



National
Qualifications
2023

2023 Biology

National 5

Finalised marking instructions

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General marking principles for National 5 Biology

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this paper. These principles must be read in conjunction with the marking instructions, which identify the key features required in candidate responses.

- (a) Marks for each candidate response must **always** be assigned in line with these general marking principles and the detailed marking instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.
- (c) If a specific candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.
- (d) There are no half marks awarded.
- (e) Where a candidate makes an error at an early stage in the first part of a question, credit should normally be given for subsequent answers that are correct with regard to this original error. Candidates should not be penalised more than once for the same error.
- (f) Unless a numerical question specifically requires evidence of working to be shown, full marks should be awarded for a correct final answer (including units, if appropriate) on its own.
- (g) In the detailed marking instructions, if a word is underlined then it is essential; if a word is (bracketed) then it is not essential.
- (h) In the detailed marking instructions, words separated by / are alternatives.
- (i) A correct answer can be negated if:
 - an extra, incorrect, response is given
 - additional information that contradicts the correct response is included.
- (j) Unless otherwise required by the question, use of abbreviations (eg DNA, ATP) or chemical formulae (eg CO₂, H₂O) are acceptable alternatives to naming.
- (k) Where incorrect spelling is given:
 - If the correct word is recognisable then give the mark.
 - If the word can easily be confused with another biological term then do not give the mark eg mitosis and meiosis.
 - If the word is a mixture of other biological words then do not give the mark, eg osmotis, respirduction, protosynthesis.
- (l) Presentation of data
 - If a candidate provides two graphs or charts, mark both and give the higher score.
 - If a question asks for a particular type of graph and the wrong type is given, then full marks cannot be awarded. Candidates cannot achieve the plot mark but **may** be able to achieve the mark for scale and label.
 - If the x and y data are transposed, then do not give the scale and label mark.
 - If the graph uses less than 50% of the axes, then do not give the scale and label mark.
 - If 0 is plotted when no data is given, then do not give the plot mark (ie candidates should only plot the data given).
 - No distinction is made between bar graphs and histograms for marking purposes.
 - In a pie chart lines must originate from the central point and extend to tick marks. Labels must be given in full.

- (m) Marks are awarded only for a valid response to the question asked. For example, in response to questions that ask candidates to:
- **identify, name, give or state**, they need only answer or present in brief form;
 - **describe**, they must provide a statement as opposed to simply one word;
 - **explain**, they must provide a reason for the information given;
 - **compare**, they must demonstrate knowledge and understanding of the similarities and/or differences between topics being examined;
 - **calculate**, they must determine a number from given facts, figures or information;
 - **predict**, they must indicate what may happen based on available information;
 - **suggest**, they must apply their knowledge and understanding to a new situation.

Marking instructions for each question

Section 1

Question	Response	Mark
1.	B	1
2.	A	1
3.	C	1
4.	A	1
5.	A	1
6.	A	1
7.	B	1
8.	B	1
9.	C	1
10.	D	1
11.	B	1
12.	A	1
13.	D	1
14.	D	1
15.	B	1
16.	C	1
17.	D	1
18.	C	1
19.	B	1
20.	B	1
21.	C	1
22.	D	1
23.	C	1
24.	A	1
25.	B	1

Section 2

Question			Expected response	Max mark	Additional guidance
1.	(a)	(i)	Cell membrane/ribosome/cytoplasm	1	
		(ii)	Cellulose	1	
	(b)	(i)	65	1	
		(ii)	<p>Bacterial cells have no nucleus/ mitochondria/vacuole/chloroplasts and plant cells do</p> <p>Plant cells have a nucleus/ mitochondria/vacuole/chloroplasts and bacterial cells don't</p> <p>OR</p> <p>Bacterial cells have plasmids and plant cells don't</p> <p>OR</p> <p>The cell walls are made of different materials</p>	1	Response must include a clear difference
2.	(a)		<ul style="list-style-type: none"> • Requires energy (1) • (Membrane) proteins move the molecules/ions (1) • Molecules/ions move against the concentration gradient/from a low(er) to a high(er) concentration (1) <p style="text-align: center;">Any 2 points from 3</p>	2	
	(b)	(i)	No energy required	1	
		(ii)	Xylem	1	
		(iii)	Turgid	1	
3.	(a)	(i)	Adenine (1) Cytosine (1)	2	
		(ii)	180	1	
	(b)		Amino acid(s)	1	
4.	(a)	(i)	Q → R → P	1	
		(ii)	The <u>active site</u> (of pepsin/enzyme) is complementary/specific (to the substrate)	1	
	(b)		2.4	1	
	(c)		The enzyme/active site changes shape	1	

