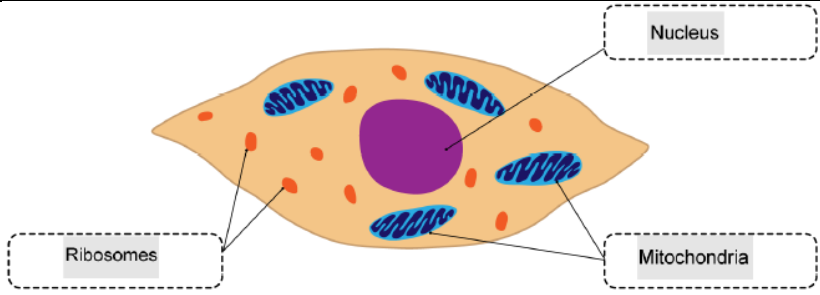


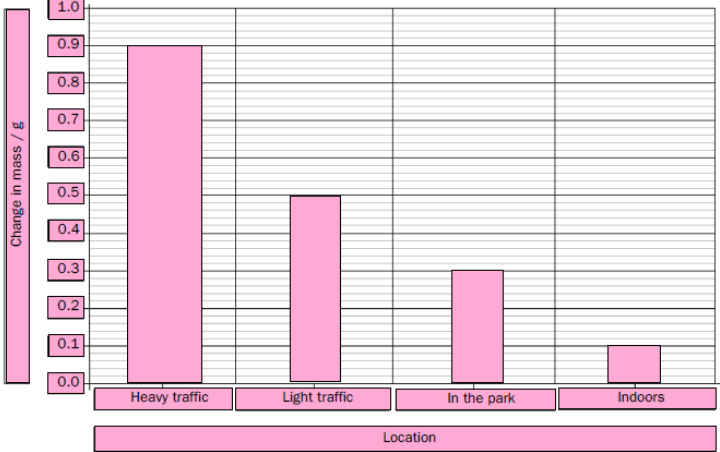
		Answers	Notes	Total	Crit
1	a	Organ system		1	A
	b	 <p>One correct All correct</p>		2	A
	c	<p>(Muscles are frequently) contracting <b>or</b> extending <b>or</b> moving <b>or</b> exercising</p> <p>(muscles require) high demand for energy <b>or</b> ATP</p> <p>(provided by cellular) <u>respiration</u> (in mitochondria)</p> <p>hence more mitochondria in muscle cells</p>	<p><i>WTTE, Accept answers in any box</i></p> <p><i>Do not award M4 unless at least one other mark is awarded</i></p>	4	A
	d	<p>Graph A</p> <p>Justification: Reference to acidic conditions in the stomach <b>or</b> the stomach has a low pH</p>	<p><i>Only award second mark if first mark is awarded</i></p>	2	A

<b>2</b>	<b>a</b>	Friction <b>or</b> resistive force <b>or</b> retarding force <b>or</b> resistance		<b>1</b>	A
	<b>b</b>	45 (N)  Forwards <b>or</b> in the direction of the 80N force	<i>Accept to the right, award this mark separately</i>	<b>2</b>	A
	<b>c</b>	Moves to the right with increasing speed		<b>1</b>	A
	<b>d</b>	Gravitational potential		<b>1</b>	A
	<b>e</b>	$W = f \times d$ or $W = m \times g \times d$  $W = 900$  J <b>or</b> joules <b>or</b> $\text{kgm}^2\text{s}^{-2}$ <b>or</b> Nm	<i>Seen or implied</i>  <i>Accept 883 if <math>9.81 \text{ Nkg}^{-1}</math> is used</i>  <i>Award this mark separately</i>	<b>3</b>	A  D
	<b>f</b>	Both forces are <u>equal</u> <b>and</b> in <u>opposite</u> directions <b>or</b> Every action has an <u>equal</u> and <u>opposite</u> reaction  The athlete applies a force / pulls on the band to the left <b>or</b> Pulls on the band towards her  The band applies a force on (the athlete) and pulls (her) to the right	<i>The first marking point may be included in points 2 or 3 below</i>  <i>Accept clear references to direction in place of left and right, do <b>not</b> accept push</i>	<b>3</b>	A

