
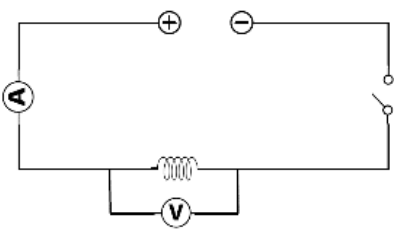
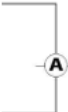


Question	Answers	Notes	Total	Criterion
1	<p>a</p>  <p>Any three in the correct sequence All correct</p>		2	A
	<p>b</p> $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ <p>6</p> <p>6</p>		2	A
	<p>c</p> <p>Accept any reasonable structural difference, for example [max 1]</p> <ul style="list-style-type: none"> • Fewer internal walls • membranes • sections • smaller (internal surface) area (in diseased alveoli) 	<p>WTTE</p> <p>Do not accept fewer alveoli or colour change</p>	1	A
	<p>d</p> <p>Diseased lungs have damaged alveoli</p> <p>Gas exchange occurs through <u>diffusion</u></p> <p>(Damaged or fewer alveoli means) smaller (surface) area through which the exchange of gases can occur</p> <p>Rate of gas exchange or diffusion is slower/less efficient</p>		4	A

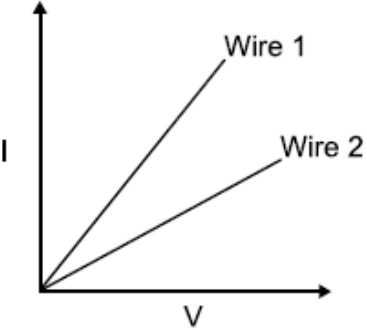
2	a	<p>Accept two reasonable sources of air pollution, for example [max 2]</p> <ul style="list-style-type: none"> • Industry or building • Burning fossil fuels • Farming • Transportation or cars • Cooking • Mining • Smoking • Natural events (eruption, forest fires) 	<p>Accept specific examples for different types of sources</p> <p>Accept only one example of burning fossil fuels</p>	2	A
	b	<p>Correct value 0.0000025 (m)</p> <p>Value in standard form 2.5×10^{-6} (m)</p>	<p>ECF for second mark</p> <p>Award two marks if only the number in standard form is seen</p>	2	D
	c	56 – 150 ($\mu\text{g m}^{-3}$)		1	A
	d	<p>Country A range = 0 – 12 and Country B range = 0 – 35</p> <p>(so) difference in range is 23 ($\mu\text{g m}^{-3}$)</p> <p>(so) Country A has higher standards for air quality</p>	<p>Seen or implied</p> <p>Award two marks if only 23 is seen</p> <p>ORA</p> <p>Do not award marking point 3 unless at least one other mark is awarded</p>	3	A

3	a	Alkaline ▾		1	A
	b	<p>Cellular respiration</p> <p>The process occurring in every cell that converts energy from food to ATP.</p> <p>Breathing</p> <p>The process of moving air into and out of the lungs.</p>		2	A
	c	<p>(Increased breathing rate means) more CO₂ is breathed out</p> <p>(so) less CO₂ in blood</p> <p>(so) pH of blood rises (again) or pH returns to initial or normal values or pH is balanced or acidity decreases</p>	<p><i>Do not accept regulate the pH as it is given in the question. Do not award the third marking point unless the second mark is awarded.</i></p>	3	A
	d	<p>Accept any two responses from the following, [max 2]</p> <ul style="list-style-type: none"> • Less oxygen or carbon dioxide (transported through) the blood • Concentration (gradient) of oxygen or carbon dioxide is reduced or diffusion is affected • (Cell respiration process) is less efficient/reduced/less ATP produced or energy production reduced 	WTTE	2	A
	e	RQ linking time at altitude with change in haemoglobin percentage or concentration or mass	<p><i>Accept a statement or a question</i></p> <p><i>Do not accept any reference/comparison to sea level</i></p>	1	B

