Static Electricity

Total marks:21

Q1.

Complete the following sentences using words from the box below.

electrostatic	friction	gravitational	magnetic

(i) The force that keeps the Earth in orbit around the sun is
..... attraction.

(1)

(ii) The force that opposes motion between two surfaces is
..... .

(1)

(iii) The force that can move small pieces of paper towards a plastic comb is ..... attraction.

(1)

(Total for question = 3 marks)

Q2.

Two small objects, P and Q, are each given an electric charge.

Figure 3 represents the electric fields around the objects, P and Q.

Figure 3

(i) Use information from Figure 3 to give **two** differences between the charge on P and the charge on Q.

(2)

1 .....

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2 .....

.....

(ii) Object P and object Q are held near to each other so that their electric fields interact with each other.

State the effect that the electric field of object Q has on object P.

(1)

.....

.....

(Total for question = 3 marks)

Q3.

* This question is about electrostatic charges and the forces between them.

Figure 16 shows some apparatus that can be used to show that like charges repel and unlike charges attract.

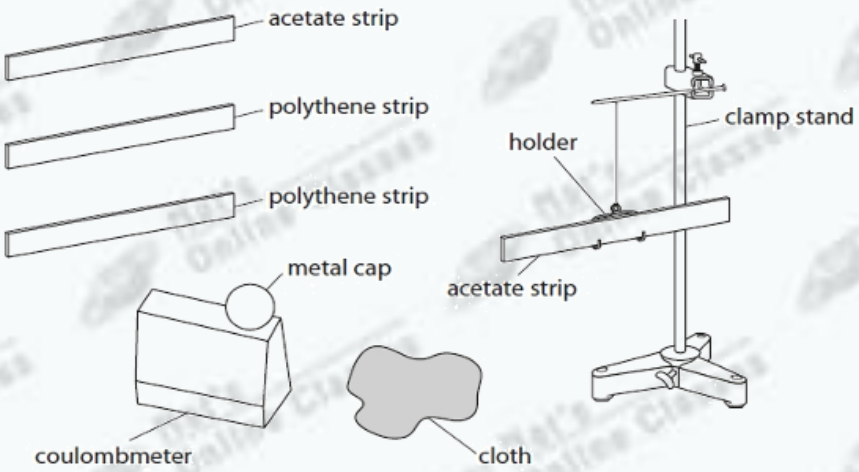

Figure 16

An acetate strip can be charged positively.

A polythene strip can be charged negatively.

A coulombmeter can be used to measure charge and whether the charge is positive or negative.

Explain how you would use the apparatus in Figure 16 to show that like charges repel and unlike charges attract.

(6)

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(Total for question = 6 marks)

Q4.

This question is about static electricity.

Figure 26 shows a plastic block and a metal disc with an insulating handle.

The top surface of the plastic block has a negative charge.

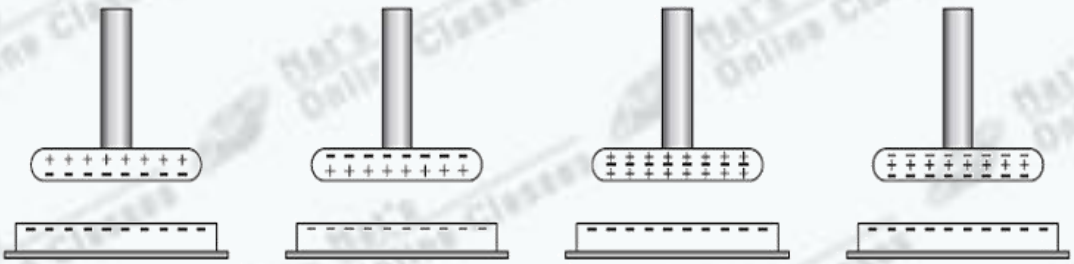
The metal disc has no overall electric charge.

Figure 26

A student uses the insulating handle to hold the metal disc above the plastic block.

(i) Which of these diagrams shows how the charge is distributed on the metal disc?

(1)



☒ A ☒ B ☒ C ☒ D

(ii) The student keeps holding the metal disc above the charged plastic block and taps the metal disc with a finger.

This earths the metal disc for a short time.
Explain why the disc now has an overall positive charge.

(2)

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(iii) Figure 27 shows the charges on part of the metal disc and the plastic block.

