AQA GCSE Physics | 8463

SPECIFICATION POINT 4.2.5.2

Electric fields

Past-paper questions

Tier	**Foundation**
Question groups	**7**
Available paper years	**2008–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.2.5.2 Electric fields

Question 01

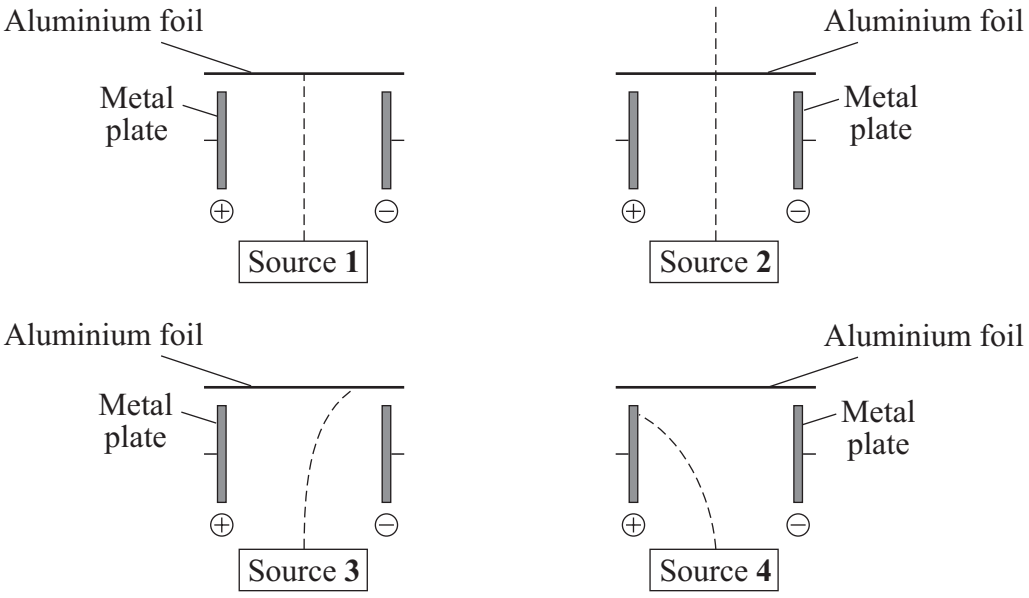
November 2008 | PHY1BP | Original Q5 | Legacy

QUESTION FIVE

Radiation from four sources, **1**, **2**, **3** and **4**, is directed into an electric field between two metal plates.

There is a sheet of aluminium foil after the gap between the metal plates.

Light waves are not deflected in electric fields.



In each diagram, the dashed line (----------) shows the path of the radiation.

Match the types of radiation, **A**, **B**, **C** and **D**, with the sources **1–4**.

A alpha radiation

B beta radiation

C gamma radiation

D visible light

4.2.5.2 Electric fields

Question 02

January 2011 | PHY1F | Original Q3 | Legacy

3 (a) The names of the three types of nuclear radiation are given in **List A**.
Some properties of these types of radiation are given in **List B**.

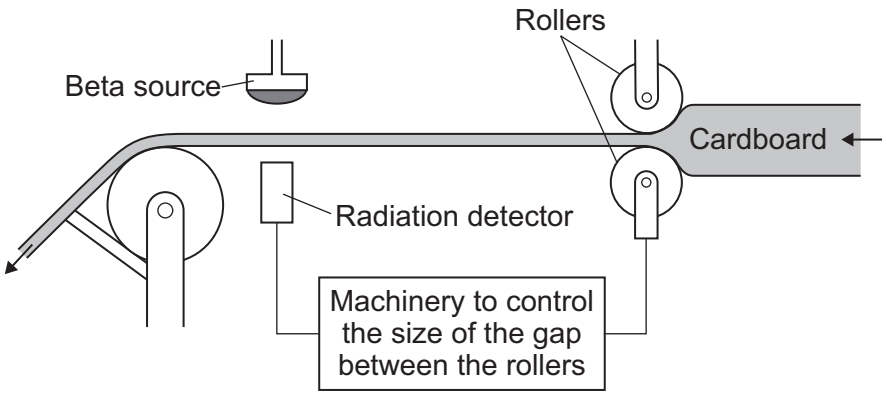
Draw a straight line to link each type of radiation in **List A** to its correct property in **List B**.

