Markscheme

November 2020

Biology

On-screen examination

11 pages

The following are the annotations available to use when marking responses.

Annotation	Explanation
	Correct point, place at the point in the response where it is clear that the candidate deserves the mark. For use in analytically marked questions only.
	Omission, incomplete
CON	Contradiction
	Valid part (to be used when more than one element is required to gain the mark)
	Error carried forward
	Dynamic annotation, it can be expanded to surround work
	Horizontal wavy line that can be expanded
	Highlight tool that can be expanded to mark an area of a response

Annotation	Explanation
	Not good enough
	The candidate has given a response but it is not worthy of any marks
	Text box used for additional marking comments
	Seen; must be stamped on all blank response areas and on duplicate pages of concatenated responses
	Vertical wavy line that can be expanded
	Words to that effect
	Award 1, 2, 3, 4 marks. For use in holistically marked questions only

Markscheme instructions

1 Mark positively. Give candidates credit for what they have achieved and what is correct. Do not deduct marks for incorrect responses.

2 Follow the markscheme provided and award only whole marks.

3 Each marking point appears on a separate line.

4 The maximum mark for each subpart is indicated in the "Total" column.

5 Where a mark is awarded a tick should be placed in the text at the precise point where it is clear the candidate deserves the mark.

6 Each marking point in a question part should be awarded separately unless there is an instruction to the contrary in the Notes column.

7 A question subpart may have more marking points than the total allows. This will be indicated by the word "***max***" in the Answer column. Further guidance may be given in the Notes column.

8 Additional instructions on how to interpret the markscheme are in bold italic text in the Answer column.

9 Alternative wording may be indicated in the Answer column by a slash (/). Either alternative is equally acceptable but the candidate cannot be rewarded for both as they are associated with the same marking point.

10 Alternative answers are indicated in the Answer column by "***or***". Either alternative is equally acceptable but the candidate cannot be rewarded for both as they are associated with the same marking point.

11 If two related points are required to award a mark, this is indicated by "***and***" in the answer column.

12 Words in brackets ( ) in the Answer column are not necessary to gain the mark.

13 Words that are <u>underlined</u> are essential for the mark.

14 In some questions a reverse argument is also acceptable. This is indicated by the abbreviation *ORA (or reverse argument)* in the Notes column. Candidates should not be rewarded for reverse arguments unless *ORA* is given in the Notes column.

15 If the candidate's response has the same meaning or is clearly equivalent to the expected answer the mark should be awarded. In some questions this is emphasized by the abbreviation *WTTE (or words to that effect)* in the Notes column.

16 When incorrect answers are used correctly in subsequent question parts the follow through rule applies. Award the mark and add ECF (error carried forward) to the candidate response.

17 The order of marking points does not have to be the same as in the Answer column unless stated otherwise.

18 Marks should not be awarded where there is a contradiction in an answer. Add CON to the candidate response at the point where the contradiction is made.

19 Do not penalize candidates for errors in units or significant figures unless there is specific guidance in the Notes column.

20 Questions with higher mark allocations will generally be assessed using a level response method using task specific clarifications developed with reference to the criteria level descriptors. A candidate's work should be reviewed to determine holistically the mark for each row of the holistic grid and a mark awarded for each row.

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

3	a	***Any two characteristics (2 max):*** • movement • respiration • sensitivity (homeostasis) ***or*** response • growth • reproduction • excretion • nutrition		**2**	A
	b	(in *Daphnia*) no cell wall ***or*** no chloroplasts ***or*** no (large) vacuole	*ORA*	**1**	A
	c	if level of sugar increases, then heart rate will increase (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	*ORA*	**2**	B
	d	IV: amount of sugar DV: heart rate ***Accept any two reasonable control variables, for example (2 max):*** • temperature • light • volume of water • species of *Daphnia*	*Do **not** award marks for duplicated variables, add CON annotation to response* *Accept amount of water*	**4**	B
	e	at least five different levels of sugar should be provided to *Daphnia* so that a trend can be seen in the data	*Award this mark independently*	**2**	B
	f	minimum of three trials reduce random error ***or*** calculate average ***or*** identify an anomaly		**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):*** • only one trial • only three increments of temperature • different *Daphnia* 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):*** • light • Type of sugar • type of water • species of *Daphnia* • 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 *Daphnia* 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 *Daphnia* 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 *Daphnia* 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						**17**	B

	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	

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%)	*ECF from part a* *ECF from part a, seen or implied*	**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	*WTTE*	**2**	C

7	a	respiration photosynthesis		**2**	A
	b	***Any two human actions, for example (2 max):*** • mass transportation • intensive agriculture • using fossil fuels as a source of energy ***Correctly linked consequence for the carbon cycle, for example (2 max):*** • combustion of fossil fuels (from mass transport) • (combustion of fossil fuels) releasing CO_2 into the atmosphere • release of CH_4 (from intensive agriculture) • CH_4 causes global warming	*Award marks either for two consequences or for one consequence and its effect.* *Award marks if consequence is seen in either box.*	**4**	D
	c	***Any two reasonable biological consequences of increased temperature on the environment, for example (2 max):*** • 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	*Award marks either for two consequences or for one consequence and its effect.*	**2**	D

8

	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		

17 D