Figure 5 shows the results.

Figure 5



0 4 . 1 Complete the sentences.

Choose answers from the box.

Each answer can be used once, more than once or not at all.

decreased	stayed the same	increased

[3 marks]

As the number of lamps increased, the current _____.

As the number of lamps increased, the total resistance of the circuit _____.

As the number of lamps increased, the potential difference across the battery _____.

0 4 . 2 When there were three lamps in the circuit the ammeter reading kept changing between 0.35 A and 0.36 A.

What type of error would this lead to?

[1 mark]

Tick (✓) **one** box.

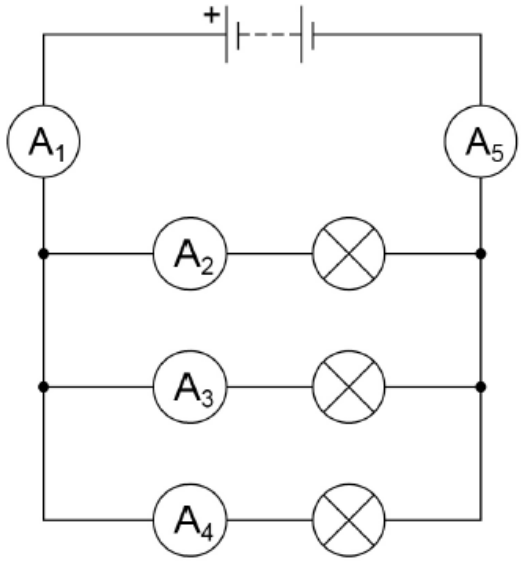
Random error ☐

Systematic error ☐

Zero error ☐

Figure 6 shows a circuit with five ammeters and three identical lamps.

Figure 6



0 4 . 3 Complete **Table 2** to show the readings on ammeters A_2 and A_5.

[2 marks]

Table 2

Ammeter	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
Current in amps	0.36		0.12	0.12	

0 4 . 4 The resistance of one lamp is 15 Ω.

The current in the lamp is 0.12 A.

Calculate the power output of the lamp.

Use the equation:

$$\text{power} = (\text{current})^2 \times \text{resistance}$$

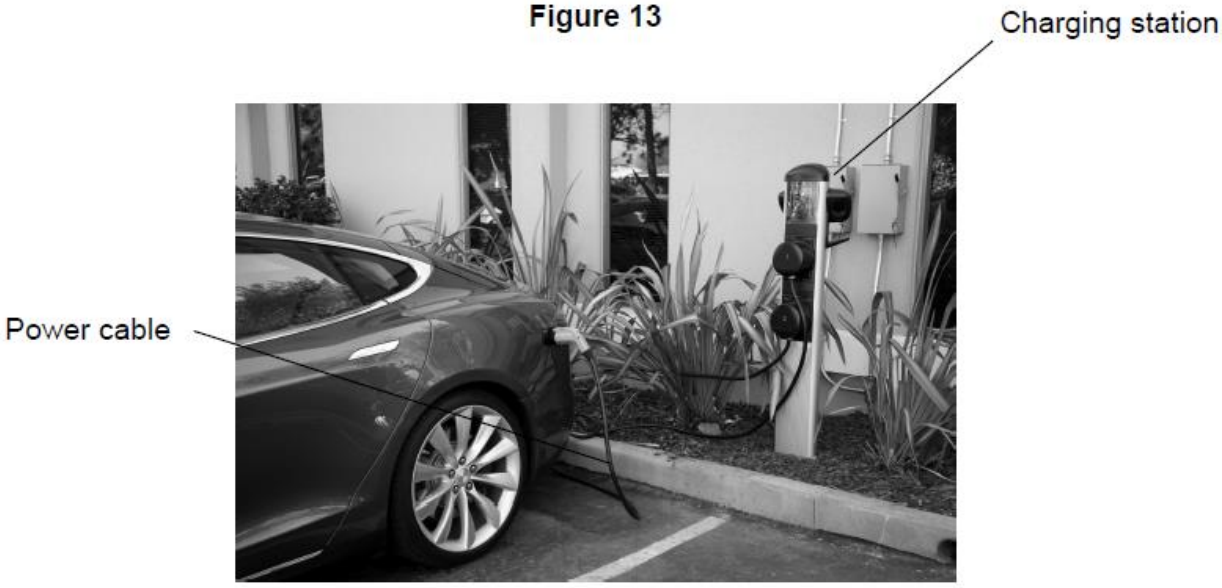
[2 marks]

Power = _____ W

3. June/2021/Paper_1F/No.9

0 9 **Figure 13** shows an electric car being recharged.

