



National
Qualifications
2026

2026 Biology

Advanced Higher

Question Paper Finalised Marking Instructions

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

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General marking principles for Advanced Higher 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. Marks should be awarded for what is correct and not deducted for 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 should seek guidance from your Team Leader.
- (d) There are no half marks awarded.
- (e) Where a candidate makes an error 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) on its own.
- (g) Larger mark allocations may be fully accessed whether responses are provided in continuous prose, linked statements or a series of discrete developed points.
- (h) In the detailed marking instructions, if a word is **underlined** then it is essential; if a word is **(bracketed)** then it is not essential.
- (i) In the detailed marking instructions, words separated by / are alternatives.
- (j) A correct answer can be negated if:
 - an extra, incorrect, response is given;
 - additional information that contradicts the correct response is included.
- (k) Where the candidate is instructed to choose one question to answer but instead answers both questions, both responses should be marked and the better mark awarded.
- (l) The assessment is of skills, knowledge and understanding in Biology, so marks should be awarded for a valid response, even if the response is not presented in the format expected. For example, if the response is correct but is not presented in the table as requested, or if it is circled rather than underlined as requested, give the mark.
- (m) Unless otherwise required by the question, use of abbreviations (eg DNA, ATP) or chemical formulae (eg CO₂, H₂O) are acceptable alternatives to naming.
- (n) If a numerical answer is required and units are not given in the stem of the question or in the answer space, candidates must supply the units to gain the mark. If units are required on more than one occasion, candidates should not be penalised repeatedly.

Marking instructions for each question

Section 1

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

Section 2

Question			Expected response	Max mark	Additional guidance
1.	(a)	(i)	Prosthetic group	1	
		(ii)	1.68 times.	1	Accept: 1.7
		(iii)	Require most oxygen stored/delivered because they are used for swimming/diving. OR These tissues have the highest oxygen demand. OR They have the highest rate of respiration.	1	Ignore references to muscle size. Answer must be comparative: Higher/larger/greater
	(b)	(i)	Trend in dive depths identified: eg The deeper a species dives (1) The more myoglobin they have in muscles/muscle tissues. (1)	2	Award 1 mark only for: only referring to one species OR only referring to specific muscle groups
		(ii)	There would be less interspecific competition for food. OR The realised niches of the species are sufficiently different (to allow all three species to occupy the same range).	1	

Question			Expected response	Max mark	Additional guidance
1.	(c)	(i)	There is no significant difference (between glide distances during ascent or descent phases of a dive).	1	
		(ii)	Buoyancy forces high from 0 to 50 m. (1) AND Energy needed to swim down. (1) OR Deeper than 50 m buoyancy forces are smaller. (1) AND So gliding more effective because less energy needed. (1)	2	Award max 1 mark for comments about general trend: as depth increases, buoyancy force decreases so less energy is needed (1)

Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	A series of flattened membrane discs.	1	
		(ii)	Addition of sugars/carbohydrates.	1	Accept: glycosylation
	(b)	(i)	Interact with the hydrophobic region of the membrane. OR Interact with the phospholipid tails.	1	Phospholipid bilayer = membrane.
		(ii)	Golgi resident proteins (GRPs) are not formed correctly meaning vesicles do not form. OR (Golgi) vesicles are not formed so proteins are not transported/processed/secreted. OR Proteins (required for the extracellular matrix) are not processed correctly / secreted. (1) IDEA OF: The cells in the tissue not holding together. OR The cells in the tissue not communicating with each other. (1)	2	

Question			Expected response	Max mark	Additional guidance
3.	(a)	(i)	Immunoassay	1	
		(ii)	Antibodies with the same specificity.	1	
		(iii)	1. an antibody specific to the (PPRV) antigen is linked to a coloured chemical 'label' 2. (PPRV) antigen binds to the antibody 3. (PPRV) antigen-antibody complex binds to a (second) antibody embedded at the test line 4. build-up of the coloured molecule at the test line (would cause a colour change and indicate a positive test) Any 2	2	Viral antigen = (PPRV) protein.
		(iv)	Positive. AND It is proving that the test itself is working.	1	
	(b)	(i)	Antigenic variation needs to be taken account of.	1	
		(ii)	The diagnosis is immediate/don't have to wait to send samples to the lab. OR Prevent/reduce transmission between saiga faster. OR Can take action to protect the herd faster.	1	

