




Question	Answers	Notes	Total	Criterion	
1	a	Food web			
			<i>Accept tropic web Do not accept food chain</i>	1	A
	b	Energy flow or nutrient flow (through the system) or What organisms eat other organisms or Predation		1	A
	c	Producer: tree or grass or shrub Secondary consumers, two needed from this list only for the mark: <ul style="list-style-type: none"> • shrike • baboon • caracal • lion • vulture • leopard 		2	A
	d	Shrub (population) increases (because there are) fewer impalas eating the shrub Any three correctly reasoned points relating to baboon population change, for example (3 max): <ul style="list-style-type: none"> • baboon population decreases • because more are eaten by leopards • because the leopards no longer eat impala • baboon population might not be affected as there is more grass for consumers lower down the food chain 		5	A
	e	Break down dead organisms or Recycle nutrients		1	A
f	Any reasonable suggestion, for example (1 max): <ul style="list-style-type: none"> • not all relationships shown • no abiotic factors shown • no development over time • no indication of biomass or numbers 	<i>Accept specific named examples that are not included</i>	1	A	




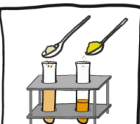
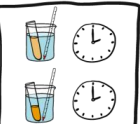
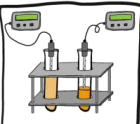
2	a	Cells are the smallest unit of life		1	A
	b	<p>Any two from the following list (2 max):</p> <ul style="list-style-type: none"> • cell wall • chloroplasts • (large central) vacuole <p>A correctly linked outline (2 max):</p> <ul style="list-style-type: none"> • cell wall provides structure or support or protection for plant • chloroplast is where photosynthesis occurs • (large central) vacuole stores water or provides support for plant 	<p><i>Do not accept chlorophyll as a structure</i></p> <p><i>Accept chlorophyll for the justification mark only if linked to photosynthesis</i></p>	4	A
	c	<p>A correct use of the term <i>photosynthesis</i></p> <p>Chlorophyll absorbs light</p> <p>Any two points from the list (2 max):</p> <ul style="list-style-type: none"> • energy from light is needed • light energy is transformed into chemical energy • to combine carbon dioxide and water • glucose and oxygen are formed 		4	A
	d	<p>Sugar moves or is transported</p> <p>(down a tube) from where it is produced to where it is used</p> <p>A correct use of the term translocation or phloem</p>	WTTE	3	A D

3	a	<p>IV: temperature</p> <p>DV: size of balloon or volume of balloon or volume of CO₂ produced</p> <p>Any two reasonable control variables, for example (2 max):</p> <ul style="list-style-type: none"> • volume of solutions • concentration of sugar or type of sugar • duration of reaction • starting temperature of solution 	<i>Indication of quantity must be present</i>	4	B		
	b	<p>Any two of the following points (2 max):</p> <ul style="list-style-type: none"> • no and range is insufficient • no and no repeats are shown • no and no numerical data is generated • no and no graph is possible • no and the increment is too large • yes and there is a range of temps used or the size of the balloons can be compared 				2	B
	c	<p>Any two reasonable improvements, for example (2 max):</p> <ul style="list-style-type: none"> • use a better measuring tool • more trials • larger temperature range • control the mass of yeast or sugar <p>Correctly linked justification, for example (2 max):</p> <ul style="list-style-type: none"> • this will give more precise data / quantitative data • reduces experimental uncertainty • this will give reliable or repeatable data 					

4	a	<p>A research question linking different sugars with an implied DV for example (1 max):</p> <ul style="list-style-type: none"> • respiration • rate of respiration • effect on yeast <p>Implied DV is measurable, for example (1 max):</p> <ul style="list-style-type: none"> • volume • amount of CO₂ • size of balloon 		2	B																								
	b	<p>Glucose</p> <p>(glucose) fits in the (active site of the) enzyme or glucose is the correct shape or the other sugars don't fit</p> <p>(glucose) fits best or fits better than the other sugars</p> <p>A correct use of either the term "active site" or mention of lock-and-key model</p>		4	B D																								
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5	a	Biofuels are renewable <i>or</i> fossil fuels are non-renewable	<i>Accept less pollution only if it is clear that this is linked to production and not combustion</i>	1	D
	b	<p>Any two reasonable points, for example (2 max)</p> <ul style="list-style-type: none"> • if crops were used there would be less food for eating • waste would otherwise be thrown away • less waste in landfills • agricultural land could be used for crop production rather than biofuel 		2	D
	c	<p>Water chestnut</p> <p> Response Short Textbox</p> <p>Day 3 <input type="text"/></p> <p> Text Object</p> <p>Pineapple</p> <p> Response Short Textbox</p> <p>Day 5 <input type="text"/></p>		1	C
	d	<p>Title: Mass of ethanol produced linked to time (with reference to two different types of food waste)</p> <p>Plotting: Three points correctly plotted ± 0.2</p> <p>All points plotted correctly</p> <p>Axis labels: x: day <i>or</i> time/day(s)</p> <p>y: mass of ethanol / mg</p>	<p><i>No unit needed if day is given on x axis. Time must have an associated unit of day(s)</i></p> <p><i>Unit is needed for this mark</i></p>	5	C

