

Mark schemes

1.	(a)	repel	1
		opposite	1
		attract	1
		<i>correct order only</i>	
	(b)	refuelling an aircraft	1
	<i>reason cannot score if refuelling aircraft is not chosen</i>		
		a spark may cause an explosion / fire / ignite the fuel	
		<i>accept the static for a spark</i>	
		<i>accept named fuel</i>	
		<i>there must be a consequence of having a spark</i>	
		<i>do not accept answers in terms of people getting a shock or electrocuted</i>	1
			[5]
2.	(a)	fleece rubs against shirt	1
		<i>it refers to the fleece</i>	
		or	
		friction (between fleece and shirt)	
		(causing) <u>electrons</u> to transfer from one to the other	1
		<i>accept a specific direction of transfer</i>	
		<i>do not accept charge for electrons</i>	
		<i>positive electrons negates this mark</i>	
		<i>movement of protons negates this mark</i>	
	(b)	Electrical charges move easily through metals.	1
		An electric current is a flow of electrical charge.	1
	(c)	(i) copper	1
		<i>reason only scores if copper chosen</i>	
		(good electrical) conductor	
		<i>accept it is a metal</i>	
		<i>any mention of heat conduction negates this mark</i>	1

(ii) lower than

1

(iii) accept any sensible suggestion, eg:

- too many variables (to control)
- lightning strikes / storms are random / unpredictable
- do not know which building will be struck
- do not know when a building will be struck
- do not know when lightning will happen
- (very) difficult to create same conditions in a laboratory
- lightning storms are not the same
it is not safe is insufficient
*do **not** accept lightning does not strike the same place twice*

1

[8]

3.

(a) transfer of electrons

mention of positive charge moving negates both marks

1

from the carpet to the student

1

(b) three arrows perpendicular to sphere's surface with all arrows directed inwards and distributed evenly around sphere

1

(c) there is a potential difference between the student and the tap

*do **not** accept the tap / sink is charged*

1

which causes electrons / charges to transfer from the student

or

which causes electrons / charges to transfer to the tap

1

which earths the charge

allow the tap is earthed

1

- (d) carpet / copper has a low resistance
allow carpet is a conductor
or
copper is a conductor

1

lower / no build-up of charge (on the student)

or

(so there is a) smaller / no potential difference between student and tap / earth

1

[8]

4.

- (a) electrons

1

- (b) a positive

1

- (c) the forces are repulsive

allow the forces act in opposite directions

1

the forces are equal in size

allow the forces are the same (size)

1

- (d) reproducible

1

[5]

5.

- (a) **Level 2 (3–4 marks):**

A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points.

Level 1 (1–2 marks):

Simple statements are made, but not precisely. The logic is unclear.

0 marks:

No relevant content

Indicative content

- friction (between cloth and rod) causes
- electrons (to) move
- from the acetate rod **or** to the cloth
- (net) charge on cloth is now negative
- (net) charge on rod is now positive

4

- (b) there is a force of attraction between the acetate rod and the cloth

(reason)

1

unlike charges attract

or

negative charges attract positive charges

1

(c) increase

1

(d) $0.000025 \times 60\,000$

1

1.5 (J)

1

accept 1.5 (J) with no working shown for 2 marks

[9]

6.

(a) 3rd box

The negative charge in the water is repelled by the rod and the positive charge is attracted.

1

(b) (i) friction between bottles and conveyor belt / (plastic) guides

accept bottles rub against conveyor belt / (plastic) guides

1

charge transfers between bottles and conveyor belt / (plastic) guides

accept specific reference

eg electrons move onto / off the bottles

reference to positive electrons / protons negates this mark

1

(ii) an atom that has lost / gained electron(s)

*do **not** accept a charged particle*

1

(iii) charge will not (easily) flow off the conveyor belt

accept the conveyor belt / bottle is an insulator / not a conductor

accept conveyor belt is rubber

1

[5]