<b>3</b>	<b>a</b>	Input: Electrical Useful output: Kinetic		<b>2</b>	A
	<b>b</b>	Resistance= $120/2.8$ 42.9 (ohms) <b>or</b> 42.86 <b>or</b> 42.857(14...)  Correctly expressed to 2 sig figs: 43 (ohms)	<i>Ohm's Law seen or implied</i>  <i>Award two marks if 42.9 or 42.86 or 42.857(14...) is seen without calculation</i>  <i>Award full marks if only 43 is seen</i>	<b>3</b>	A  D
	<b>c</b>	(Concentration of) lactic acid increases with increased running speed  (as a result of) <u>anerobic</u> respiration  (because) not enough oxygen supplied <b>or</b> more oxygen needed <b>or</b> reference to oxygen debt	<i>Accept positive correlation</i>  <i>Do not accept respiration alone</i>  WTTE	<b>3</b>	A

4	a	<p>As water evaporates</p> <p>The concentration (of the solution) increases</p> <p>So salt crystals form</p> <p><b>or</b></p> <p>As the temperature decreases</p> <p>The solubility (of NaCl) decreases</p> <p>So salt crystals form</p>	<p><i>Do not award M3 unless at least one other mark is awarded</i></p>	3	B
	b	<p><b>IV:</b> Type of compound <b>or</b> different compounds</p> <p><b>Accept any two CV, [max 2]</b></p> <ul style="list-style-type: none"> <li>• Volume of water</li> <li>• Same duration <i>or</i> time</li> <li>• (Initial) temperature of water</li> <li>• All solutions to be kept at the same room temperature <b>or</b> in the same place</li> <li>• Length of stick in the solution</li> <li>• Type of water (distilled vs tap)</li> </ul>	<p><i>Do not accept mass of compound</i></p> <p><i>Do not accept mass of compound or amount of water or amount of compound</i></p>	3	B
5	a	<p><b>If:</b> the (initial) temperature of the water is increased</p> <p><b>Then:</b> the mass of crystals (formed) will increase</p> <p><b>Because:</b> more sugar is dissolved</p> <p>as the (kinetic) energy of the water molecules is higher</p> <p><b>or</b> there are more collisions</p>	<p><i>ORA for all marking points if correctly followed through</i></p> <p><i>WTTE</i></p>	4	B

<b>5</b>	<b>b</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>16</b>	<b>B</b>
		<b>V</b>	IV <b>and</b> DV implied	IV identified as temperature <b>and</b> DV explicitly identified as the mass of crystals <b>or</b> IV identified as temperature or DV explicitly identified as the mass of crystals <b>and</b> 1 CV is identified.	IV identified as the temperature <b>and</b> DV explicitly identified as mass of crystals <b>and</b> at least 1 CV explicitly identified	IV identified as the temperature <b>and</b> DV explicitly identified as mass of crystals <b>and</b> at least 2 CV		
		<b>E</b>	Some equipment is listed	Equipment to change <b>or</b> measure temperature (IV) <b>and</b> Equipment to measure their DV	Thermometer or temperature probe to measure temperature (IV) <b>and</b> balance to measure mass of crystals (DV) <b>and</b> equipment to monitor one CV	Thermometer or temperature probe to measure temperature (IV) <b>and</b> balance to measure mass of crystals (DV) <b>and</b> equipment to monitor two CV		
		<b>D</b>	Reference to different initial temperatures <b>or</b> different number of trials	At least five different initial temperatures <b>or</b> three trials	At least five different initial temperatures <b>and</b> three trials	At least five different initial temperatures <b>and</b> three trials <b>and</b> calculates mean mass		
		<b>M</b>	An attempt at the method has been made but detail is insufficient to follow	Method can be followed but detail is incomplete or incorrect	Complete method to vary temperature is described, fully explained and could easily be followed (details of how to prepare saturated is needed but the term saturated is not required)			
		<b>S</b>	A safety precaution linked to the use of hot equipment					

