

<b>M1.</b>	<p>(a) <b>Level 2 (3–4 marks):</b> A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points.</p> <p><b>Level 1 (1–2 marks):</b> Simple statements are made, but not precisely. The logic is unclear.</p> <p><b>0 marks:</b> No relevant content</p> <p><b>Indicative content</b></p> <ul style="list-style-type: none"> <li>• friction (between cloth and rod) causes</li> <li>• electrons (to) move</li> <li>• from the acetate rod <b>or</b> to the cloth</li> <li>• (net) charge on cloth is now negative</li> <li>• (net) charge on rod is now positive</li> </ul>	4
	<p>(b) there is a force of attraction between the acetate rod and the cloth</p> <p>(reason)</p> <p>unlike charges attract</p> <p><b>or</b></p> <p>negative charges attract positive charges</p>	1
	<p>(c) increase</p>	1
	<p>(d) <math>0.000025 \times 60\,000</math></p> <p>1.5 (J)</p>	1

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

**[9]**

- M2.** (a) (i) (bottom **or** other ends) move apart or  
repel  
*accept they move apart* 1
- (ii) have same charge  
*accept both have negative charge*  
*(from part (b) do not credit both have positive charge*  
same **or** like charges repel  
*not just opposite charges attract* 2
- (b) positive 1
- electrons 1
- cloth 1
- polythene  
*accept strips* 1
- (c) (i) conductors  
*accept metals* 1
- (ii) insulators  
*accept non-conductors/poor conductors do not credit*  
*non-metals* 1

**[9]**

**M3.** (a) becomes (electrically) charged or description of electron movement  
*for 1 mark*

1

(b) comb attracts paper  
*for 1 mark*

1

(c) charge/electricity gone to Earth/body  
*for 1 mark each*

2

**[4]**

- M4.** (a) (i) electrons 1
- jumper 1
- (ii) positive  
*accept protons*  
*accept +* 1
- (iii) positively charged  
*accept any clear way of indicating the answer* 1
- (b) (i) copper 1
- it is an (electrical) conductor  
*only accept if copper is identified*  
*do **not** accept it conducts heat*  
*accept it conducts heat and electricity*  
*accept copper is the best conductor*  
*accept correct description of conduction* 1
- (ii) current 1

[7]

- M5.** (a) repel 1
- opposite 1
- attract 1
- correct order only*
- (b) refuelling an aircraft 1
- reason cannot score if refuelling aircraft is not chosen*
- a spark may cause an explosion / fire / ignite the fuel
- accept the static for a spark*
- accept named fuel*
- there must be a consequence of having a spark*
- do **not** accept answers in terms of people getting a shock or electrocuted*
- 1

[5]

M6. (a) (i) electrons 1

a positive 1

(ii) (forces are) equal  
*accept (forces are) the same*  
*forces are balanced is insufficient* 1

(forces act in) opposite directions  
*accept (forces) repel*  
*both sides have the same charge is insufficient* 1

(b) aluminium 1

[5]

**M7.** (a) fleece rubs against shirt  
*it refers to the fleece* 1

**or**  
friction (between fleece and shirt)  
(causing) electrons to transfer from one to the other  
*accept a specific direction of transfer*  
*do **not** accept charge for electrons*  
*positive electrons negates this mark*  
*movement of protons negates this mark* 1

(b) Electrical charges move easily through metals. 1

An electric current is a flow of electrical charge. 1

(c) (i) copper  
*reason only scores if copper chosen* 1

(good electrical) conductor  
*accept it is a metal*  
*any mention of heat conduction negates this mark* 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]