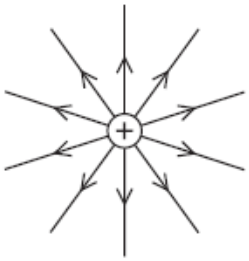
Questions

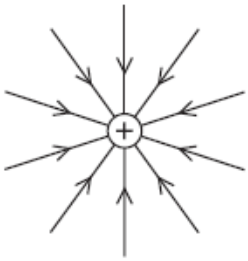
Q1.

Which of these diagrams shows the shape and direction of the electric field around a positive point charge?

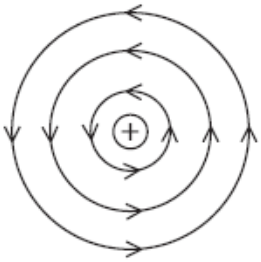
(1)



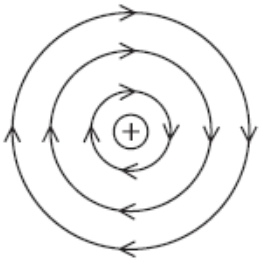
☒ **A**



☒ **B**



☒ **C**



☒ **D**

(Total for question = 1 mark)

Q2.

Figure 3 shows two charged metal plates.

Figure 3

The top plate has a negative electric charge.

The bottom plate has a positive electric charge.

On Figure 3, draw the electric field lines between the two plates and show the direction of this electric field.

(Total for question = 2 marks)

Q3.

Figure 7 shows two metal spheres.

Metal sphere A is fixed to a table.
Metal sphere B can be moved.

Metal sphere B is placed at a short distance from metal sphere A.

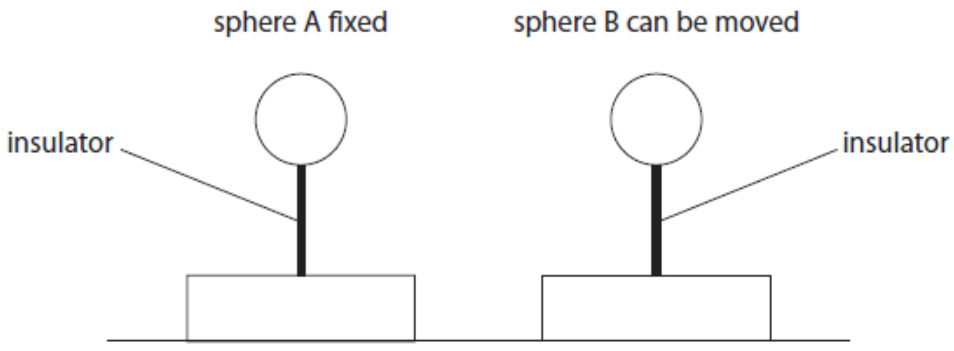


Figure 7

Both spheres are insulated from the table and given a negative charge.

The force between the charged spheres is measured.

(i) Explain, in terms of electric fields, why a force is exerted on sphere B.

(2)

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(ii) Sphere B is moved and the force between the spheres is measured at several different distances.

Figure 8 is a graph of force on sphere B against distance between the centres of the spheres.

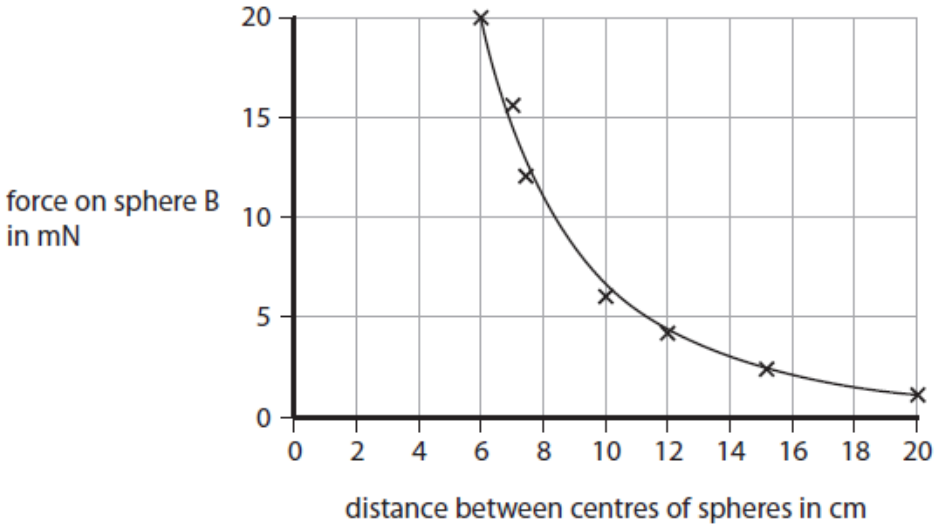

Figure 8

Describe how the force on sphere B varies with the distance between the centres of the spheres.