<b>6</b>	<b>a</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #00a0c0; color: white;"> <th colspan="4">Table Object</th> </tr> <tr> <th style="text-align: left;">Location</th> <th style="text-align: left;">Total initial mass of 3 leaves / g</th> <th style="text-align: left;">Total final mass of 3 leaves / g</th> <th style="text-align: left;">Change in mass / g</th> </tr> </thead> <tbody> <tr> <td>Heavy traffic</td> <td>15.0</td> <td>15.9</td> <td>0.9</td> </tr> <tr> <td>Light traffic</td> <td>15.7</td> <td>16.2</td> <td>0.5</td> </tr> <tr> <td>In the park</td> <td>16.0</td> <td>16.3</td> <td>0.3</td> </tr> <tr> <td>Indoors</td> <td>15.1</td> <td>15.2</td> <td>0.1</td> </tr> </tbody> </table> <p style="text-align: right; margin-top: 10px;">All correct</p>	Table Object				Location	Total initial mass of 3 leaves / g	Total final mass of 3 leaves / g	Change in mass / g	Heavy traffic	15.0	15.9	0.9	Light traffic	15.7	16.2	0.5	In the park	16.0	16.3	0.3	Indoors	15.1	15.2	0.1	<b>1</b>	<b>C</b>
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	<b>b</b>	 <p style="margin-top: 10px;"><i>Title linking location and change in mass</i></p> <p><i>X axis: location and y axis: <u>change</u> in mass</i></p> <p><i>Unit on y axis: g</i></p> <p><i>Y axis scale from 0 (to 1.0) with equal increments</i></p> <p><i>Two locations plotted correctly (<math>\pm 0.02</math>)</i></p> <p><i>All locations plotted correctly</i></p>	<b>6</b>	<b>C</b>																								

*ECF from part a*

*Ignore different widths of bars*

*Order of locations on x axis is not important*



f	<p><b>Accept any reasonable weakness, [max 2]</b></p> <ul style="list-style-type: none"> <li>• environmental conditions are difficult to control</li> <li>• only three leaves used in each location</li> <li>• experiment was done over four days only</li> <li>• weekdays or weekends were not specified</li> </ul> <p><b>Accept any correctly linked improvement, [max 2]</b></p> <ul style="list-style-type: none"> <li>• conduct more trials to reduce the effect of outliers</li> <li>• more trials would help to exclude outliers</li> <li>• a longer duration would give more comprehensive data</li> <li>• conduct the experiment on weekdays only</li> </ul>	WTTE	4	C
g	<p><b>Accept any reasonable change in IV, for example [max 1]</b></p> <ul style="list-style-type: none"> <li>• altitude</li> <li>• weather conditions</li> <li>• effect of different industries</li> </ul>	Do not accept different locations	1	C
h	<p><b>A comment implying a comparison between plastic and leaves, for example [ max 1]</b></p> <ul style="list-style-type: none"> <li>• the plastic will give a controlled surface area</li> <li>• Vaseline in the plastic would be lost due to high temp/wind</li> <li>• the Vaseline would not stick well to the plastic</li> <li>• the plastic would not rot or be affected by the weather conditions.</li> </ul> <p><b>A comment about how the mass or result would be affected, for example [ max 1]</b></p> <ul style="list-style-type: none"> <li>• better control of surface area means data are more reliable or reproducible or fewer outliers</li> <li>• the total mass would be less affected (by weather etc) than leaves.</li> <li>• the total mass would be more affected/decreased (because particulates would not stick to the plastic easily)</li> </ul> <p><b>A correctly linked comment about the validity of using plastic [max 1]</b></p> <ul style="list-style-type: none"> <li>• (so) the method is less valid</li> <li>• (so) the method is more valid</li> </ul>	Do not award the third mark unless at least one other mark is awarded	3	C

