National
Qualifications
2022

2022 Biology

National 5

Finalised marking instructions

© Scottish Qualifications Authority 2022

These marking instructions have been prepared by examination teams for use by SQA appointed markers when marking external course assessments.

The information in this document may be reproduced in support of SQA qualifications only on a non-commercial basis. If it is reproduced, SQA must be clearly acknowledged as the source. If it is to be reproduced for any other purpose, written permission must be obtained from permissions@sqa.org.uk.

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 for each question, 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_2, H_20) 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.	A	**1**
2.	B	**1**
3.	C	**1**
4.	A	**1**
5.	D	**1**
6.	A	**1**
7.	D	**1**
8.	B	**1**
9.	C	**1**
10.	B	**1**
11.	A	**1**
12.	D	**1**
13.	C	**1**
14.	C	**1**
15.	B	**1**
16.	B	**1**
17.	B	**1**
18.	C	**1**
19.	A	**1**
20.	D	**1**
21.	D	**1**
22.	A	**1**
23.	C	**1**
24.	D	**1**
25.	C	**1**

Section 2

Question			Expected response	Max mark	Additional guidance
1	(a)	(i)	Cell wall	**1**	Not acceptable: wall on its own
		(ii)	50	**1**	
	(b)		They would not contain any chloroplasts	**1**	Not acceptable: contains less chloroplasts **OR** don't contain chlorophyll
2	(a)		Double (stranded) helix	**1**	Not acceptable: helix on its own
	(b)		Y	**1**	
	(c)	(i)	Protein	**1**	Not acceptable: amino acids
		(ii)	Different (order/sequence of) amino acid(s) **OR** Different shape/structure (of protein/molecule) **OR** The function (of the protein/ molecule) could be different/ affected	**1**	Not acceptable: it would be different; different protein
		(iii)	Radiation/(some) chemicals **OR** suitable examples	**1**	Not acceptable: radioactivity
3.	(a)		1.7	**1**	
	(b)	(i)	Enzyme/pepsin is less active at pH7/(the) high pH **OR** Enzyme/pepsin is more active at pH 2/(the) low pH **OR** Enzyme/pepsin is not at its optimum pH in test tube B/pH 7 **OR** Enzyme/pepsin is at its optimum pH in test tube A/pH 2	**1**	Not acceptable: enzyme doesn't work as well

Question			Expected response	Max mark	Additional guidance
3.	(b)	(ii)	Not the specific/complementary enzyme/active site **OR** Catalase/the enzyme doesn't break down egg white/protein **OR** Catalase/the enzyme has no effect on egg white **OR** Egg white is not the substrate for catalase/the enzyme	**1**	Not acceptable: wrong/not correct enzyme
	(c)	(i)	Shape would change/be different	**1**	Not acceptable: denatured on its own without a description structure/it would change
		(ii)	Decreases/stops/slows down	**1**	
4.			**Similarities** 1. glucose is converted to pyruvate. **(1)** 2. completed/take place in the cytoplasm. **(1)** 3. yields two (molecules of) ATP. **(1)** 4. (pathways) occur without/in the absence of oxygen. **(1)** 5. is enzyme controlled. **(1)** **Max 2 marks** **Differences** 6. The end products in yeast/fungal cells are ethanol and CO_2 **(1)** 7. In muscle/animal cells the product is lactate. **(1)** **OR** 8. In one, the end products are ethanol and CO_2 and the other is lactate. **(1)** **Max 2 marks**	**4**	Arrows as alternatives are acceptable in points 1, 3, 6, 7, 8. Arrows must have arrow heads → 'Plant cells' on its own is not acceptable but 'plants and yeast' does not negate. If plant cells (but not yeast) are referred to throughout, then this should only be penalised once. Point 8 can only be awarded if neither points 6 or 7 are awarded.

Question			Expected response	Max mark	Additional guidance
5.	(a)		<table><tr><th>Structure</th><th>Letter</th></tr><tr><td>Bacterial cell</td><td>E</td></tr><tr><td>Gene for penicillin</td><td>C</td></tr><tr><td>(modified) plasmid</td><td>D</td></tr></table> 1 mark for each correct answer	**3**	
	(b)		Insert (modified) plasmid/D into a (different) bacterial/host cell	**1**	If an incorrect structure for D in 5a is carried forward then this would not negate an otherwise correct response for 5b. Not acceptable: Any implication that the plasmid is returned to original bacterial cell.
6.	(a)		So that only one variable/factor was being altered **OR** To make the experiment valid/ ensure validity **OR** To allow a valid comparison	**1**	Not acceptable: to make it fair/ a fair test; to make results valid Any additional incorrect answer eg reliable, would negate
	(b)		60	**1**	
	(c)		Live/living peas carry out aerobic respiration/respire **OR** Dead peas do not carry out aerobic respiration/respire	**1**	Answer must refer to peas
	(d)		Repeat it/investigation/experiment	**1**	
7.	(a)	(i)	Spindle (fibres)	**1**	
		(ii)	Nuclear membrane(s) form/develop **OR** (Two) nuclei form	**1**	Any additional subsequent stage, provided the order is correct, would not negate. Not acceptable: any reference to chromatids nuclear membrane 'reforms'
	(b)		Unspecialised	**1**	Also acceptable: non-specialised/undifferentiated