Draw only **three** lines.

List A **Type of nuclear radiation**	**List B** **Property of radiation**
Alpha	Has the same mass as an electron
Beta	Very strongly ionising
Gamma	Passes through 10 cm of aluminium
	Deflected by a magnetic field but not deflected by an electric field

(3 marks)

3 (b) The diagram shows a system used to control the thickness of cardboard as it is made.



4.2.5.2 Electric fields

Question 02 · continued

The cardboard passes through a narrow gap between a beta radiation source and a radiation detector.

The table gives the detector readings over 1 hour.

Time	Detector reading
08:00	150
08:15	148
08:30	151
08:45	101
09:00	149

3 (b) (i) Between 08:00 and 08:30, the cardboard is produced at the usual, correct thickness.

Explain how you can tell from the detector readings that the cardboard produced at 08:45 is thicker than usual.

.....

.....

.....

.....

(2 marks)

3 (b) (ii) Which would be the most suitable half-life for the beta source?

Draw a ring around your answer.

six days **six months** **six years**

(1 mark)

3 (b) (iii) This control system would **not** work if the beta radiation source was replaced by an alpha radiation source.

Why not?

.....

.....

(1 mark)

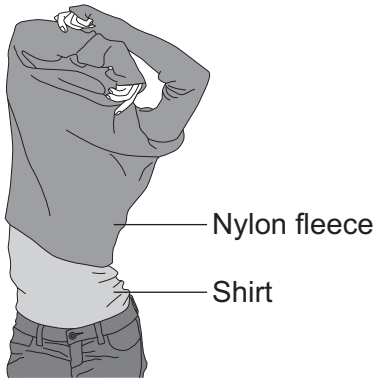
7

4.2.5.2 Electric fields

Question 03

June 2011 | PHY2F | Original Q4 | Legacy

4 (a) A student takes off his nylon fleece and feels a small electric shock.
He realises that this happens because his fleece becomes charged.



Explain why the fleece becomes charged.

.....

.....

.....

.....

.....

(2 marks)

4 (b) Only **two** of the following statements are correct.

Put a tick (✓) in the boxes next to the **two** correct statements.

Positively charged objects repel negatively charged objects. ☐

Electrical charges move easily through metals. ☐

Static electricity is safe; it never causes any danger. ☐

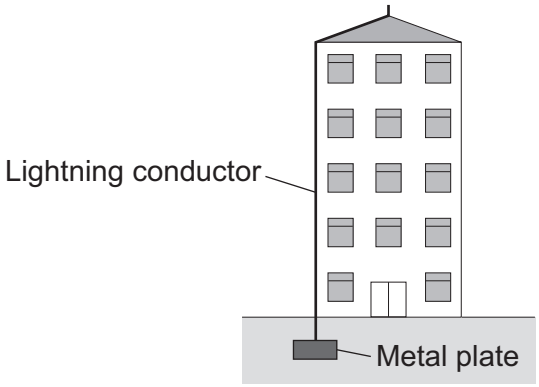
An electric current is a flow of electrical charge. ☐

(2 marks)

4.2.5.2 Electric fields

Question 03 · continued

4 (c) The diagram shows a lightning conductor attached to the side of a tall building.



If the building is struck by lightning, charge flows to earth through the lightning conductor.

4 (c) (i) Which of the materials in the list is used to make the lightning conductor?

Draw a ring around your answer.

copper **glass** **plastic**

Give a reason for your answer.

.....

.....

.....

(2 marks)

4 (c) (ii) Complete the sentence by drawing a ring around the correct line in the box.

The resistance of the lightning conductor is

higher than
the same as
lower than

the resistance of the building.

(1 mark)

4 (c) (iii) It is almost impossible to test different designs of lightning conductor in controlled experiments during a lightning storm.

Suggest a reason why.

.....

.....

(1 mark)

8

4.2.5.2 Electric fields

Question 04

June 2018 | 8463/1F | Original Q10

1 0 **Figure 15** shows a student walking on a carpet.