e	<p>Trend 1: Alcohol production increases initially (until day 5)</p> <p>One pair of explanatory points The yeast population increases</p> <p>(so) there is more respiration</p> <p>or</p> <p>Respiration generates heat</p> <p>Which increases rate of respiration</p> <p>Trend 2: (after day 5 or then) alcohol production decreases or plateaus</p> <p>One pair of explanatory points Food supply has become limited</p> <p>(so) less respiration is taking place</p> <p>or</p> <p>Ethanol increases (to toxic levels)</p> <p>(so) the yeast cells die (and no longer respire) or respiration is inhibited or enzymes are denatured</p>	<p>Accept trends if seen in explanation box only, ignore incorrect use of "exponential"</p> <p>WTTE</p> <p>WTTE</p>	6	C
f	Pineapple: 22.9 (mg)	Accept correct answer in table or response box	1	C
g	Difference in mass: (-) 5.0 (mg)	Must be quoted to 2 sig figs	1	C

h	<p>First mark: Water chestnut has the highest amount of carbohydrate and the lowest total of ethanol produced</p> <p>Second mark, either The sugars present in the carbohydrate may not always be fermented by the yeast or Nutritional data is about food, but food waste was used in the investigation</p>	WTTE	2	C				
i	<table border="1"> <thead> <tr> <th>Variable that was not controlled</th> <th>Effect on the results</th> </tr> </thead> <tbody> <tr> <td>the temperature of the water bath was not controlled</td> <td>a higher temperature might give a faster rate of reaction</td> </tr> </tbody> </table> <p>Variables (2 max):</p> <ul style="list-style-type: none"> • storage of waste • has food been dried completely • different mass/amount/volume of food or yeast • different volume of solutions • time in the water bath <p>Any reasonable linked effect, for example (2 max):</p> <ul style="list-style-type: none"> • food might already have started fermenting • water present makes the food heavier or sugar might have been lost through burning • more fruit will give more ethanol • larger volume will give more ethanol • longer time would give more ethanol 	Variable that was not controlled	Effect on the results	the temperature of the water bath was not controlled	a higher temperature might give a faster rate of reaction	 <p>1. Grow the yeast.</p>  <p>2. Collect food waste from different houses in the neighbourhood.</p>  <p>3. Dry the food waste in an oven and grind into a powder.</p>  <p>4. Mix the yeast solution and food waste powder.</p>  <p>5. Place in a beaker of warm water to allow fermentation to occur.</p>  <p>6. Measure the amount of ethanol present.</p>	4	C
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the temperature of the water bath was not controlled	a higher temperature might give a faster rate of reaction							

6	a	The maintenance of a constant internal environment			1	A																								
	b	1. <input type="text" value="Human insulin gene extracted"/> 2. <input type="text" value="Plasmid DNA opened"/> 3. <input type="text" value="Genetically modified bacteria reproduce"/> 4. <input type="text" value="Extraction and purification of human insulin"/>			4	D																								
	c	Any two marks from the following (2 max): <ul style="list-style-type: none"> eating increases blood sugar insulin reduces blood sugar people with diabetes do not produce or respond to insulin fast-acting insulin means people with diabetes do not need to plan ahead 			2	D																								
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e	Any reasonable response, for example (2 max): <ul style="list-style-type: none"> some religious groups may have concerns vegetarians or other groups may prefer to avoid using animals for human benefit could be concerns that diseases could be transmitted DNA crossing the species barrier 				2	D																								