Electrostatics – 2019 Nov IGCSE

1. 0625/31/O/N/19/No.9

A student is experimenting with magnets and electric charges.

(a) The student places a bar magnet on a piece of paper, as shown in Fig. 9.1.

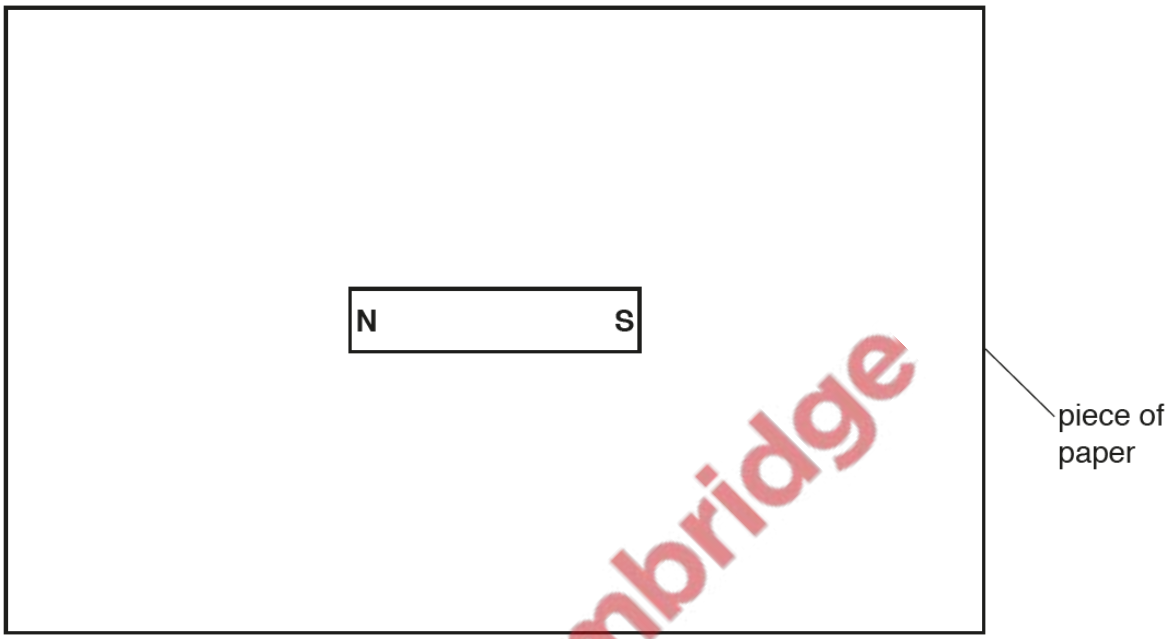

Fig. 9.1

Show the pattern of magnetic field lines around the bar magnet.

Draw **two** lines above the magnet and **two** lines below the magnet. Start and finish each line at a pole. Include **one** arrow to show the direction of the magnetic field. [3]

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

Explain why the friction between the plastic and the cloth causes the plastic to become positively charged.

.....

.....

.....

..... [2]

(c) The student investigates the forces between two pairs of objects.

Fig. 9.2 and Fig. 9.3 show the pairs of objects.

State whether there is a force of attraction, a force of repulsion, or no force between the pairs of objects. Draw a **ring** around **one** phrase for each pair of objects.

1. two positively charged spheres

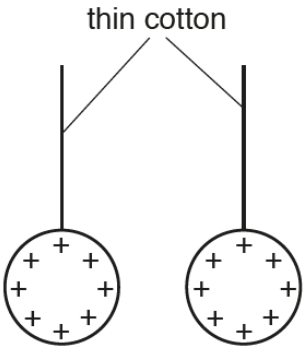

Fig. 9.2

force of attraction **force of repulsion** **no force**

2. a bar magnet and a bar of copper metal

Fig. 9.3

force of attraction **force of repulsion** **no force**

[2]

[Total: 7]

2. 0625/41/O/N/19/No.5

Fig. 5.1 shows a sphere that is negatively charged. The sphere is attached to a plastic stand.

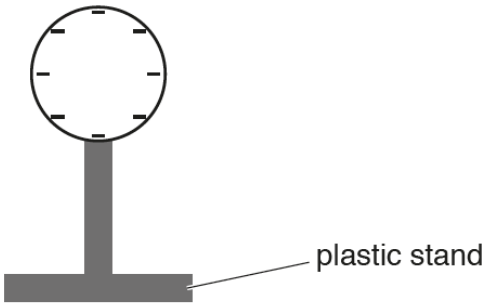

Fig. 5.1

(a) On Fig. 5.1, draw arrows to indicate the pattern and direction of the electric field in the region surrounding the sphere. [2]

(b) A smaller, uncharged metal sphere S is suspended by a plastic thread and brought close to the negatively charged sphere. Fig. 5.2 shows the two spheres.