Figure 13



0 9 . 1 The charging station applies a direct potential difference across the battery of the car.

What does 'direct potential difference' mean?

[1 mark]

0 9 . 2 Which equation links energy transferred (E), power (P) and time (t)?

[1 mark]

Tick (✓) **one** box.

energy transferred = $\frac{\text{power}}{\text{time}}$ ☐

energy transferred = $\frac{\text{time}}{\text{power}}$ ☐

energy transferred = power × time ☐

energy transferred = power^2 × time ☐

0 9 . 3 The battery in the electric car can store 162 000 000 J of energy.

The charging station has a power output of 7200 W.

Calculate the time taken to fully recharge the battery from zero.

[3 marks]

Time taken = _____ s

0 9 . 4 Which equation links current (I), potential difference (V) and resistance (R)?

[1 mark]

Tick (✓) **one** box.

$I = V \times R$ ☐

$I = V^2 \times R$ ☐

$R = I \times V$ ☐

$V = I \times R$ ☐

0 9 . 5 The potential difference across the battery is 480 V.

There is a current of 15 A in the circuit connecting the battery to the motor of the electric car.

Calculate the resistance of the motor.

[3 marks]

Resistance = _____ Ω

0 9 . 6 Different charging systems use different electrical currents.

- Charging system **A** has a current of 13 A.
- Charging system **B** has a current of 26 A.
- The potential difference of both charging systems is 230 V.

How does the time taken to recharge a battery using charging system **A** compare with the time taken using charging system **B**?

[1 mark]

Tick (✓) **one** box.

Time taken using system **A** is half the time of system **B** ☐

Time taken using system **A** is the same as system **B** ☐

Time taken using system **A** is double the time of system **B** ☐

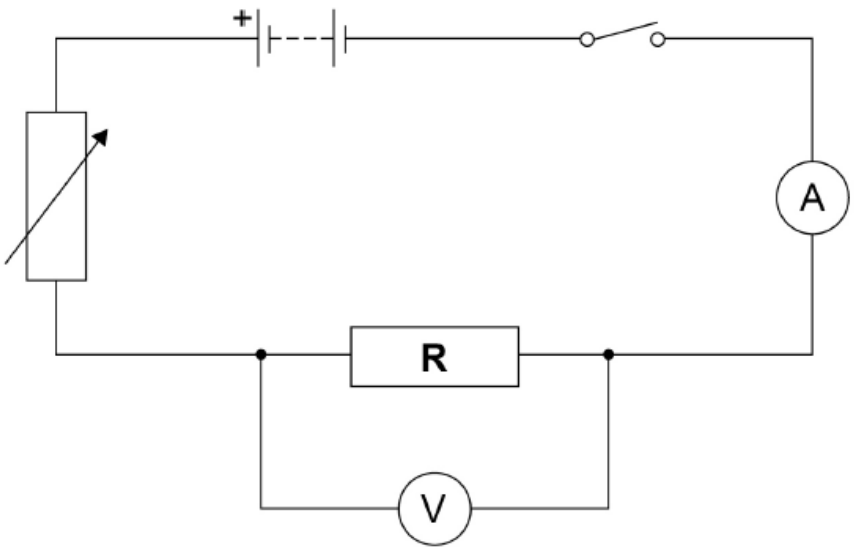
4. June/2021/Paper_1F/No.11

1 1 Student **A** investigated how the current in resistor **R** at constant temperature varied with the potential difference across the resistor.

Student **A** recorded both positive and negative values of current.

Figure 14 shows the circuit Student **A** used.

Figure 14



1 1 . 1 Describe a method that Student **A** could use for this investigation.

[6 marks]

1 1 . 2 Student **B** repeated the investigation.

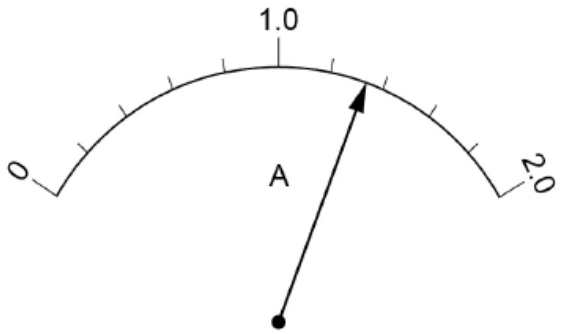
During Student **B**'s investigation the temperature of resistor **R** increased.

