Static Electricity GCSE AQA Higher Physics Past Papers Questions

01.

Figure 6 shows a Van de Graaff generator that is used to investigate static electricity.

Before it is switched on, the metal dome has no net charge.

After it is switched on, the metal dome becomes positively charged.

Figure 6

1 Explain how an uncharged object may become positively charged.

[3 marks]

2 **Figure 7** shows a plan view of the positively charged metal dome of a Van de Graaff generator.

Draw the electric field pattern around the metal dome when it is isolated from its surroundings.

Use arrows to show the direction of the electric field.

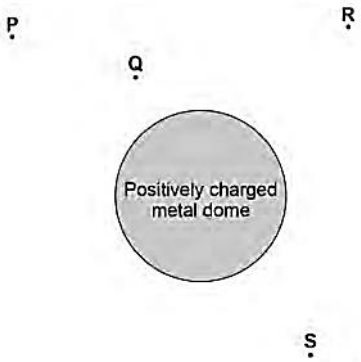
[2 marks]

Figure 7

3 Another positively charged object is placed in the electric field.

Look at **Figure 8**.

Figure 8



In which position would the object experience the greatest force?

Tick **one** box.

[1 mark]

P ☐

Q ☐

R ☐

S ☐

02.

Figure 1 shows a student walking on a carpet.

Figure 1

1 The student becomes negatively charged because of the friction between his socks and the carpet.

Explain why the friction causes the student to become charged.

[2 marks]

. 2 The student's head is represented by the sphere in **Figure 2.**

The student is negatively charged. The arrow shows part of the electric field around the student's head.

Draw **three** more arrows on **Figure 2** to complete the electric field pattern.

[1 mark]

Figure 2

. 3 The negatively charged student touches a metal tap and receives an electric shock.

Explain why.

[3 marks]

4 Some carpets have thin copper wires running through them. The student is less likely to receive an electric shock after walking on this type of carpet.

Suggest why.

[2 marks]

_____

_____

_____

_____

_____

8

03. _____

Figure 12 shows a student after rubbing a balloon on his hair.

The balloon and hair have become charged.

Figure 12

. 1 Describe the force that acts on the student's hair in **Figure 12**.

[2 marks]

_____

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_____

_____

2 An earthed conductor was brought near the charged student.
A spark jumped between the conductor and the student.

The potential difference between the conductor and the student was 2.5 kV
The energy transferred by the spark was 0.0050 J

Calculate the charge transferred by the spark.

[3 marks]

_____

_____

_____

Charge = _____ C

3 A defibrillator can transfer a charge to regulate a person's heartbeat.

Figure 13 shows a defibrillator.

Figure 13

When the defibrillator is in use, a potential difference of 4800 V is applied across the person's chest.

A charge of 0.16 coulombs passes through the person's chest in 4.0 ms

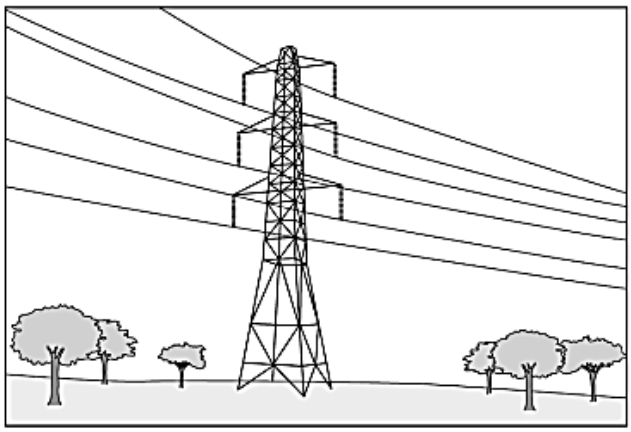
Calculate the resistance of the person's chest.

[5 marks]

Resistance = _____ Ω

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

Figure 13



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

[3 marks]

. 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.

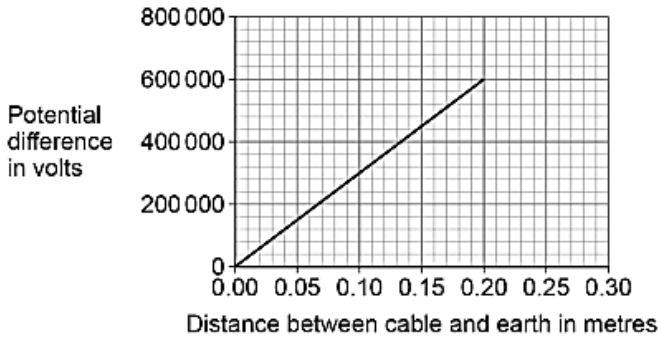
Explain why.

[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



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

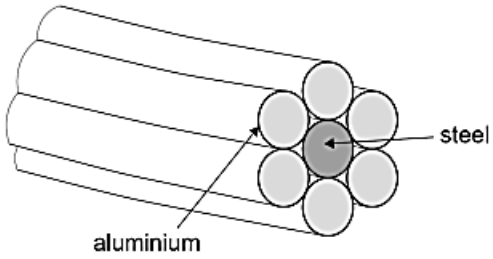
When the humidity of air increases the air becomes a better conductor of electricity.

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

[2 marks]

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]

10

05.

A student rubbed a plastic rod with a cloth.

The rod became negatively charged and the cloth became positively charged.

1 Explain why the cloth became positively charged.

[3 marks]

Figure 6 shows the negatively charged rod on a balance.

Figure 6

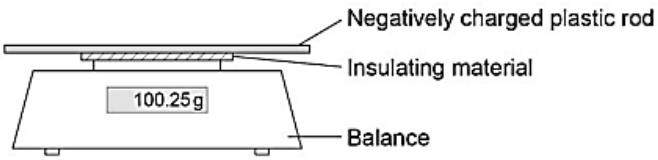
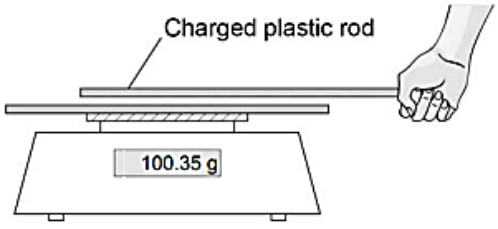


Figure 7 shows another charged rod being held stationary above the rod on the balance.

The rods do not touch each other.

Figure 7



. 2 Explain why the reading on the balance increases.

[3 marks]

. 3 The balance had a zero error.

The zero error is not important in this experiment.

Give the reason why.

[1 mark]

. 4 A negatively charged rod is held near an earthed conductor.

Explain why a spark jumps between the negatively charged rod and the earthed conductor.

[3 marks]

10