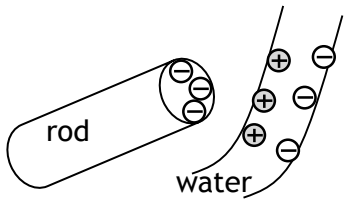


Question Number	Answer	Acceptable answers	Mark
<b>1(a)(i)</b>	<b>A</b> positive : equal (1)		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	An explanation linking  negative charge(s)/electrons (1)  (move/ transfer) { to (plastic) rod / to it / from cloth} (1)	Any reference to positive charges, positive electrons or protons moving scores zero marks for question  ignore contradictions to Q i.e. cloth is negatively charged  attract is insufficient for transfer  e.g. {rod /it} gains/gets electrons (from cloth) for 2 marks  the cloth loses electrons (to the rod) for 2 marks	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(iii)</b>	B  		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(iv)</b>	a suggestion including:  plastic rod has { become neutral/ discharged/no longer charged/not negatively charged (anymore)}  OR  { charge/electrons} { transferred/taken} from rod (to/by the water) (1)	Any reference to positive charges, positive electrons or protons moving scores zero marks for question  accept the rod loses its charge/ electrons <b>OR rod is 'earthed'/'grounded'</b>  ignore has same charge as water  the water removes/washes away the electrons/charge	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)</b>	Conversion to correct units: 120 seen anywhere (1)  Substitution: $0.08 \times 120$ (1)  Evaluation: 9.6 (C) (1) accept 10 C	Allow full marks for correct answer with no working seen.  $0.08 \times 2$ gains 1 mark for sub of <b>their time into correct eq'n</b> 0.16 (C) gains 2 marks (only mistake is not converting time to seconds)  accept any power of 10 error for 2 marks e.g. 960 (C)	<b>(3)</b>

Total for Question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	C (gain electrons)		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	An explanation linking <ul style="list-style-type: none"> <li>• (Force of) attraction (1)</li> <li>• (plates have) opposite charge (to dust) (1)</li> </ul>	Plates have a positive charge Ignore different charge	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)(i)</b>	transferred to plate / lost (1)	neutral / become discharged	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)(ii)</b>	An explanation linking any two of <ul style="list-style-type: none"> <li>• Metal is a conductor (1)</li> <li>• Electrons / ( negative ) charge moves (through the plates/ wire) (1)</li> <li>• Towards the voltage supply / earth /ground (1)</li> </ul>	Metal not an insulator Plates / charges are earthed	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(d)</b>	Substitution: $Q = 1.2 \times 10^{-3} \times 40$ (1) Evaluation: $0.048$ or $4.8 \times 10^{-2}$ (1) C / coulombs (1)	Give 2 marks for correct answer with no working shown  Unit mark is independent Allow for 1 mark 48 ( with incorrect or no units) Allow for 2 marks 48 C Allow for all 3 marks 48 mC	<b>(3)</b>

Total for Question 2 = 9 marks

Question Number	Answer	Acceptable answers	Mark
<b>3(a)</b>	repel (1)		<b>(4)</b>
	charge (1)		
	positive (1)		
	electrons (1)		

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(i)</b>	<p>An explanation linking any <b>three</b> from the following:</p> <ul style="list-style-type: none"> <li>• Droplets have same charge (1)</li> <li>• (droplets) repel (one another) (1)</li> <li>• (This produces) a fine spray/mist (1)</li> <li>• attraction between droplets and plant (1)</li> <li>• This improves coverage OR Spray covers whole [leaf /plant] top and underside of leaf/ gives a fine coating/ even coat (1)</li> <li>• Less spray used/wasted/ falls onto soil (so saves money) (1)</li> </ul>	<p>Ignore references to attracting or repelling insects.</p> <p>ignore droplets are positive /negative</p> <p>droplets spread out</p> <p>(produce an) even spray</p> <p>droplets attracted to negative/opposite charge (on plant)</p> <p>or</p> <p>spray will stick to leaves/plant</p> <p>better/more chance of spray landing on/hitting plant</p> <p>or</p> <p>spray (lands) evenly on plant</p> <p>none is wasted/Less will run off the leaves/Same amount of spray will cover a larger area(so saves money)</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(ii)</b>	<p>10 minutes = 600 seconds (1)</p> <p>substitution <math>0.008 \times 600</math> (1)</p> <p>evaluation 4.8 (C) (1)</p> <p>Ignore any unit given by the candidate</p>	<p>ECF from their time eg 2 marks for 0.08 if their time is 10 0.8/8/8.0/80 gains 1 mark (bod POT error)</p> <p>Power of ten error max of 2 marks eg 480 gains 2 marks Award 3 marks for correct answer, no working</p> <p>No power of ten error mark if answer less than 0.008 as probably dividing</p> <p>Award 2 marks for 0.08, no working</p>	<b>(3)</b>

**(Total for Question 3 = 10 marks)**

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(i)</b>	<b>A</b> - negative charge has moved from the cloth to the rod		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(a)(ii)</b>	An explanation linking they repelled (1) (strips had) like charge (1)	push away same (type of) charge	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(i)</b>	An explanation linking any <b>two</b> from charges are separated (1) possibility of a spark (1) ignite the fuel (1)	ignore ref to electric shock pd between plane and ground cause fire / explosion	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(ii)</b>	<p>An explanation linking <b>three</b> from</p> <p>Metals are (good) conductors (1)</p> <p>Electrons/(negative) charge can flow through wire (1)</p> <p>charge goes from/to the ground / earth (1)</p> <p>discharge the tank/aircraft/pipes (1)</p>	<p>Reject flow of positive charge for this mark</p> <p>plane is earthed/grounded</p> <p>charge does not build up/dissipates</p> <p>Allow no pd between plane and ground so no spark possible for 2 marks</p>	<b>(3)</b>

**(Total for Question 1 = 8 marks)**



Question Number	Answer	Acceptable answers	Mark
<b>5 (a)</b>	an explanation linking: balloons repel (1)  (because) they have like charges (1)	balloons repulse / push away (from each other/to the side)  same charge / both positive / both negative  accept like charges repel for 2 marks	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5 (b) (i)</b>	<input checked="" type="checkbox"/> <b>D</b> an equal positive charge		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b) (ii)</b>	an explanation linking any two of  friction (between cloth and balloon) (1)  transfer of electrons (1)  (electrons/negative charges move) from cloth to balloon (1)	charge/electrons move  accept balloon gains electrons from the cloth for 2 marks	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b) (iii)</b>	a description including <b>two</b> from the following:  <ul style="list-style-type: none"> <li>• balloon becomes discharged (1)</li> <li>• metal /cabinet is a conductor (1)</li> <li>• electrons { move through / on to} metal / cabinet (1)</li> </ul>	earthed / neutral  (negative) charge for electrons  accept electrons move to earth for 2 marks	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b) (iv)</b>	(surface of) wall (becomes) positively charged /charged by induction (1)	charges on the wall separate charge closest to the surface of the wall is opposite to the charge on the balloon	<b>(1)</b>