Question		Expected response	Max mark	Additional guidance
5.	(a)	Genetic engineering	1	
	(b)	Plasmid	1	
	(c)	(Modified) plasmid/ring of DNA/it/ this is inserted into host (bacterial) cell/a (different) bacterial cell	1	Not acceptable: Any implication that the plasmid is returned to the <i>original</i> bacterial cell
6.	(a)	45	1	
	(b)	(i) Type of cotton (plant)	1	Not acceptable: 'cotton' alone Acceptable: modifying/modified cotton (plants)
		(ii) Number of (cotton) plants Mass/number of seeds Spacing between cotton plants Type/pH/irrigation of soil Nutrient content/fertility of soil Area/size of field Time left to grow Timing of planting/harvest	1	Not acceptable: Temperature Humidity Light intensity Rainfall CO ₂ concentration
	(c)	To compare mass/yields OR To show difference in mass/yields is due to type of cotton OR To show the modification increases/changes mass/yield	1	Not acceptable: As a comparison
	(d)	Repeat the investigation/experiment Increase the number of fields/farms (planted with each type of cotton)	1	Not acceptable: repeat it
7.	(a)	Aerobic	1	
	(b)	(i) Pyruvate	1	Acceptable: Pyruvic Acid
		(ii) Oxygen	1	
	(c)	(i) 35:4	1	
		(ii) Muscle cells/they require more energy/ATP/have higher energy requirement OR Skin cells require less energy/ATP/ have lower energy requirement	1	Needs to be comparative

Question			Expected response	Max mark	Additional guidance
8.	(a)		They have the potential to become different types of (blood) cell They are unspecialised/can become specialised	1	Acceptable: can differentiate Not acceptable: 'self-renew' alone but does not negate a correct response
	(b)		157	1	Acceptable: 157000000
	(c)	(i)	64	1	
		(ii)	As number of months (after a stem cell transplant) increases, the survival rate decreases	1	Not acceptable: 'less likely to survive' as an alternative to survival rate decreases
	(d)		Embryo/embryonic	1	
9.	(a)	(i)	215 000	1	
		(ii)	275 000	1	
	(b)	(i)	Cells in other organs/they don't have the (complementary) receptors (proteins) for insulin	1	Acceptable: Only some cells have (complementary) receptors (proteins) for insulin Answer must refer to receptors
		(ii)	Glucose is converted to glycogen	1	Acceptable: Glucose > Glycogen
	(c)		Endocrine	1	Not acceptable: named glands
10.	(a)	(i)	Egg/ovum	1	
		(ii)	Testis/testes	1	
	(b)		Zygote	1	
	(c)	(i)	63	1	
		(ii)	They/horses and donkeys are different species	1	
11.	(a)	(i)	Bacteria/bacterium	1	
		(ii)	To investigate if (capsules of) faeces can cure/treat diarrhoea caused by <i>C. difficile</i>	1	
	(b)		To ensure/improve/increase validity (of the experiment/study) OR To make it valid	1	Not acceptable: Any reference to reliable To increase validity of results To make <i>results</i> valid
	(c)		70	1	
	(d)		Immune (system)	1	

Question			Expected response	Max mark	Additional guidance
12.	(a)	(i)	Scale, label (1) Points plotted and line drawn (1)	2	
		(ii)	As altitude increases, the (red blood) cell count also increase OR As altitude decreases, the (red blood) cell count also decreases	1	Must show correct causation
		(iii)	6.8	1	
	(b)	(i)	Oxyhaemoglobin	1	
		(ii)	Biconcave (in shape) OR Has no nucleus OR Contains haemoglobin	1	
13.	(a)		(Primary) Consumer OR Herbivore OR Prey	1	Not acceptable: Predator
	(b)		Effect: Decrease (1) Explanation: fewer whelks to eat OR increased competition for sea urchins (1) Effect: Stays the same (1) Explanation: must detail decrease (in whelks) and increase (in sea urchins) (1)	2	
	(c)		31	1	

Question		Expected response	Max mark	Additional guidance
14.	(a)	Go to 3 Douglas fir Needles (arranged) in clusters	3	
	(b)	(i)	To improve/increase the reliability (of the results)	1 Not acceptable: To make the results reliable To increase reliability of experiment/investigation
		(ii)	Wipe/dry the probe (between samples)/place the probe at the same depth each time	1 Not acceptable: wipe the meter
15.		1. Algal populations increase/an algal bloom forms (1) 2. (Algal blooms) reduce light levels (killing aquatic plants) (1) 3. Bacteria feed on dead plants/dead algae (1) 4. Bacteria increase (greatly in number)/results in more bacteria (1) 5. Bacteria use up (large quantities of) oxygen OR Bacteria reduce oxygen availability for other organisms (1)	4	2. Acceptable: Blocks/prevents/does not allow/stops light Plants can't photosynthesise/carry out less photosynthesis 5. Must be clear that bacteria are responsible.
16.	(a)	Sun/sunlight/light	1	Acceptable: light energy
	(b)	(i)	Diffusion	1
		(ii)	18	1
		(iii)	Carbon dioxide/CO ₂	1
	(c)	(i)	From hydrogen and carbon dioxide (and ATP)	1 Acceptable: Hydrogen and carbon dioxide combine/react (ATP provides energy) OR Hydrogen and ATP are used with carbon dioxide (to produce sugar)
		(ii)	Starch/cellulose	1

[END OF MARKING INSTRUCTIONS]