Explain how the increased temperature of resistor **R** would have affected Student **B**'s results.

[2 marks]

Figure 15 shows the scale on a moving coil ammeter at one time in the investigation.

Figure 15



1 1 . 3 What is the resolution of the moving coil ammeter?

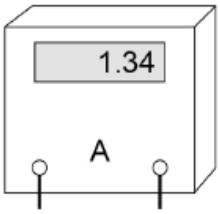
[1 mark]

Resolution = _____ A

1 1 . 4 Student **B** replaced the moving coil ammeter with a digital ammeter.

Figure 16 shows the reading on the digital ammeter.

Figure 16



The digital ammeter has a higher resolution than the moving coil ammeter.

Give **one** other reason why it would have been better to use the digital ammeter throughout this investigation.

[1 mark]

_____

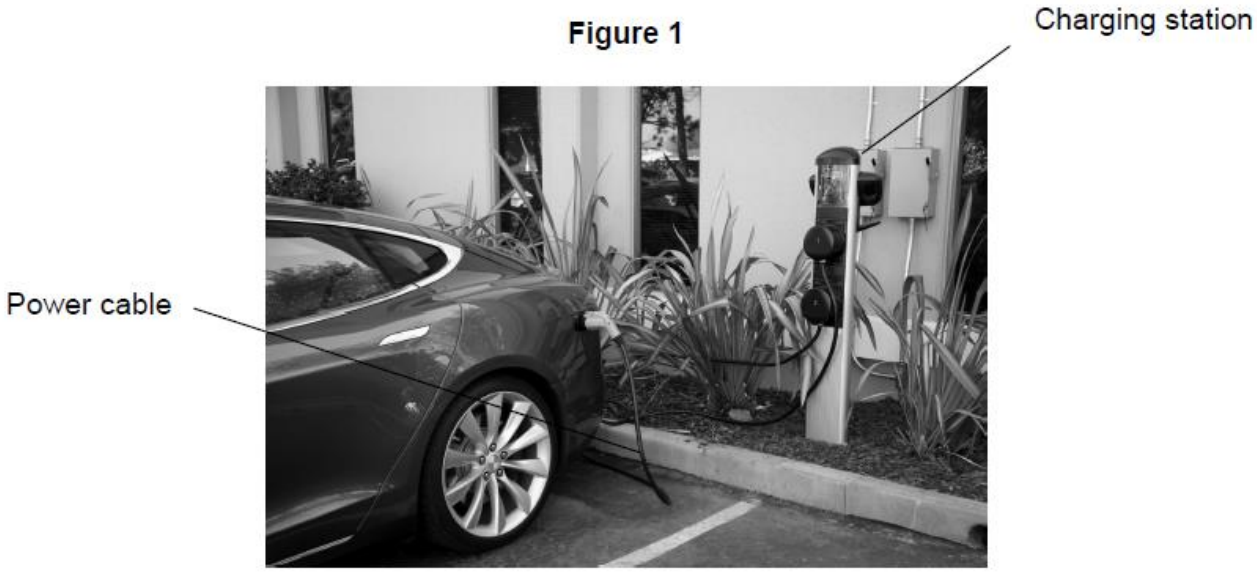
_____

_____

5. June/2021/Paper_1H/No.1

0 1 **Figure 1** shows an electric car being recharged.

Figure 1



0 1 . 1 The charging station applies a direct potential difference across the battery of the car.

What does 'direct potential difference' mean?

[1 mark]

0 1 . 2 Which equation links energy transferred (E), power (P) and time (t)?

[1 mark]

Tick (✓) **one** box.

energy transferred = $\frac{\text{power}}{\text{time}}$ ☐

energy transferred = $\frac{\text{time}}{\text{power}}$ ☐

energy transferred = power × time ☐

energy transferred = power^2 × time ☐

0 1 . 3 The battery in the electric car can store 162 000 000 J of energy.

The charging station has a power output of 7200 W.

Calculate the time taken to fully recharge the battery from zero.

[3 marks]

Time taken = _____ s

0 1 . 4 Which equation links current (I), potential difference (V) and resistance (R)?

[1 mark]

Tick (✓) **one** box.

