

## Markscheme

November 2022

Biology

## **On-screen examination**



13 pages

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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.
λ	Omission, incomplete
CON	Contradiction
	Valid part (to be used when more than one element is required to gain the mark)
ECF	Error carried forward
0	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
NGE	Not good enough
0	The candidate has given a response but it is not worthy of any marks
T	Text box used for additional marking comments
SEEN	Seen; must be stamped on all blank response areas and on duplicate pages of concatenated responses
2	Vertical wavy line that can be expanded
WITE	Words to that effect
✓ 1 ✓ 2 ✓ 3 ✓ 4	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. Do not deduct marks for spelling errors.
- 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.

А

4

Accept reference to prey with respect to sea urchins and otters eating them

Question	Answers	Answers     Notes       rchin or small fish or large crab		Crit
а	Sea urchin <b>or</b> small fish <b>or</b> large crab		1	Α
b	Producers carry out photosynthesis <b>or</b> producers can convert/capture light energy	Accept references to autotrophs for mp1	2	A
	Into sugar <b>or</b> chemical energy <b>or</b> food for a consumer	WTTE Accept nutrition		
С	<ul> <li>Accept any reasonable suggestion, for example [max 1]</li> <li>Conservation zones or creation of national parks</li> <li>Captive breeding program</li> <li>Reintroduction into the wild</li> </ul>	The role of humans in the action must be clear	1	A

1

d

Number of sea urchins has decreased

There are fewer sea urchins to eat kelp

(as) more are being eaten by the sea otters

(so) the number of kelp (plants) has increased

2	а	Carbohydrates <b>or</b> fats <b>or</b> sugars <b>or</b> named example	"Protein" alongside a correct answer is a CON do <b>not</b> award a mark	1	А
	b	Amino acids		1	Α
	С	A The optimum pH is acidic or 1.9	No of First more must be correct for	2	A
			second to be awarded		
	d	Diffusion	Accept facilitated or passive diffusion		
		(passively) moved from an area of high concentration to an area of lower concentration			
		or		2	А
		Active transport			
		(actively) moved from an area of low concentration to an area of higher concentration			
	е	Accept any feature, [max 2]			
		no nucleus			
		haemoglobin			
		biconcave disc <i>or</i> curved shape			
		small and flexible			
		Accept any correctly linked explanation, [max 2]		4	A
		to create more space			
		<ul> <li>binds to oxygen (to transport around the body)</li> </ul>			
		<ul> <li>maximize surface area (to volume ratio)</li> </ul>			
		can pass through <u>capillaries</u>	Do <b>not</b> accept arteries or veins		



4 a	a	Carbon dioxide + Water Glucose + Oxygen		1	A
k	b	<i>IV:</i> Temperature			
		<b>DV:</b> $O_2$ concentration or amount of $O_2$	Do <b>not</b> accept biomass		
		<ul> <li>Accept any two control variables, for example [max 2]</li> <li>CO<sub>2</sub> concentration</li> <li>Length of plant stem</li> <li>Type of plant</li> <li>Light level</li> </ul>		4	В
C	C	<i>If:</i> The temperature increases <i>Then:</i> oxygen concentration will increase	ORA. Direction of change must be stated.	_	_
		Because: (the rate of) photosynthesis increases		3	В
C	d	260.666			
		261	Award 2 marks for correct answer only	2	С
€	e	Add units for temperature to the table		1	С
f	F	Results do not support the prediction from 20(°C) to 40(°C)			
		Results support the prediction as temperature rises above 40(°C)			
		or		2	С
		There is insufficient data to draw a conclusion			
		At least five increments <b>or</b> temperatures are needed to show a reliable trend			

5	a	<ul> <li>Accept any two reasonable CV, for example [max 2]</li> <li>One CV associated with plant eg stem length or type of plant or number of leaves</li> <li>light level/intensity was not controlled</li> <li>Initial O<sub>2</sub> concentration</li> </ul>		2	С
	b	To control the temperature <i>or</i> temperature is a control variable This is the optimum temperature for the reaction <i>or</i> the reaction will take place quickly	WTTE	2	В
	C	<ul> <li>Accept any reasonable suggestion, for example [max 2] <ul> <li>more trials/repeats</li> <li>more increments of IV or intermediate values of IV</li> <li>there is no control experiment (with CO<sub>2</sub>=0% or atmospheric CO<sub>2</sub> level)</li> </ul> </li> <li>Accept any correctly linked justification, for example [max 2] <ul> <li>more reliable data or allows identification of outliers or can calculate an average or more accurate results</li> <li>more values give a clearer pattern</li> <li>cannot establish a baseline</li> </ul> </li> </ul>	WTTE	4	С
	d	As the concentration of CO <sub>2</sub> increases the rate of photosynthesis increases (below 0.10%) The line plateaus (above 0.10% CO <sub>2</sub> ) Value of 0.10% correctly referenced Because CO <sub>2</sub> is limiting (below 0.10%) Other limiting factors are involved (above 0.10%)		5	С
	е	Increase the temperature or light intensity		1	С