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(Total for question = 4 marks)

Q4.

A battery sends a current through a metal wire.

Plastic is an insulator.

A student rubs a piece of plastic with a cloth.

This gives the plastic a negative charge.

(i) Explain how the plastic is charged by the rubbing.

(2)

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(ii) The cloth is also charged when it rubs against the plastic.

Describe the charge on the cloth.

(2)

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Q5.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Figure 1 shows a paint sprayer.

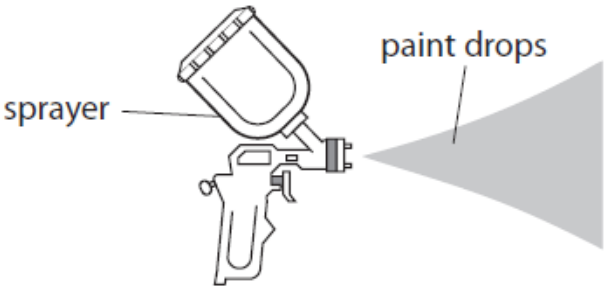

Figure 1

Some paint sprayers give the paint drops a positive charge as they leave the sprayer.

(i) The paint drops have a positive charge because the sprayer

(1)

☒ **A** removes electrons from the paint drops

☒ **B** adds electrons to the paint drops

☒ **C** removes protons from the paint drops

☒ **D** adds protons to the paint drops

(ii) Figure 2 shows the spray pattern from two different paint sprayers.

Figure 2

Sprayer X does not charge the paint drops. Sprayer Y gives the paint drops a positive charge.

Explain how charging the paint drops changes the shape of the spray pattern.

(2)

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(iii) Sprayer Y is used in a factory to paint a metal object.

The object hangs by a metal wire that is connected to earth.

Explain why a metal wire is used to connect the object to earth.

(2)

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(Total for question = 5 marks)

Q6.

A student rubs a plastic comb with a dry cloth to give the comb a positive electric charge.

Figure 6 shows the charged plastic comb picking up small pieces of paper.

(Source © GIPhotoStock/SCIENCE PHOTO LIBRARY)

Figure 6

(i) Explain how rubbing the comb with a dry cloth gives the comb a positive electric charge.

(3)

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(ii) Explain how the positively-charged plastic comb picks up the small pieces of paper.

(3)

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(Total for question = 6 marks)

Q7.

A battery sends a current through a metal wire.

(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Direct current is movement of charge

(1)

☒ **A** backwards and forwards

☒ **B** in many directions

☒ **C** in one direction

☒ **D** up and down

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The particles that flow in the metal wire are

(1)

☒ **A** atoms

☒ **B** electrons

☒ **C** protons

☒ **D** neutrons

(b) The current in a wire is 3.7 A.

Calculate the charge that flows into the wire in 13 s.

(2)

charge = ...C

(c) Plastic is an insulator.

A student rubs a piece of plastic with a cloth.

This gives the plastic a negative charge.

(i) Explain how the plastic is charged by the rubbing.

(2)

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(ii) The cloth is also charged when it rubs against the plastic.

Describe the charge on the cloth.

(2)

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(Total for Question is 8 marks)

Q8.

(a) A student rubs a plastic rod with a dry cloth. The cloth becomes positively charged.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The cloth becomes positively charged because

(1)

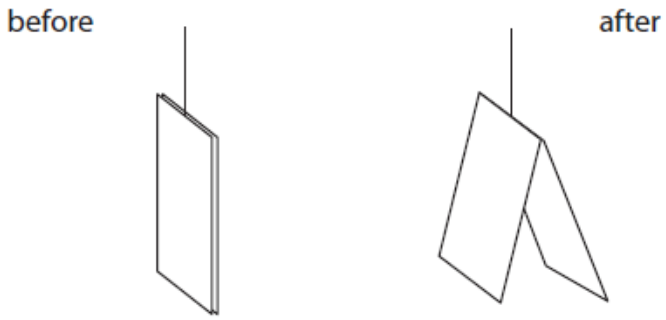
☒ **A** negative charge has moved from the cloth to the rod

☒ **B** negative charge has moved from the rod to the cloth

☒ **C** positive charge has moved from the cloth to the rod

☒ **D** positive charge has moved from the rod to the cloth.

(ii) Two plastic strips are joined at the top and are hanging by a thread.
The student rubs both strips with another dry cloth.
The diagram shows the two plastic strips before and after the student rubs them.