$I = V \times R$ ☐

$I = V^2 \times R$ ☐

$R = I \times V$ ☐

$V = I \times R$ ☐

0 1 . 5 The potential difference across the battery is 480 V.

There is a current of 15 A in the circuit connecting the battery to the motor of the electric car.

Calculate the resistance of the motor.

[3 marks]

Resistance = _____ Ω

0 1 . 6 Different charging systems use different electrical currents.

- Charging system **A** has a current of 13 A.
- Charging system **B** has a current of 26 A.
- The potential difference of both charging systems is 230 V.

How does the time taken to recharge a battery using charging system **A** compare with the time taken using charging system **B**?

[1 mark]

Tick (✓) **one** box.

Time taken using system **A** is half the time of system **B** ☐

Time taken using system **A** is the same as system **B** ☐

Time taken using system **A** is double the time of system **B** ☐

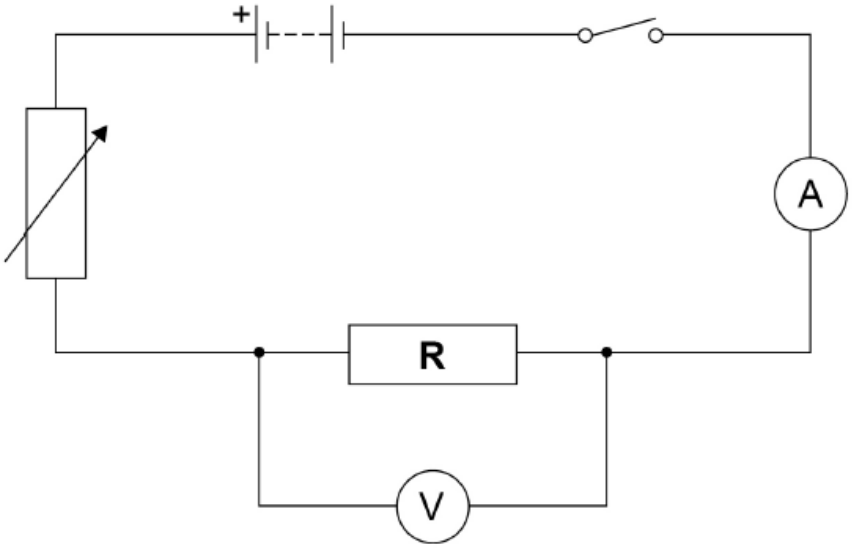
6. June/2021/Paper_1H/No.3

0 3 Student **A** investigated how the current in resistor **R** at constant temperature varied with the potential difference across the resistor.

Student **A** recorded both positive and negative values of current.

Figure 2 shows the circuit Student **A** used.

Figure 2



0 3 . 1 Describe a method that Student **A** could use for this investigation.

[6 marks]

0 3 . 2 Student **B** repeated the investigation.

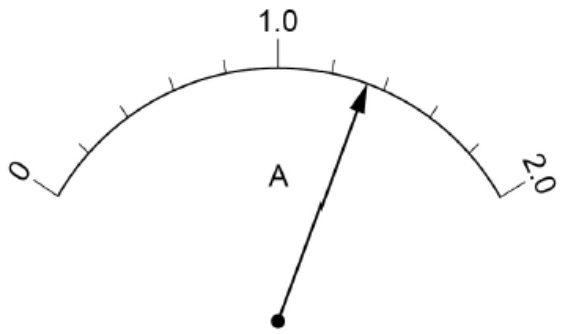
During Student **B**'s investigation the temperature of resistor **R** increased.

Explain how the increased temperature of resistor **R** would have affected Student **B**'s results.

[2 marks]

Figure 3 shows the scale on a moving coil ammeter at one time in the investigation.

Figure 3



0 3 . 3 What is the resolution of the moving coil ammeter?

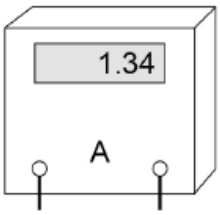
[1 mark]

Resolution = _____ A

0 3 . 4 Student **B** replaced the moving coil ammeter with a digital ammeter.

Figure 4 shows the reading on the digital ammeter.

Figure 4



The digital ammeter has a higher resolution than the moving coil ammeter.

Give **one** other reason why it would have been better to use the digital ammeter throughout this investigation.