Figure 15



1 0 . 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]

4.2.5.2 Electric fields

Question 04 · continued

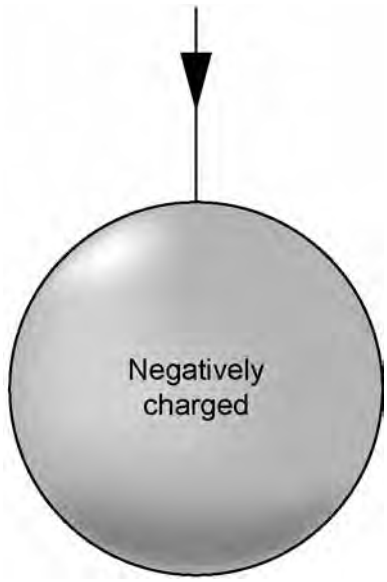
1 0 . 2 The student's head is represented by the sphere in **Figure 16.**

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

Draw **three** more arrows on **Figure 16** to complete the electric field pattern.

[1 mark]

Figure 16



1 0 . 3 The negatively charged student touches a metal tap and receives an electric shock.

Explain why.

[3 marks]

4.2.5.2 Electric fields

Question 04 · continued

June 2018 | 8463/1F | Original Q10

1 0 . 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

4.2.5.2 Electric fields

Question 05

June 2019 | 8463/1F | Original Q4

0 4 The ancient Greeks thought that atoms were tiny spheres that could not be divided into anything smaller.

Since then, different discoveries have led to the model of the atom changing.

Some of the discoveries are given in **Table 1**.

Table 1

The mass of an atom is concentrated in the nucleus.	**A**
Electrons orbit the nucleus at specific distances.	**B**
The nucleus contains neutrons.	**C**
The nucleus contains positively charged protons.	**D**

0 4 . 1 Which discovery was the earliest?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 4 . 2 Which discovery was the most recent?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

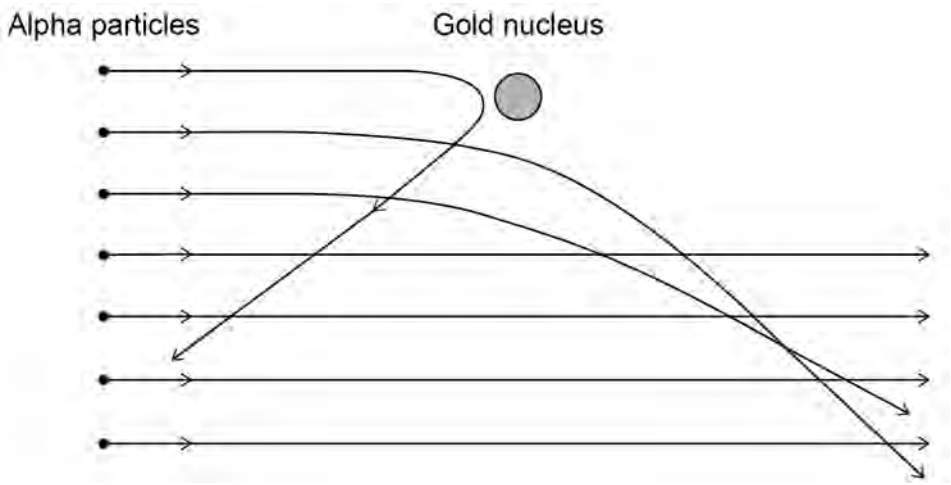
4.2.5.2 Electric fields

Question 05 · continued

0 4 . 3 The alpha particle scattering experiment led to the nuclear model of the atom.

Figure 5 shows the paths of alpha particles travelling close to a gold nucleus.

Figure 5



Complete the sentences.

Choose answers from the box.

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

[3 marks]

attracts	**decreases**	**does not change**
increases	**reflects**	**repels**

Alpha particles and gold nuclei are both positively charged.

The gold nucleus _____ the alpha particles.

As the alpha particle approaches the gold nucleus, the electric field strength experienced by the alpha particle _____ .

As an alpha particle approaches the gold nucleus, the force experienced by the alpha particle _____ .

4.2.5.2 Electric fields

Question 05 · continued

0 4 . 4 The results of the alpha particle scattering experiment were reproducible.

What does reproducible mean?