	1 mark	2 marks	3 marks	4 marks	
Variables	IV as light intensity <b>or</b> a measurable DV <b>or</b> one CV is identified	IV as light intensity <b>and</b> a measurable DV <b>and</b> one CV is identified	IV as light intensity <b>and</b> a measurable DV <b>and</b> two CV are identified		
Hypothesis	Formulates a hypothesis connected to a relevant variable	Formulates a testable hypothesis correctly linked to a (stated) DV (no explanation)	Formulates a testable hypothesis correctly linked to a (stated) DV with correct scientific explanation		
Equipment (included in method)	Some relevant equipment is referenced	Equipment to measure (stated) DV <i>and</i> manipulate IV	Equipment to measure (stated) DV <b>and</b> manipulate IV <b>and</b> monitor at least one CV		15
Method	Attempt at a method but detail is insufficient to collect relevant data	Detail of the method is incomplete but some relevant data could be collected	Detail of method is sufficient to follow and similar data could be collected	Detail of method is sufficient to repeat the experiment	
Data	Plans to repeat at least three trials <b>or</b> to collect data for at least five increments	Plans to repeat at least three trials <b>and</b> to collect data for at least five increments			

7	а	Plant W		1	С
	b	Boric acid does not have an impact on the pest species attacking those plants	Allow reference to plant X only		
		or		1	С
		Not all plants are affected by pests			
	С	To control all other variables		1	С
	d	Plant W – 4%		2	C
		Plant Y – 6%		2	C
	е	The farmer should use 6%			
		Because, 6% is the lowest concentration which gives maximum yield of both plants	WTTE	2	С

8	а	<ul> <li>Similarity: Accept any reasonable trend, for example [max 1]</li> <li>Number of new cases increases and then decreases with age in both males and females</li> <li>Difference: Accept any reasonable trend, for example [max 1]</li> <li>Males in presence with 74 (mode) within females increases with 20 (mode)</li> </ul>	2	D
		<ul> <li>Males increase until 74 (peak) while females increase until 69 (peak)</li> <li>Female cases higher than males 0 – 59 and 85+ / male cases higher than females 60 - 84</li> </ul>		
	b	<ul> <li>(Greater) exposure to (named) risk factor(s) over time</li> <li>Accept a correctly linked justification [max 1] <ul> <li>Greater chance of mutations occurring</li> <li>(and) more mutations can accumulate over time</li> </ul> </li> </ul>	2	D
-	C	<ul> <li>Accept any reasonable positive impact, for example [2 max]</li> <li>Good for mental health / SAD</li> <li>Vitamin D production / Calcium absorption and strong bones / Rickets</li> <li>Able to do sports outside</li> </ul> Accept any reasonable negative impact, for example [2 max] <ul> <li>Increased risk of (skin) cancer</li> <li>Cataracts</li> <li>Sunburn</li> </ul> A brief concluding statement	6	D

		1 mark	2 marks	3 marks	4 marks	
Me	Medical	One statement of a medical benefit	Two statements of a medical benefit <b>or</b> One statement of a medical benefit with further development	Two statements of a medical benefit, one with further development	Two statements of a medical benefit, both with further development	
Ecc	onomic	One statement of an economic consideration	Two statements of an economic consideration <b>or</b> One statement of an economic consideration with further development	Two statements of an economic consideration, one with further development	Two statements of an economic consideration, both with further development	14
Et	thical	One statement of an ethical consideration	Two statements of an ethical consideration <b>or</b> One statement of an ethical consideration with further development	Two statements of an ethical consideration, one with further development	Two statements of an ethical consideration, both with further development	
Con	clusion	A simple conclusion is stated	A conclusion is stated with further			

development