4	a	 <p>Switch and copper wire coil correctly connected</p> <p>Ammeter in series</p> <p>Voltmeter in parallel with coil</p>	<p>Do not award the first mark if a cell or other additional components are seen. Do not accept a resistor in place of the coil.</p> <p>Accept poor presentation of ammeter if it is clearly in series eg</p>  <p>Accept poor presentation of voltmeter if it is clearly in parallel with the coil</p>	3	B
	b	<p>Accept any two pairs of control variable and correctly linked justification [max 4]</p> <p>Material of wire Different materials have different resistivity</p> <p>or</p> <p>Length of wire Increased length means increased resistance</p> <p>or</p> <p>Cross-sectional area or thickness Increased CSA means decreased resistance</p> <p>or</p> <p>Same ammeter Consistent errors in same device</p> <p>or</p> <p>Same voltmeter Consistent errors in same device</p>	<p>Do not accept power supply</p> <p>Do not accept type of wire</p> <p>accept resistance</p> <p>ORA</p> <p>ORA</p>	4	B

c	<table border="1"> <thead> <tr> <th>Voltage / V</th> <th>Current / A</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0.0</td> </tr> <tr> <td>1</td> <td>0.3</td> </tr> <tr> <td>2</td> <td>0.5 or 0.6</td> </tr> <tr> <td>3</td> <td>0.8</td> </tr> <tr> <td>5</td> <td>1.3</td> </tr> <tr> <td>10</td> <td>2.4</td> </tr> <tr> <td>11</td> <td>2.7</td> </tr> <tr> <td>12</td> <td>2.9</td> </tr> </tbody> </table> <p>V and A as units</p> <p>Any two correct pairs of voltage (0 dp) and current (1 dp)</p> <p>0V – 0(.0)A or 1V – 0.3A included</p> <p>12V – 2.9A included</p>	Voltage / V	Current / A	0	0.0	1	0.3	2	0.5 or 0.6	3	0.8	5	1.3	10	2.4	11	2.7	12	2.9	<p><i>All possible values are included in the table for reference. Candidates will have added two data points to complete the table.</i></p> <p><i>Accept Volts and Amperes / Amps</i></p>	4	C
Voltage / V	Current / A																					
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d	<p>X axis scale has numbers at equal increments and starts at zero with plotted points taking up at least half the graph</p> <p>y axis scale has numbers at equal increments with plotted points taking up at least half the graph</p> <p>Two data points plotted correctly</p> <p>Five data points plotted correctly</p> <p>Best fit line roughly going through all or most points and intercepting the y axis</p>	<p><i>Refer to data table in part c for information</i></p> <p><i>Accept through (0,0) no ECF for incorrectly plotted points</i></p>	5	C																		

e	<p>Method one Resistance is 1/gradient</p> <p>Use of two data points to calculate gradient</p> <p>Gradient calculation</p> <p>Resistance = 4 ± 0.2</p> <p>Ohms or Ω</p> <p>Method two Resistance is V/I</p> <p>Calculation of resistance using at least 5 data points from the graph or 5 points taken from line of best fit</p> <p>Line of best fit used in calculation of gradient or Calculation using mean of five resistances in marking point 2</p> <p>Resistance = 4 ± 0.2</p> <p>Ohms or Ω</p>	<p><i>Two possible ways of answering ECF from part d</i></p> <p><i>seen or implied</i></p> <p><i>Only award marking point 4 if calculation linked to is shown</i></p> <p><i>Only award marking point 4 if calculation is shown</i></p>	5	C
f	<p>Accept any reasonable weakness and correctly linked improvement, for example [max 2] Only one trial Do multiple trials and take average</p> <p>or</p> <p>Coil temperature not controlled A suggestion of how the coil temperature could be monitored or controlled</p>	<p><i>Award two marks if only one trial is implied</i></p>	2	C

g	<p>As the voltage increases, current increases too</p> <p>(as the) graph shows a straight line passing through the origin or current is proportional to voltage</p>	<p><i>Award two marks if only the second statement is seen</i></p>	<p>2</p>	<p>C</p>
h	 <p>A higher voltage is required in wire 2 than in wire 1 for the same current to flow or Gradient is $1/R$ or line is less steep for higher R in wire 2</p> <p>(so) wire 2 has a higher resistance</p> <p>(So therefore suggestion is) incorrect</p>	<p><i>ORA</i></p> <p><i>Only award the third mark if the first two marks are awarded</i></p>	<p>3</p>	<p>C</p>