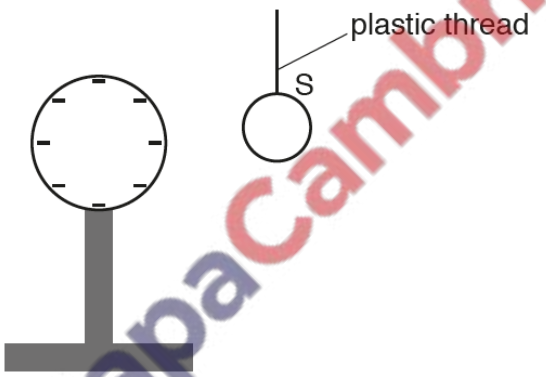

Fig. 5.2

(i) By drawing on Fig. 5.2, indicate the distribution of charge on S. [2]

(ii) State what happens to S.

.....

..... [1]

(iii) An earth wire is then touched against S.

Describe what happens in the wire and state how this affects the charge on S.

.....

.....

..... [2]

(c) The metal sphere S is an electrical conductor. The plastic thread is an electrical insulator.

Explain this difference by referring to the structures of the two materials.

.....

.....

..... [2]

[Total: 9]

3. 0625/42/O/N/19/No.9

(a) Describe what is meant by the term *electric field*.

.....

..... [1]

(b) Fig. 9.1 shows two parallel conducting plates connected to a battery.

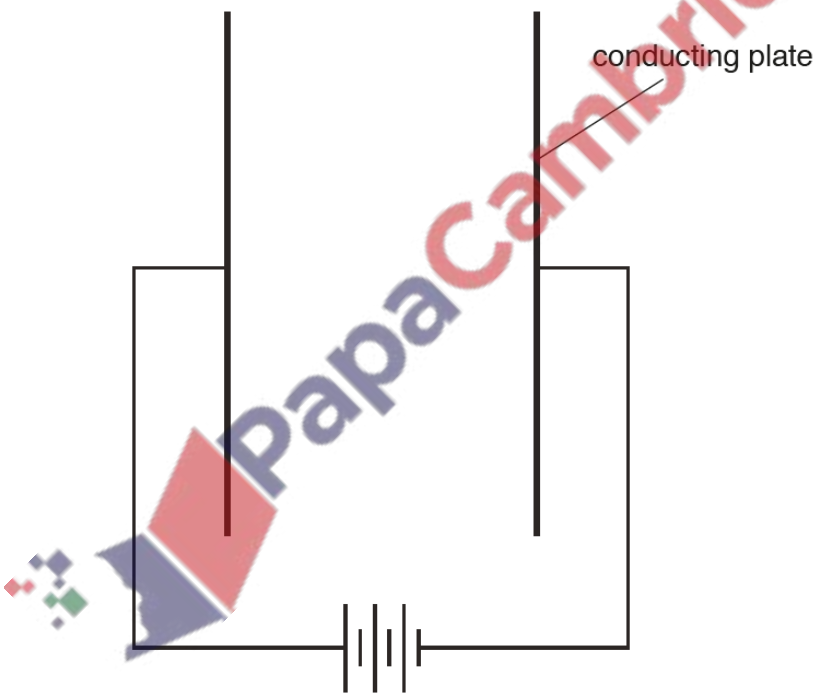

Fig. 9.1

On Fig. 9.1, draw **five** lines to show the electric field pattern between the two plates. [2]

(c) When fully charged, a 1.2 V rechargeable battery can deliver a current of 210 mA for 10 hours.

(i) Calculate the charge that can be delivered by the fully charged battery.

charge = ... [3]

(ii) Calculate the energy stored in the battery when fully charged.

energy stored = ... [2]

(iii) State the type of energy stored when the battery is charged.

..... [1]

[Total: 9]

4. 0625/43/O/N/19/No.8

(a) Fig. 8.1 shows a negatively charged conducting sphere.

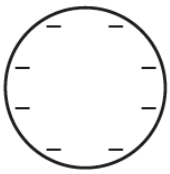

Fig. 8.1

On Fig. 8.1, draw the electric field pattern around the sphere. [2]

(b) The current in an electrical device is 0.21 A.

Calculate the charge that flows during a 75 s period of time.

charge = ... [2]

[Total: 4]