Question			Expected response	Max mark	Additional guidance
8.	(a)		He is heterozygous/Aa/has both alleles/both forms of the gene **AND** has FH/ familial hypercholesterolemia/the condition/is affected	**1**	Not acceptable: he has high cholesterol
	(b)		100	**1**	
	(c)		discrete	**1**	
9.	(a)		ovary	**1**	
	(b)		diploid	**1**	
	(c)	(i)	5	**1**	
		(ii)	35	**1**	
	(d)		Mitochondrion/mitochondria	**1**	
10.	(a)	(i)	Hormones	**1**	Not acceptable: Named examples alone
		(ii)	Target tissues/cells have receptors/receptor proteins **(1)** which are complementary/specific to a hormone/chemical messenger **OR** Hormones are specific to the target tissue/cells **(1)**	**2**	Must be clear that the receptors are on the target tissues.
	(b)		Phloem/xylem	**1**	
11.	(a)		Gas - Carbon dioxide **(1)** Method of transport – Diffusion **(1)**	**2**	Not acceptable: Passive transport (but would not negate)
	(b)		Thin walls/walls only one cell thick/ large surface area	**1**	Not acceptable: One cell thick (alone); Extensive blood supply

Question			Expected response	Max mark	Additional guidance
12.	(a)		Disease-causing micro-organism/ microbe/virus/bacteria/fungi	**1**	
	(b)	(i)	As the vaccine uptake decreases, the number of cases increases (or converse) **OR** As fewer people get vaccinated, more people get measles (or converse) **OR** As the number of people getting the vaccine decreases, the number of cases of measles increases (or converse)	**1**	Also acceptable: Any other suitable equivalent
		(ii)	People believed that the threat/risk (of catching measles) was less **OR** the UK was measles-free/it was less common **OR** (People reluctant to have children immunised as) the MMR vaccine was associated with autism	**1**	Also acceptable: there are more 'anti-vaxxers'
	(c)		2:7	**1**	
	(d)		92% vaccinated but needs to be (at least) 95% to be measles-free. **OR** Less than 95% vaccinated	**1**	Values required. Not acceptable: only 92% were vaccinated.
13.	(a)		(Bubble) potometer	**1**	
	(b)		As total leaf surface area decreases the rate of water uptake decreases **OR** As total leaf surface area increases the rate of water uptake increases	**1**	
	(c)	(i)	Transpiration	**1**	
		(ii)	Guard (cells)	**1**	

Question			Expected response	Max mark	Additional guidance
14.	(a)	(i)	Volume of water/temperature/pH/ time left for/age of seed/moisture level	**1**	Not acceptable: spacing of seeds/size of dish/light/ CO_2 concentration
		(ii)	90	**1**	
		(iii)	It has the lowest percentage of germinating seeds	**1**	Not acceptable: it has the lowest number/amount of germinating seeds/fewer seeds germinated in D
	(b)		Intraspecific	**1**	
	(c)		Resources are limited/in short supply	**1**	Acceptable: named resource(s)
15.	(a)		Light meter **(1)** Don't cast a shadow/don't block the light/ensure sensor is facing light source **(1)**	**2**	Not acceptable: light intensity meter; light/moisture meter Award one mark if wrong apparatus given but correct precaution for that apparatus is given.
	(b)	(i)	May have been duller/cloudier (on day 2) **OR** less sunlight/sun/light (on day 2) **OR** Days 1 and 3 may have been brighter/less cloudy/sunnier (must be comparative)	**1**	Not acceptable: Different weather/light may have been blocked/no sun
		(ii)	To reduce the effect of atypical results **OR** Improve the reliability (of the results)	**1**	Any reference to accuracy/validity would negate Not acceptable: Reliability/improve reliability of experiment/so an average can be calculated (but this would not negate)
	(c)		(soil) moisture/pH/temperature/ humidity/wind speed	**1**	
16.	(a)		Oxygen	**1**	
	(b)		Light to chemical (energy) **OR** Light (energy) → Chemical (energy)	**1**	
	(c)		M – <u>light intensity</u> **(1)** N – temperature **(1)**	**2**	Not acceptable: carbon dioxide concentration

Question			Expected response	Max mark	Additional guidance
17.	(a)		Scale and label on y-axis **(1)** All bars at correct height and are able to be identified by shading/ labels **(1)**	**2**	
	(b)		Invalid Reason: it is not true for *V. cholerae*/all species **OR** Ethanol was more effective at preventing growth for only *S. flexneri* and *S.paratyphi* **OR** Methanol was more effective at preventing growth for *V. cholerae* **OR** Growth of V. cholerae was greater with ethanol than methanol	**1**	
	(c)		Bacterial growth would increase/ more bacteria grow **OR** Growth of bacteria/it would not be reduced as much	**1**	Also acceptable: twice as many bacteria would grow Not acceptable: faster growth of bacteria
18.	(a)	(i)	To make proteins/amino acids	**1**	
		(ii)	0.6	**1**	
	(b)	(i)	(Algal) bloom	**1**	
		(ii)	Blocks light/sunlight/reduces light levels **(1)** Plants can't photosynthesise/ carry out (less) photosynthesis **(1)**	**2**	Not acceptable: 'Blocks the sun' on its own Cause of plant death must be clearly linked to only lack of photosynthesis.

[END OF MARKING INSTRUCTIONS]