[1 mark]

Tick (✓) **one** box.

- Another scientist repeats the experiment and gets the same results. ☐
- Another scientist repeats the experiment and gets different results. ☐
- The same scientist repeats the experiment and gets the same results. ☐
- The same scientist repeats the experiment and gets different results. ☐

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4.2.5.2 Electric fields

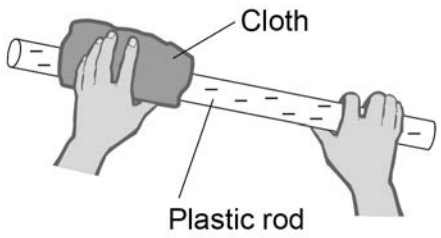
Question 06

June 2022 | 8463/1F | Original Q3

0 3 **Figure 3** shows a plastic rod being rubbed with a cloth.

The plastic rod becomes negatively charged.

Figure 3



0 3 . 1 Complete the sentences.

Choose answers from the box.

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

[2 marks]

electrons	neutrons	protons

The plastic rod becomes charged because it gains _____ .

The cloth also becomes charged because it loses _____ .

0 3 . 2 What charge is left on the cloth?

[1 mark]

Tick (✓) **one** box.

A negative charge ☐

A neutral charge ☐

A positive charge ☐

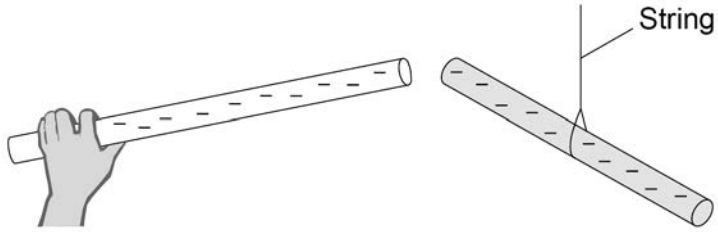
4.2.5.2 Electric fields

Question 06 · continued

0 3 . 3 The negatively charged plastic rod is put near another negatively charged plastic rod that is hanging from a string.

Figure 4 shows the two rods.

Figure 4



What force is exerted on the two rods?

Tick (✓) **one** box.

Give a reason for your answer.

[2 marks]

A force of attraction ☐

A force of repulsion ☐

There is no force ☐

Reason _____

_____

_____

Question 3 continues on the next page

4.2.5.2 Electric fields

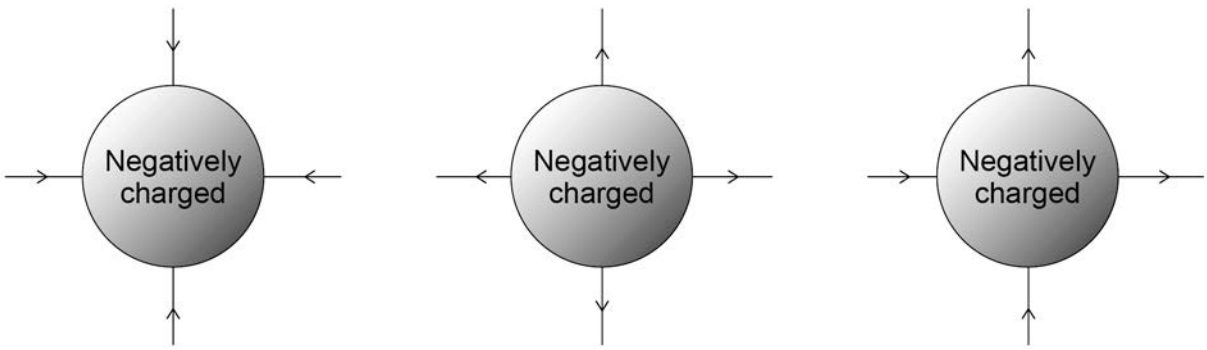
Question 06 · continued

0 3 . 4 There is an electric field around any charged object.

Which diagram shows the electric field pattern around a negatively charged sphere?

[1 mark]

Tick (✓) **one** box.

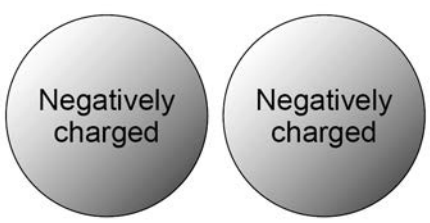


☐ ☐ ☐

0 3 . 5 In which position do two charged spheres experience the greatest electrostatic force?

