

Markscheme

November 2018

Biology

On-screen examination

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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 underlined 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	<p>Any two correct for each mark:</p> <p>Rice: carbohydrates</p> <p>Olive oil: fats</p> <p>Milk: fat or protein</p> <p>Fish: protein</p>		2	A
	b	needed for growth or repair or structure or enzymes		1	A
	c	50 (g) grams / g		2	A D
	d	<p>(yes) because it contains all of the nutrient groups in the table</p> <p>all of the daily vitamin C is included</p> <p>calcium is low so should be supplemented</p> <p>(so) you would need to know what else was eaten during the day</p>		4	A
	e	<p>Any two points from the list:</p> <ul style="list-style-type: none"> • an unbalanced diet can lead to a high energy intake or low energy usage if activity levels are low • energy intake is higher than energy used • genetic factors or low metabolic rate 		2	A

2	a	an organism or virus that causes a disease or an infection	WTTE	1	A
	b	<p>Any two from (2 max):</p> <ul style="list-style-type: none"> • movement • respiration • response to stimulus • growth • reproduction • excretion • digestion or nutrition 	WTTE	2	A
	c	<p>drinking water supply chains or sewage facilities are broken</p> <p>Any additional reasonable point, for example:</p> <ul style="list-style-type: none"> • people do not have access to bottled or clean water • people do not have access to antibiotics/cures/medical care 		2	D
	d	<p>Skin: physical barrier or pH or oils or sweat</p> <p>White blood cells: destroy/deactivate/eat pathogen or produce antibodies (in the bloodstream)</p>		2	A
	e	<p>Basic explanation: you do not get the (symptoms of) disease or subsequent infection will lead to quicker response</p> <p>Additional points: vaccine is a weakened/inactive form of the pathogen or parts of the pathogen</p> <p>vaccine triggers the specific white blood cells/lymphocytes</p> <p>immune system or white blood cells/lymphocytes produce specific antibodies</p> <p>memory cells are present or the selection of specific white blood cells/lymphocytes has already been done</p>		5	A

3	a	nervous		1	A
	b	<p>Any reasonable ethical consideration, for example:</p> <ul style="list-style-type: none"> • the environment should be similar to the leeches' normal habitat • moderate environmental conditions • handled with care 		1	B
	c	<p>Independent variable: light level/intensity</p> <p>Control variables (two max), for example:</p> <ul style="list-style-type: none"> • temperature • movement around leeches • where the leeches start in the decision chamber 		3	B
	d	<p>leeches will prefer the dark side or leeches will move away from the light</p> <p>(so) more leeches will be on the dark side (after 10 minutes) ORA</p> <p>link to observed behaviour (in the stream)</p>	Second mark is for a measurable prediction	3	B
	e	<p>Any reasonable point relating to sufficient data, for example:</p> <ul style="list-style-type: none"> • a minimum of three trials is needed for sufficient data • repetition improves accuracy 		1	B
	f	<p>Any two limitations, for example:</p> <ul style="list-style-type: none"> • it is not the same as the natural environment (so natural behaviour is not tested) • they were not given time for acclimation • a group of 10 might be an unnatural situation • a statement of any uncontrolled factor that should have been controlled 		2	C
	g	<p>Any reasonable improvement for this experiment, for example:</p> <ul style="list-style-type: none"> • a wider range of light levels • better control of the control variables • time for acclimation <p>A correctly linked justification</p>		2	C

	h	<i>Any different independent variable, for example</i> <ul style="list-style-type: none">• temperature• movement of water• starting position of leeches	<i>Accept suggestions of different levels of light intensity only if this is not given in part (g)</i>	1	C
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4	a	animal		1	A
	b	<p>reactions are slower at low temperatures or crickets are not active at low temperature</p> <p>reach an optimal temperature or warm temperatures are close to the temperature of their natural habitat</p> <p>enzymes do not function at a temperature that is too hot or above a certain temperature, metabolism will not work properly (and they stop chirping)</p>		3	B B B
	c	<p>(First table selected - no mark)</p> <p>Justification: mean should be calculated for each temperature or it is inappropriate to calculate the mean for each cricket at different temperatures</p>		1	C
	d	<p>x-axis: temperature</p> <p>°C included in x axis label</p> <p>y-axis: chirps per minute</p>		3	C
	e	<p>the data in the graph support the middle part of the prediction or the rate increases over the temperature range studied</p> <p>the method gave insufficient data to test the chirp rate at higher temperatures (so the method is not valid) or there were insufficient temperatures investigated</p>		2	C