[1 mark]

_____

_____

_____

7. June/2021/Paper_1H/No.7

0 7 A student investigated how the current in a series circuit varied with the resistance of a variable resistor.

Figure 8 shows the circuit used.

Figure 8

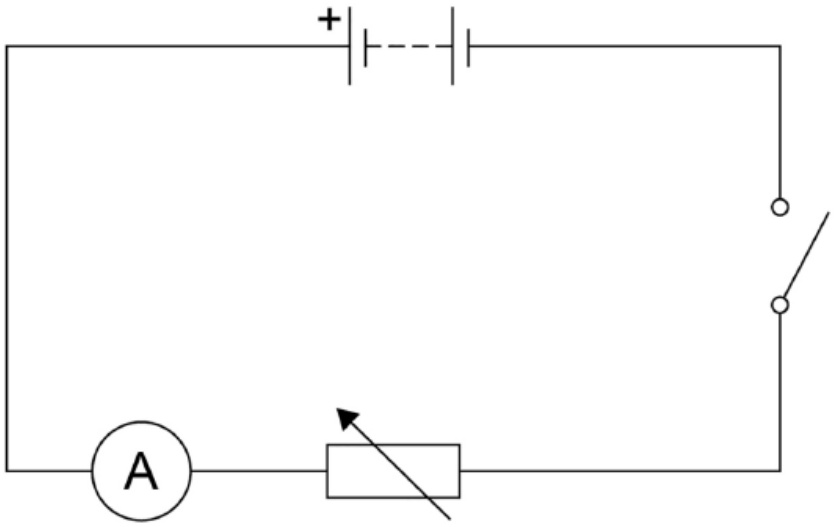
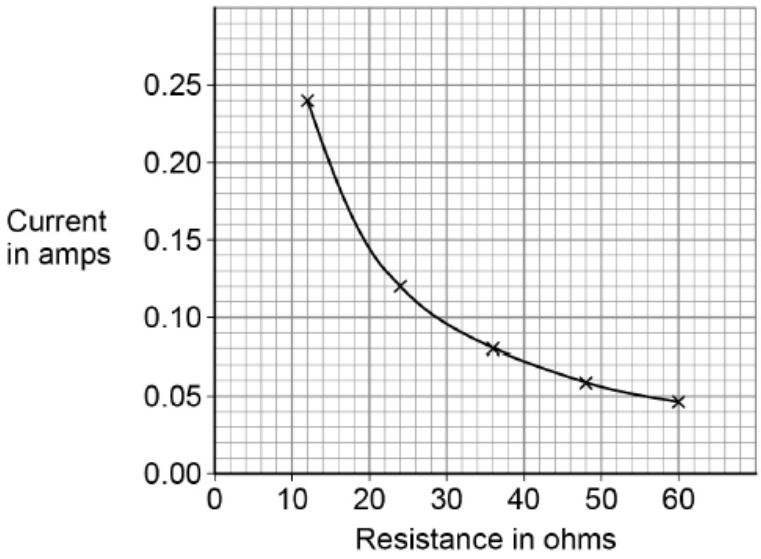


Figure 9 shows the results.

Figure 9



0 7 . 1 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.

[4 marks]

Potential difference = _____ V

0 7 . 2 The student concluded:

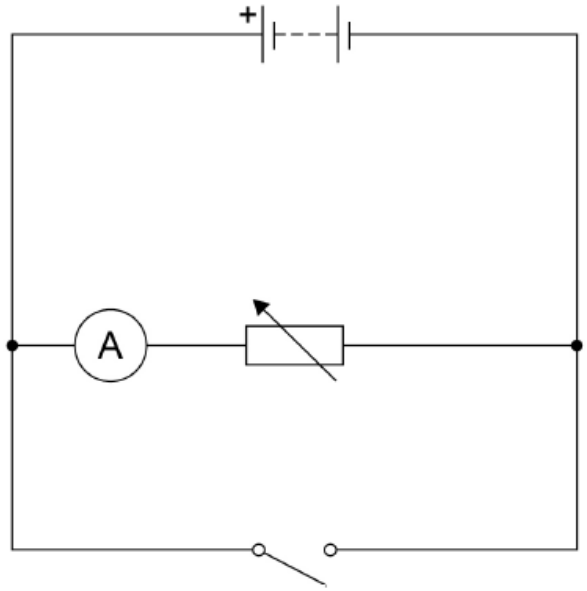
'the current in the circuit was inversely proportional to the resistance of the variable resistor.'