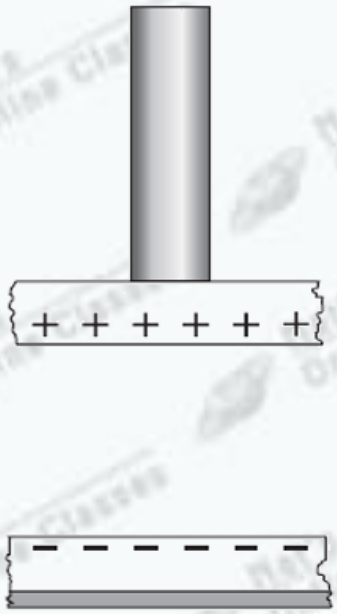

Figure 27

On Figure 27, draw lines to show the shape and direction of the electric field between the metal disc and the plastic block.

(2)

(Total for question = 5 marks)

Q5.

Figure 20 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.

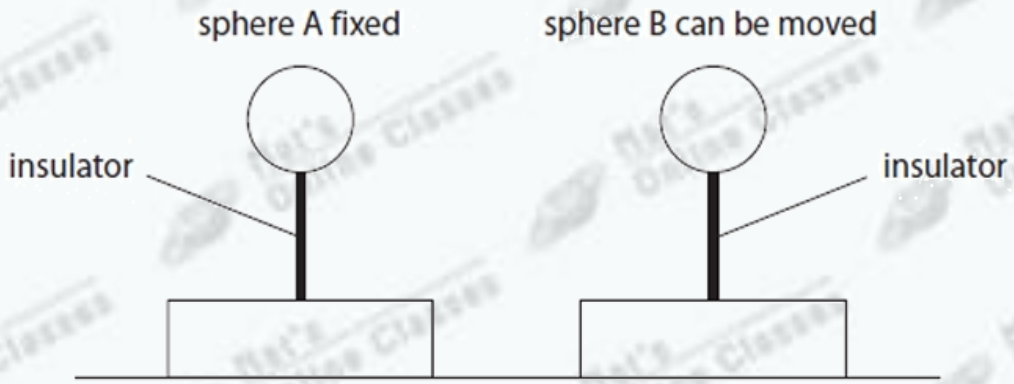

Figure 20

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

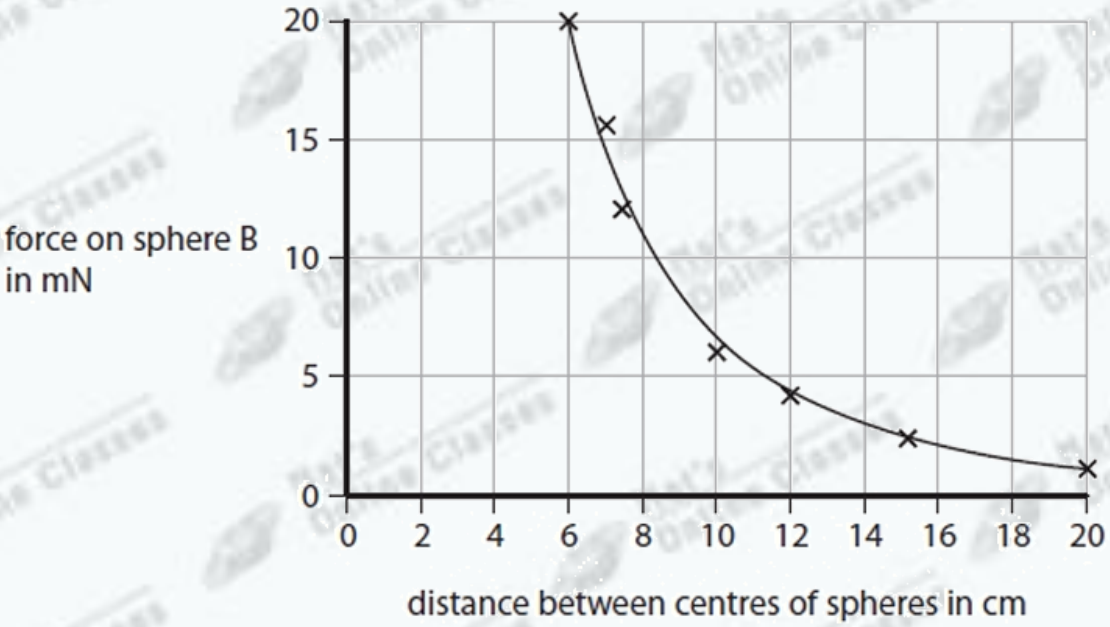

Figure 21

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

(2)

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(Total for question = 4 marks)