5	a	Protons 60 Neutrons 84 Electrons 60		3	A
	b	1.2 (rotations per second) 72 (rotations per minute)	<i>Award 2 marks for 72 only</i>	2	C
	c	IV: number of magnets Accept any two reasonable CV, for example [max 2] <ul style="list-style-type: none"> • material of wire • length of wire • mass of wire • diameter of wire • number of turns of the wire • voltage • Same battery or same type of battery • shape of dancer 	<i>CV must be explicitly stated. Do not award material or battery alone.</i>	3	B

5	d					15	B	
			1	2	3			4
		RQ	How is the dancer affected by the magnets or How does the speed of the dancer change	How does the number of magnets affect the speed of the dancer	How does the number of magnets affect the <u>rotational</u> speed or number of <u>rotations</u> per minute of the dancer			
		Equipment	Any equipment related to the experiment	Equipment to measure time (eg timer, video camera, stopwatch) and equipment to monitor one CV	Equipment to measure time (eg timer, video camera, stopwatch) and equipment to monitor two CV			
		Method	Attempt at a method but detail is insufficient to follow	Method can be followed but detail is incomplete or incorrect	Complete method is described, fully explained and could easily be followed			
		Data	Method implies a range of values	Method includes 5 values of IV or 3 trials	Method includes 5 values of IV and 3 trials			Method includes 5 values of IV and 3 trials and plans to calculate average
Safety	Safety precaution linked to specific hazard (heating of wires or battery, toxicity or strength of Nd magnet, cutting wires or use of pliers, toxicity of battery)	Safety precaution justified with reference to specific hazard (heating of wires or battery, toxicity or strength of Nd magnet, cutting wires or use of pliers, toxicity of battery)						

6	a	<p>Any reasonable suggestion, for example [max 2]</p> <ul style="list-style-type: none"> • Size of the population/high density • Inadequate building practices and regulations • Dense concentration of building with high occupancy • The absence of warning systems • Lack of public awareness on earthquake risks • Location of the city (near to the sea, mountains) 		2	D
	b	<p>Any two reasonable suggestions, for example [max 2]</p> <ul style="list-style-type: none"> • Clear emergency plans in place • Building regulations • Ensure proper functionality and preparedness of health facilities • Early warning systems • Invest in community preparedness/education • Shelters <p>Correctly linked justification, for example [max 2]</p> <ul style="list-style-type: none"> • Allow evacuation or treatment of casualties or clear communication of information • To ensure enough space or appropriate materials are used or structure is designed not to collapse • Hospitals are prepared to receive large number of casualties or hospitals have power generators • Allow people to leave or shelter prior to earthquake • Communities are often the first responders or allows people to take personal responsibility 	WTTE	4	D
	c	<p>Speed=distance/time or Time= 80/4</p> <p>Time= 20 (seconds)</p>	Award 2 marks for correct final answer	2	C

d		1	2	3	4	15	D
	App	EWS senses earthquake and warning sent via app					
	Function	A statement of a strength or a limitation of the function of the EWS app	A statement of strength and a limitation of the function of the EWS app or two strengths or limitations	A statement of a strength and a limitation of the function of the EWS app and a further strength or limitation	Statements of more than one strength and more than one limitation of the function of the EWS app		
	Social (Individual)	A statement of an impact on an individual	A statement of an impact on an individual with justification or more than one statement of an impact on an individual	More than one statement of an impact on an individual and one of these impacts is justified	More than one statement of an impact on an individual and both impacts are justified		
	Economic	A statement of an impact on a government	A statement of an impact on a government with justification or more than one statement of an impact on a government	More than one statement of an impact on a government and one of these impacts is justified	More than one statement of an impact on a government and both impacts are justified		
	Conclusion	An opinion is given	An opinion is given with justification				