[1 mark]

Tick (✓) **one** box.

A 

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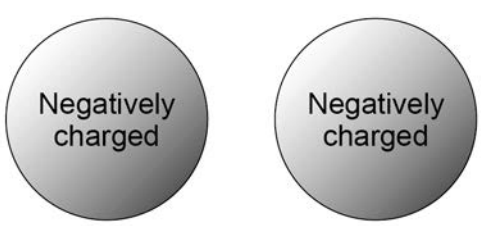
B 

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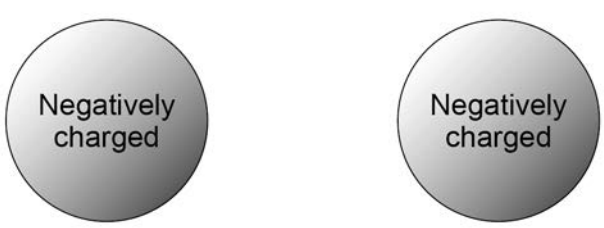
C 

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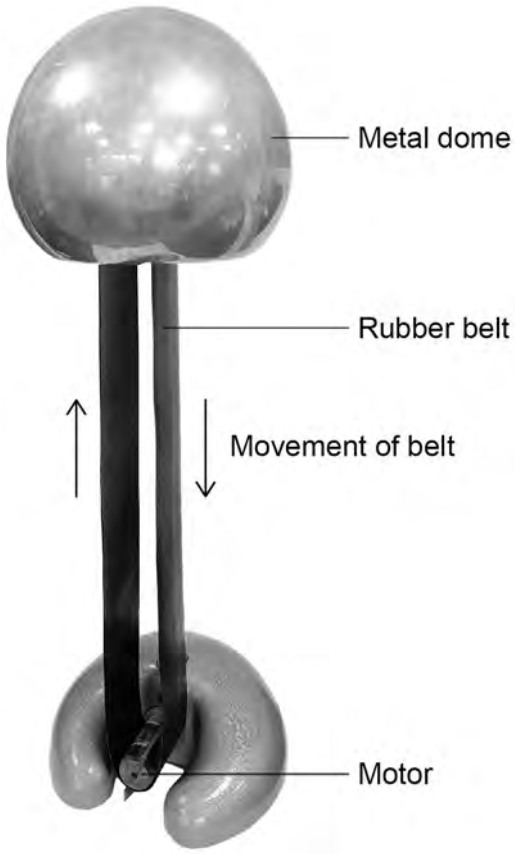
4.2.5.2 Electric fields

Question 07

June 2024 | 8463/1F | Original Q1

0 1 **Figure 1** shows a static electricity generator.

Figure 1



The rubber belt is turned by a motor.

As the rubber belt moves, charge is transferred from the rubber belt to the metal dome.

4.2.5.2 Electric fields

Question 07 · continued

Figure 2 shows a student touching the metal dome of the static electricity generator.

The dome is negatively charged.

Figure 2



0 1 . 1 Complete the sentence.

Choose the answer from the box.

[1 mark]

negative	**neutral**	**positive**

When the student touches the negatively charged metal dome the student's hair gains a _____ charge.

Question 1 continues on the next page

4.2.5.2 Electric fields

Question 07 · continued

0 1 . 2 Complete the sentence.

Choose the answer from the box.

[1 mark]