5		1	2	3	4	15	B
	Identification of variables	Some variables are referred to that are connected to the problem but these may not be explicitly identified	Independent <i>or</i> dependent variable <i>and</i> one control variable are identified	Independent variable <i>and</i> dependent variable <i>and</i> one control variable are identified	Independent, dependent <i>and</i> at least two control variables are identified		
	Hypothesis	Formulates a hypothesis connected to the variables but not explicitly linked to the variables	Formulate a testable hypothesis correctly linked to the variables (no explanation)	Formulate a testable hypothesis correctly linked to the variables with correct scientific explanation			
	Manipulation of variables/ description of method	Attempt at a method but detail is insufficient for another student to follow	Partial method is described but detail is insufficient for another student to follow	Method is described and could easily be followed by another student	Complete method is described and could be replicated by another student		
	Collection of data	Plans to repeat at least three trials with five woodlice <i>or</i> measures for four different conditions	Plans to repeat at least three trials with five woodlice <i>and</i> measures for four different conditions				
	Ethical	Any relevant comment relating to ethics	Any relevant and detailed comment relating to ethics				

6	a	decrease because there is more competition for plant material or food		1	C
	b	<p>increase because there are fewer owls eating the woodlice or decrease because there is more predation from rats or no change linking fewer owls with more rats</p> <p>correct use of a term from the list: predator, prey, predation, trophic levels, consumer</p>		2	C D
	c	add units to axes		1	C
	d	<p>First mark: population of both rats and woodlice goes up and down or increases and decreases (over time)</p> <p>Any two additional points from the list below (2 max):</p> <ul style="list-style-type: none"> • maximum population is the same number for each species (over time) • maximum population for woodlice is higher than rats • maximum for rats is after the maximum for woodlice • the cycles are regularly spaced over time <p>Explanation (3 max): as the population of woodlice grows, there is more food for the rats so their population increases</p> <p>(so) there is more predation of woodlice so the population falls</p> <p>less food for rats so the population falls or less predation on woodlice so the population of woodlice increases</p>		6	C

7	a	<p>taken in by the <u>roots</u></p> <p>by diffusion or active transport</p> <p>transported in the xylem / transport tissue / vascular tissue (to the leaves)</p> <p>use in synthesis of (organic) molecules / amino acids / plant compounds / growth</p>		4	A
	b	<p>One similarity:</p> <ul style="list-style-type: none"> • both increase nutritional value of plants • both will give the desired minerals to the crops • if overused both could lead to environmental problems / accumulation of minerals in water sources <p>One difference:</p> <ul style="list-style-type: none"> • reference to price / one more expensive than other • chemically could be more controlled in terms of quantity of nutrients • organic could be produced in the same farm <p>Any two additional points for either similarities or differences (2 max)</p>		4	D
	c	<p>a section of a chromosome or DNA and that codes for a protein or trait</p>		1	D
	d	<p>data for at least four crops included in the table</p> <p>table to have columns for crop and year and nutrient and country in any order</p> <p>order should be logical in one column or row eg increasing year or alphabetical by country or crop or nutrient</p>		3	C

e	<p>Restriction enzymes cut open a plasmid.</p> <p>The new genes are inserted into the plasmid.</p> <p>The plasmid is transferred into a bacterium.</p> <p>The modified bacterium inserts the new genes to the plant cell.</p> <p>First mark for any two in the correct sequence</p> <p>Second mark all correct</p>		2	D D
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8			1	2	3	4	14	D
	Health	A statement relating to health	More than one statement relating to health	More than one statement relating to health with at least one supported by reasoning or an example	Positive and negative statements relating to health with at least one supported by reasoning or an example			
	Environmental	A statement of an environmental impact	A statement of an environmental impact with a linked consequence	A statement of two environmental impacts at least one linked to a consequence				
	Ethical	A statement of an ethical impact	More than one statement of an ethical impact					
	Economic	A statement of an economic impact	A statement of an economic impact with justification	A statement of more than one economic impact with at least one justification				
	Appraisal	Appraisal given	Appraisal linked to previous impacts					