



National  
Qualifications  
RESOURCE

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# **2021 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 detailed 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 CO<sub>2</sub>, H<sub>2</sub>O) are acceptable alternatives to naming.
- (k) Where incorrect spelling is given, sound out the word(s).
  - 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.	B	1
4.	C	1
5.	B	1
6.	D	1
7.	C	1
8.	B	1
9.	B	1
10.	D	1
11. *	A	1
12.	D	1
13.	B	1
14.	A	1
15.	D	1
16.	C	1
17.	A	1
18.	C	1
19.	A	1
20.	D	1
21.	C	1
22.	A	1
23.	C	1
24.	D	1
25.	C	1

\* Answer option C is also correct. This is due to an error in the question. The question paper has not been updated. If candidates answer A or C then either is correct and should be awarded the mark.

## Section 2

Question			Expected response	Max mark	Additional guidance
1.	(a)	(i)	Y or Z	1	
		(ii)	W – (site of) photosynthesis X – gives structure/shape/support to the cell Y – (site of) chemical reactions Z – (site of) aerobic respiration/ATP production	1	Not acceptable: energy production
	(b)		67	1	
2.	(a)	(i)	0.35	1	
		(ii)	0.30 or 0.3	1	Also accept any value equal to or greater than 0.30 but less than 0.35.
	(b)		Label - 'number of plasmolysed rhubarb cells' and scale on y-axis (1)          Plotting and joining points accurately (1)	2	Scale: <ul style="list-style-type: none"> <li>Any 3 values to establish a linear scale.</li> <li>Number at origin not essential</li> </ul> <p>If plotted for beetroot do not award mark for label and scale but mark can be awarded for correct plot.</p> <p>If a bar chart is drawn, only the second mark can be accessed.</p>

Question			Expected response	Max mark	Additional guidance
3.	(a)		Protein	1	
	(b)		<p>1. osmosis is the movement of water molecules <b>AND</b> active transport is the movement of molecules/ions (1)</p> <p>2. in osmosis movement is from a high(er) to a low(er) water concentration/ down a concentration gradient <b>AND</b> in active transport movement is from a low(er) to a high(er) concentration/ against/up a concentration gradient (1)</p> <p>3. osmosis is a passive process, but active transport is not. <b>OR</b> No energy/ATP is required for osmosis but is needed for active transport (1)</p> <p>4. active transport requires (membrane) proteins <b>AND</b> osmosis does not. (1)</p> <p><b>Any 3 from 4 points.</b></p>	3	<p>Acceptable: Differences may be found in separate parts of the answer.</p> <p>Not acceptable: with the concentration gradient or along the concentration gradient</p>
4	(a)		Active site	1	
	(b)	(i)	36	1	
		(ii)	<p>(Enzyme/active site) changes shape (1)</p> <p>No longer complementary to/fits its substrate (1)</p>	2	
5.	(a)	(i)	Water	1	
		(ii)	Oxygen	1	
		(iii)	2	1	
	(b)	(i)	18	1	If answer not in the table units are <b>not</b> required
		(ii)	The start/initial lengths were different	1	Not acceptable: To allow a comparison to be made
		(iii)	As the ATP concentration increases, muscle contraction increases	1	Not acceptable: any answer relating only to muscle length decreasing

Question			Expected response	Max mark	Additional guidance
6.	(a)		1:3:8	1	
	(b)		Nucleus	1	
	(c)		Spindle (fibres)	1	
	(d)		Has two (matching) sets of chromosomes	1	Not acceptable: 46 chromosomes, but this does not negate an otherwise correct response
7			1. A complementary copy of the section of DNA/ gene/genetic code is made (1) 2. messenger RNA/mRNA carries the complementary code (1) 3. from (the DNA in) the nucleus (1) 4. to a ribosome (1) 5. (where proteins are formed) from amino acids (1) <b>Any 4 from 5 points</b>	4	Complementary must be mentioned in <b>either</b> point 1 or point 2 to be awarded the marks for both points.
8	(a)		Effector/muscle/gland	1	
	(b)		Spinal cord	1	Not acceptable: brain/CNS
	(c)		Along the (inter) neuron by electrical impulses (1) chemicals transfer the messages between the neurons (1)	2	
9.	(a)	(i)	Tt	1	
		(ii)	C, J or M.	1	
		(iii)	0	1	
		(iv)	50	1	
	(b)		There is a range of values (between a minimum and a maximum)	1	Not acceptable: the values are not in distinct/separate/different groups
10.	(a)	(i)	Between 20°C and 25°C there is no increase/change (in the rate of water loss) for species B.	1	
		(ii)	A	1	
		(iii)	Wind speed/humidity/surface area	1	
	(b)	(i)	Transpiration	1	Not acceptable: Diffusion or osmosis
		(ii)	Stomata	1	