7	a	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Macronutrients</th> <th>Micronutrients</th> </tr> </thead> <tbody> <tr> <td>Carbohydrates</td> <td>Vitamins</td> </tr> <tr> <td>Proteins</td> <td>Minerals</td> </tr> <tr> <td>Fats</td> <td></td> </tr> </tbody> </table> <p>All correct</p>	Macronutrients	Micronutrients	Carbohydrates	Vitamins	Proteins	Minerals	Fats				1	A
	Macronutrients	Micronutrients												
	Carbohydrates	Vitamins												
Proteins	Minerals													
Fats														
b	<p><b>Nutritional benefits, [max 1]</b></p> <ul style="list-style-type: none"> <li>• protein is higher</li> <li>• fibre is higher</li> <li>• phosphorus is higher</li> <li>• iron is higher</li> <li>• vitamin C is higher</li> </ul> <p><b>Correctly linked health benefit, [max 1]</b></p> <ul style="list-style-type: none"> <li>• protein is needed for (muscle) growth, repair, enzymes</li> <li>• fibre is important for digestive health</li> <li>• phosphorus is needed for healthy bones, teeth, nervous system</li> <li>• iron is needed for haemoglobin</li> <li>• vit C is needed for repair, immune system, collagen, growth</li> </ul>	<p><i>Comparison must be made but this could be done by quoting two values</i></p> <p>WTTE</p>			2	D								
c	<p><b>Hazard:</b> Toxic/Poisonous</p> <p><b>Accept any correct, reasonable precaution, [max 1]</b></p> <ul style="list-style-type: none"> <li>• protective equipment or gloves or goggles or glasses</li> <li>• keep away from the eyes</li> <li>• wash hands after using pesticides</li> <li>• store safely</li> </ul>				2	D								

	<p><b>d</b></p> <p><b><i>Living parts of the environment: Accept any reasonable suggestion [max 1]</i></b></p> <ul style="list-style-type: none"><li>• pesticides could affect animals (who eat the crops)</li><li>• pesticides could affect the health of human beings</li><li>• could alter the biodiversity of the soil or kill soil microbes</li><li>• removing pests will affect the food web</li><li>• bioaccumulation <b>or</b> build up in the food chain</li></ul> <p><b><i>Non-living parts of the environment: Accept any reasonable suggestion [max 1]</i></b></p> <ul style="list-style-type: none"><li>• can affect the water supply</li><li>• can affect air quality (in the local area)</li><li>• affect pH of soil</li><li>• affect pH of water</li></ul>	WTTE	2	D
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8		1	2	3	4			
	1 GM	One statement about the GM technology	Two statements about GM technology <b>or</b> one statement about GM technology with justification	Two statements about GM technology with justification for future food supply for at least one <b>or</b> one statement about GM technology with two justifications for future food supply				
	2. A (Advantages to environment, organisms, ecosystem, biotic factors)	Attempt at an advantage of the production of Bt corn	One relevant advantage of the production of Bt corn	One relevant advantage of the production of Bt corn with justification <b>or</b> More than one relevant advantage of the production of Bt corn	One relevant advantage of the production of Bt corn with more than one justification <b>or</b> More than one relevant advantage of the production of Bt corn with justification for at least one			
	3. D (Disadvantages to environment, organisms, ecosystem, biotic factors)	Attempt at a disadvantage of the production of Bt corn	One relevant disadvantage the production of Bt corn is stated	One relevant disadvantage of the production of Bt corn with justification <b>or</b> More than one relevant disadvantage of the production of Bt corn	One relevant disadvantage of the production of Bt corn with more than one justification <b>or</b> More than one relevant disadvantage of the production of Bt corn with justification for at least one			
	4. E (Economic considerations)	A statement of an economic consideration	A statement of an economic consideration with justification <b>or</b> A statement of more than one economic consideration	At least two statements of economic considerations with at least one justified				
	5. C (Concluding appraisal with justification)	A concluding appraisal giving their opinion	A concluding appraisal giving their opinion with a justification					

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D