Explain how **Figure 9** shows that the student is correct.

[2 marks]

0 7 . 3 **Figure 10** shows a circuit with a switch connected incorrectly.

Figure 10



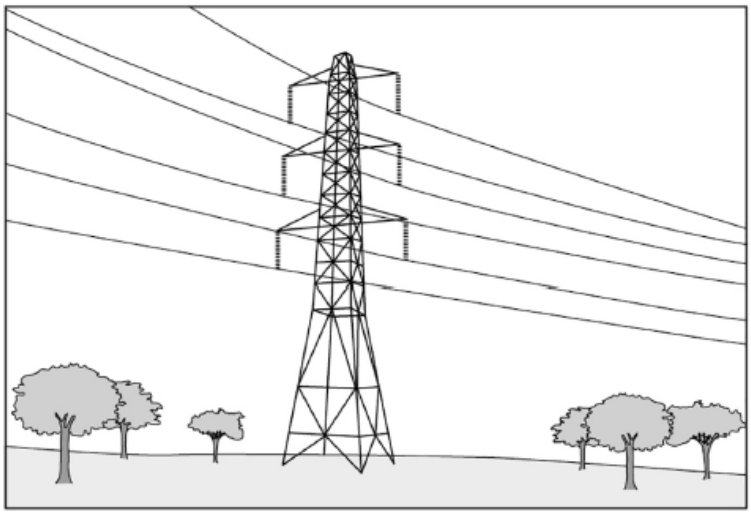
Explain how closing the switch would affect the current in the variable resistor.

[2 marks]

8. June/2021/Paper_1H/No.10

1 0 **Figure 13** shows some overhead power cables in the National Grid.

Figure 13



1 0 . 1 Explain the advantage of transmitting electricity at a very high potential difference.

[3 marks]

1 0 . 2 It is dangerous for a person to fly a kite near an overhead power cable.

Figure 14 shows a person flying a kite.

Figure 14

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

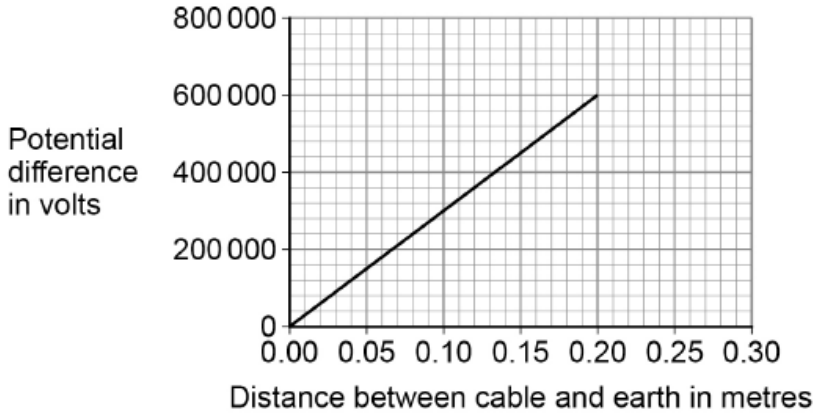
Explain why.

[3 marks]

A scientist investigated how the potential difference needed for air to conduct charge varies with the distance between a cable and earth.

Figure 15 shows the results.

Figure 15



1 0 . 3 The data in **Figure 15** gives the relationship between potential difference and distance when the air is dry.

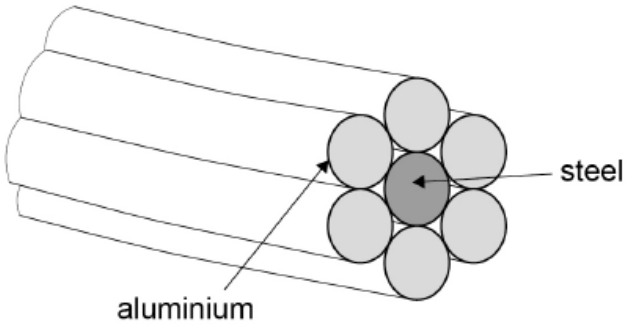
When the humidity of air increases the air becomes a better conductor of electricity.

Draw a line on **Figure 15** to show how the potential difference changes with distance if the humidity of the air increases.

[2 marks]

1 0 . 4 **Figure 16** shows a cross-section through a power cable.

Figure 16



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.

[2 marks]