Question			Expected response	Max mark	Additional guidance
11.	(a)	(i)	Vena cava	1	
		(ii)	Thick muscular wall/narrow central channel/carries blood under high pressure/carries blood away from the heart	1	
		(iii)	Prevents blood flowing back (1) into the (left) atrium/chamber 2 (1) <b>OR</b> when the heart beats/contracts	2	Not acceptable: into the right atrium
	(b)		B They identified chamber 4 (left ventricle) as having the thickest wall	1	
12.	(a)	(i)	Chloroplast(s)	1	
		(ii)	Passes/diffuses out of/from leaf/cell (1)  Passes to /used in 2nd stage/carbon fixation (1)	2	
	(b)	(i)	R – light intensity (1) S – carbon dioxide concentration (1)	2	Extra ticks negate
		(ii)	2nd stage/carbon fixation/ photosynthesis is controlled by enzymes (1)  Increase in temperature increases activity of the enzymes (1)	2	



Question			Expected response	Max mark	Additional guidance														
13.	(a)			2															
			<table><tr><th rowspan="2">Concentration of pesticide (ppb)</th><th colspan="2">Average volume of sucrose solution consumed (ml)</th></tr><tr><th>Day 1</th><th>Day 10</th></tr><tr><td>0</td><td>7.6</td><td>7.7</td></tr><tr><td>2</td><td>6.4</td><td>10.7</td></tr><tr><td>11</td><td>7.5</td><td>10.4</td></tr></table>	Concentration of pesticide (ppb)	Average volume of sucrose solution consumed (ml)		Day 1	Day 10	0	7.6	7.7	2	6.4	10.7	11	7.5	10.4		
		Concentration of pesticide (ppb)	Average volume of sucrose solution consumed (ml)																
			Day 1	Day 10															
		0	7.6	7.7															
		2	6.4	10.7															
		11	7.5	10.4															
	1 mark for heading with units. 1 mark for the numerical data.																		
	(b)	(i)	Time allowed to feed/number of feeders per area/concentration of sucrose solution	1															
		(ii)	Number of bees/volume of sucrose solution at start/size or type of container	1															
	(c)		The average volume of sucrose solution consumed increased from 0 to 2 ppb/11 ppb (then decreased from 2 to 11 ppb)  <b>OR</b>  As the concentration of pesticide increased, the average volume of sucrose solution consumed increased then decreased/didn't always decrease	1	Acceptable: 'Feeding' as an alternative to average volume of sucrose solution consumed														
	(d)		Bioaccumulation	1															
14.	(a)	(i)	10	1															
		(ii)	50	1															
		(iii)	Bacteria can survive in a higher antibiotic concentration  <b>OR</b>  It takes a higher antibiotic concentration to kill the bacteria	1	Must be comparative														
	(b)		A (random) change to the genetic material/DNA of an organism	1															
	(c)		Pathogen(s)	1															

Question			Expected response	Max mark	Additional guidance
15.	(a)		All the organisms/community and the non-living components	1	
	(b)		Food or nutrient availability/competition (for food/nutrients)/predation/disease/grazing	1	Not acceptable: food or nutrients on its own
	(c)		8210	1	
	(d)	(i)	Eats plants and animals	1	
		(ii)	Interspecific	1	
16.	(a)	(i)	An organism that makes its own food (by photosynthesis)	1	
		(ii)	Chlorophyll	1	
	(b)		562 500	1	
	(c)		Energy is lost/decreases at each stage/level	1	

[END OF MARKING INSTRUCTIONS]