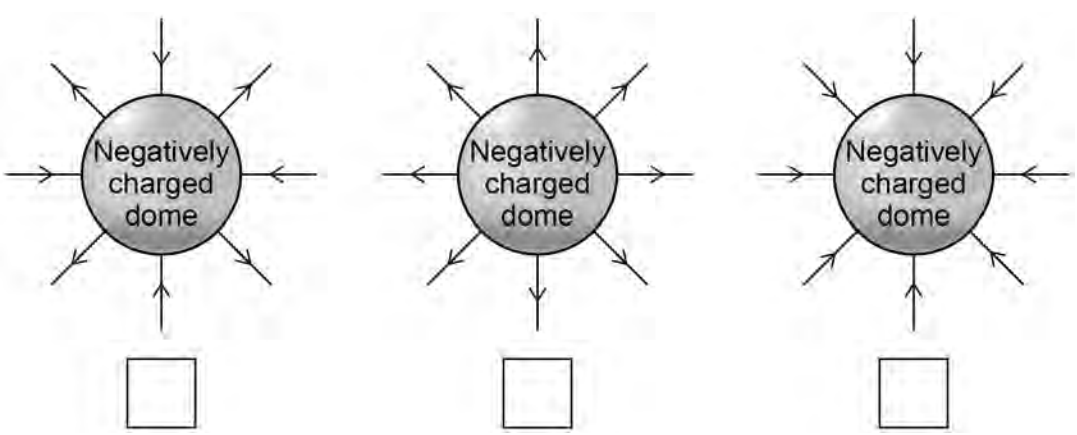
attraction	**gravity**	**repulsion**

The hair on the student's head stands up because the strands of hair experience forces of _____.

0 1 . 3 Which of the following diagrams shows the electric field pattern around the negatively charged metal dome?

[1 mark]

Tick (✓) **one** box.

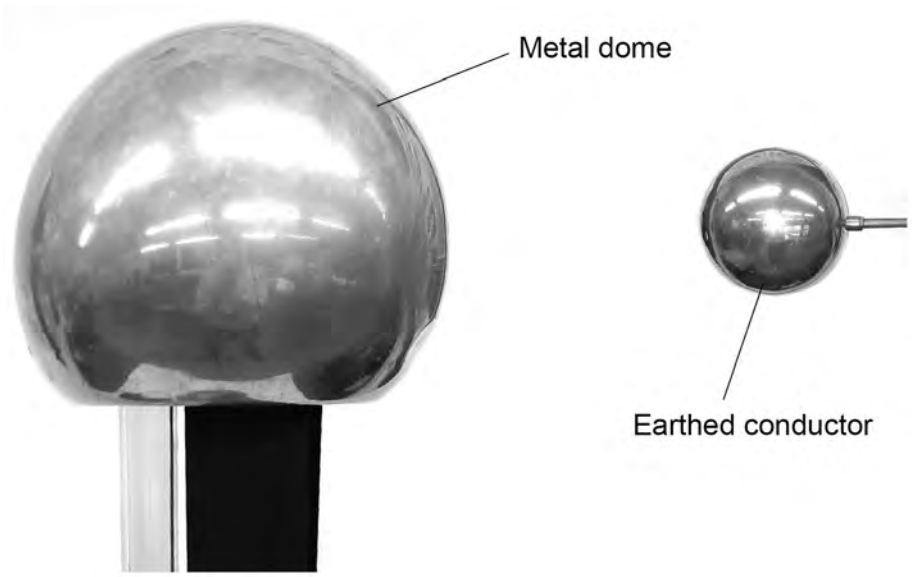


4.2.5.2 Electric fields

Question 07 · continued

Figure 3 shows the negatively charged metal dome and an earthed conductor.

Figure 3



0 1 . 4 The air between the dome and the earthed conductor is an insulator.

Complete the sentence.

Choose the answer from the box.

[1 mark]

efficiency	**resistance**	**temperature**

The air between the dome and the earthed conductor has

a high _____.

Question 1 continues on the next page

The earthed conductor is moved closer to the metal dome.

A spark jumps from the dome to the earthed conductor.

0 1 . 5 Complete the sentence.

Choose the answer from the box.

[1 mark]

earthed	**ionised**	**neutral**

The spark jumps because the air around the charged dome has

become _____.

0 1 . 6 Which particles are transferred when the spark jumps from the negatively charged metal dome to the earthed conductor?

[1 mark]

Tick (✓) **one** box.

Electrons ☐

Neutrons ☐

Protons ☐

4.2.5.2 Electric fields

Question 07 · continued

0 1 . 7 The potential difference between the metal dome and earth is 300 000 V.

When the spark jumps there is a charge flow of 0.000 002 C.

Calculate the energy transferred by the spark.

Use the equation:

energy transferred = charge flow × potential difference

[2 marks]

Energy transferred = _____ J

8

Turn over for the next question