

Question	Answers	Notes	Total	Criterion
1	a grass – cricket – frog – snake two consecutive organisms correct all correct		2	A
	b Competition Predation Parasitism		3	A
	c the living things and the non-living things/physical environment or biotic and abiotic factors a reference to the interaction of living and non-living things		2	A
	d Any three of the following points (3 max): <ul style="list-style-type: none"> • individuals in a population show variation or a cause of variation is identified • reference to survival of the fittest (competition, camouflage) • these organisms (with beneficial traits/characteristic survive to) reproduce or pass on allele to offspring • (so the frequency of) the particular trait/characteristic increases in the population Fourth mark: A correct use of one of following terms: variation, population, gene, allele, trait		4	A

2	a	maintaining (a constant) internal environment of the body		1	A
	b	(cell) membrane		1	A
	c	<p>Diffusion: Movement of solute / salts / particles / toxins</p> <p>from area of high concentration to low concentration</p> <p>Osmosis: movement of water</p> <p>from area of low salt concentration to high salt concentration</p> <p>or (osmosis takes place) through or across a semi-permeable or partially permeable membrane</p> <p>Final marking point: until (concentration) is in equilibrium</p>	<p>WTTE</p> <p><i>Accept high water potential to low water potential</i> <i>Do not accept water concentration</i></p>	5	A
	d	<p>to maintain a concentration gradient between blood and fluid</p> <p>toxin / salt removal from blood will stop</p> <p>or the toxins will build up</p>	WTTE	2	A
	e	<p>the rate of salt removal is faster or more efficient (than for one large tube)</p> <p>(because there is a) greater surface area (for diffusion or osmosis)</p>	WTTE	2	A

3	a	<p>Any two characteristics (2 max):</p> <ul style="list-style-type: none"> • movement • respiration • sensitivity (homeostasis) or response • growth • reproduction • excretion • nutrition 		2	A
	b	(in <i>Daphnia</i>) no cell wall or no chloroplasts or no (large) vacuole	ORA	1	A
	c	<p>if level of sugar increases, then heart rate will increase</p> <p>(because) sugar can be broken down rapidly or (the sugar) provides a quick increase of energy or (because of) the hormones released due to high sugar levels</p>	ORA	2	B
	d	<p>IV: amount of sugar</p> <p>DV: heart rate</p> <p>Accept any two reasonable control variables, for example (2 max):</p> <ul style="list-style-type: none"> • temperature • light • volume of water • species of <i>Daphnia</i> 	<p>Do not award marks for duplicated variables, add CON annotation to response</p> <p>Accept amount of water</p>	4	B
	e	<p>at least five different levels of sugar should be provided to <i>Daphnia</i></p> <p>so that a trend can be seen in the data</p>	Award this mark independently	2	B
	f	<p>minimum of three trials</p> <p>reduce random error or calculate average or identify an anomaly</p>		2	B

4	a	evidence of one calculation one correct calculation all three correct calculations (141, 249 and 288)	Please check response box and table for correct answers	3	C
	b	Accept any two weaknesses, (2 max): <ul style="list-style-type: none"> • only one trial • only three increments of temperature • different <i>Daphnia</i> was used for each temperature • increments were not evenly spaced • no controls listed Correctly linked justification (2 max)		4	C
	c	Accept any reasonable independent variable, for example (1 max): <ul style="list-style-type: none"> • light • Type of sugar • type of water • species of <i>Daphnia</i> • if they have eggs in the egg chamber 		1	C
	d	At higher temperatures, reactions occur faster or There is less dissolved oxygen in warmer water or The <i>Daphnia</i> are more stressed at higher temps (so heart rate is higher) (so) cells require more oxygen for respiration or Heart rate increases to increase the supply of oxygen or More CO ₂ needs to be excreted		2	C
	e	(the data supported the hypothesis but) the data was not sufficient / relevant because not enough trials or not enough increments or the same <i>Daphnia</i> was not tested Or there was not sufficient/ relevant data to test the hypothesis because not enough trials or not enough increments or the same <i>Daphnia</i> was not tested		2	C

	f	x axis: temperature and °C y axis: heart rate and bpm		2	C
	g	average at 10 °C: 88±1 average at 20 °C: 95±1		2	C