Explain why the strips behave in this way after they are rubbed with the cloth.

(2)

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(b) The student reads an article about the possible build-up of static electricity during the refuelling of an aircraft.

(i) Explain why this build-up could be dangerous.

(2)

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(ii) The article also states that the aircraft is connected by a metal cable to the ground.

The aircraft is also connected by a metal cable to the refuelling tanker.

Explain how these cables reduce the dangers when refuelling the aircraft.

(3)

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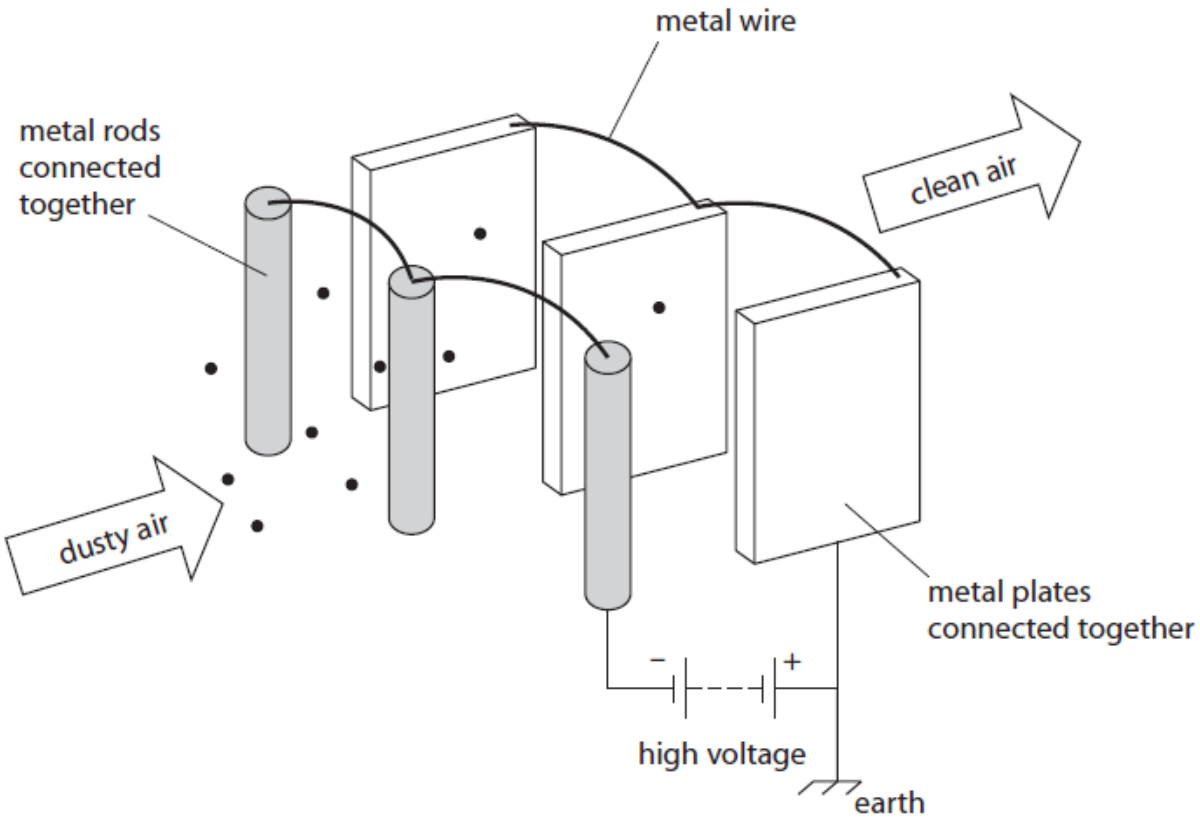
(Total for Question = 8 marks)

Q9.

An electrostatic air filter is designed to remove dust particles from the air in a room.

A fan blows dusty air past several metal rods and metal plates.

There is a large potential difference (voltage) between the metal rods and the metal plates.



(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

When dusty air goes past the metal rods, the dust particles become negatively charged.

This is because the dust particles

(1)

☒ **A** lose electrons

☒ **B** lose protons

☒ **C** gain electrons

☒ **D** gain protons

(b) When the dusty air flows past the metal plates, the dust particles settle on the metal plates.

Explain why the dust particles settle on the metal plates.

(2)

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(c) (i) State what happens to the charge on the dust particles when they settle on the metal plates.

(1)

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(ii) Explain why the charge does not build up on the metal plates.

(2)

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(d) There is a current of 1.2 mA in the circuit.

Calculate the charge transferred by this current in 40 s.

State the unit.

(3)

charge transferred = ... unit:
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