5								
			1	2	3	4		
		1. V (Variables)	Some variables implied	IV or DV and one CV identified explicitly	IV and DV and one CV identified explicitly	IV and DV and two CV identified explicitly		
		2. H (Hypothesis)	Simple RQ	A prediction linking IV to DV				
		3. D (Manipulation of IV / sufficient data)	Reference to different increments or trials	At least five increments or three trials	At least five increments and three trials	At least five increments and three trials and plans to calculate mean		
	4. M (Method)	Attempt at method but may not be relevant	Attempt at method, insufficient detail and not likely to give relevant data	Method described, could be followed, will produce relevant data	Complete method fully explained and could be replicated			
	5. E (Ethics)	A comment about ethical conditions being needed in experiments using humans	A comment about ethical conditions being needed in experiments using humans and conditions linked to caffeine or its effects	A comment about ethical conditions being needed in experiments using humans and conditions linked to caffeine or its effects and linked to a specific health concern eg heart problems				
						17	B	

6	a	95 - 97 LOBF – points should be approximately equally distributed above and below the line		2	C
	b	increase in heart rate calculated correct ratio dividing by predicted heart rate percentage expressed correctly to 3 sig figs (17.9%)	<i>ECF from part a</i> <i>ECF from part a, seen or implied</i>	3	C
	c	sugar was present in the drink (not just caffeine) (so) the sugar could have affected the heart rate also, not just caffeine	<i>WTTE</i>	2	C

7	a	respiration photosynthesis		2	A
	b	Any two human actions, for example (2 max): <ul style="list-style-type: none"> • mass transportation • intensive agriculture • using fossil fuels as a source of energy Correctly linked consequence for the carbon cycle, for example (2 max): <ul style="list-style-type: none"> • combustion of fossil fuels (from mass transport) • (combustion of fossil fuels) releasing CO₂ into the atmosphere • release of CH₄ (from intensive agriculture) • CH₄ causes global warming 	<i>Award marks either for two consequences or for one consequence and its effect.</i> <i>Award marks if consequence is seen in either box.</i>	4	D
	c	Any two reasonable biological consequences of increased temperature on the environment, for example (2 max): <ul style="list-style-type: none"> • increased rate of photosynthesis • (increased rate of photosynthesis) removes carbon dioxide • stress on animals • (stress on animals) leads to poor health or lower rates of reproduction • animals migrating to cooler areas • leading to change in predator–prey relationships or changing food web in another ecosystem • invasive species could move into area • leading to change in predator–prey relationships • organisms unable to extend range • leading to extinction 	<i>Award marks either for two consequences or for one consequence and its effect.</i>	2	D

	1	2	3	4
1. Ac (Action to reverse climate change?)	An incomplete statement of how humans can reduce climate change	A correct statement of how humans can reduce climate change	A description how humans can reduce climate change	More than one description of ways humans can reduce climate change
2. S (Scientific effect of the human action)	An attempt at a scientific justification of one of the climate change solutions	A correct scientific justification of one climate change solutions and a second is named Or An attempt at a scientific justification of two solutions	A correct scientific justification of both climate change solutions	
3. Ad (Advantages)	An incomplete statement of an advantage	A complete statement of an advantage Or Incomplete statements of two disadvantages	A complete statement of one advantage and an incomplete statement of a second advantage	A complete statement of more than one advantage
4. Dis (Disadvantages)	An incomplete statement of a disadvantage	A complete statement of a disadvantage Or an incomplete statement of two disadvantages	A complete statement of one disadvantage and an incomplete statement of a second disadvantage	A complete statement of more than one disadvantage
5. Ap (Appraisal)	A concluding statement	A concluding choice with justification		