Question			Expected response	Max mark	Additional guidance
4.	(a)	(i)	Glucagon cannot cross the membrane/phospholipid bilayer.	1	
		(ii)	Relay signals to target proteins (inside the cell).	1	
	(b)	(i)	Insulin	1	Accept: adrenaline
		(ii)	(Increased glucagon) would increase glycogen breakdown so raise blood glucose levels even higher.	1	

Question			Expected response	Max mark	Additional guidance
5.	(a)		Cytokinesis	1	
	(b)		1. microtubules form spindle (fibres) 2. by polymerisation of tubulin 3. spindle fibres attach to chromosomes/centromere/kinetochore or Spindle fibres align chromosomes at metaphase plate 4. microtubules depolymerise/shorten to separate sister chromatids 5. chromosomes pulled to opposite poles	3	pt.3 NOT: homologous chromosomes
	(c)	(i)	(More M-CDK so) sufficient phosphorylation of target proteins to drive cell into mitosis/M-phase. OR Phosphorylation of target proteins required for mitosis/progression.	1	NOT: reference to Rb/p53/G1 checkpoint.
		(ii)	(Blocking cyclin B) would prevent M-Cdk formation. OR Preventing phosphorylation. OR Preventing entry into M-phase/mitosis decreases uncontrolled cell division. (1) or decreases the rate of the cell cycle. (1)	2	IGNORE reference to P53 or Rb.

Question			Expected response	Max mark	Additional guidance
6.	(a)	(i)	Binding changes the conformation of the active site (1) reducing its affinity for substrate. OR Substrate could no longer bind. (1)	2	NOT: ligand
		(ii)	The impulse would be continuously transmitted. OR (ACh) receptors would be hyperstimulated.	1	
		(iii)	To maintain a food source/supply of ants.	1	Must be from perspective of the benefit to pitcher plant.
	(b)	(i)	Convergent (evolution)	1	
		(ii)	(These six species) do not have a recent common ancestor. OR (Species) lack a common ancestor that is carnivorous. OR DNA may show carnivory developed in different branches.	1	

Question			Expected response	Max mark	Additional guidance
7.	(a)	(i)	Classification guide/biological key	1	
		(ii)	Point count	1	
		(iii)	To reduce volunteer bias towards specific sites. OR Pre-selected sites will be risk assessed. OR To allow replication/comparison in subsequent years.	1	
	(b)	(i)	A result which is unlikely to be due to chance alone.	1	
		(ii)	Numbers are increasing in Scotland. AND No significant increase in England.	1	
	(c)		An over/under population estimate may be due to roost switching. OR (Roost switching) bats may be counted more than once/not counted.	1	
	(d)		Correct training ensures they have the knowledge to carry out this specific type of work. OR Reduce harm to the individual carrying out the survey.	1	

Question			Expected response	Max mark	Additional guidance
8.			1. chance/random events occur 2. cause unpredictable fluctuations in allele frequencies from one generation to the next 3. more important in small populations 4. as alleles are more likely to be lost from the gene pool 5. population bottlenecks occur when a population size is reduced for at least one generation/over short period of time 6. founder effects occur through the isolation of a few members of a population from a larger population 7. the gene pool of the new population is not representative of that in the original gene pool 8. alleles may be under-represented or over-represented and allele frequencies change	5	pt4. Alleles $\neq$ genes

Question			Expected response	Max mark	Additional guidance
9.	(a)		Reproduction from a female gamete without fertilisation.	1	
	(b)		Parthenogenesis gives limited variation. (1) Unable to adapt to changing environments. (1)	2	
	(c)		Disrupt successful genome of parthenogenic population. (1)	1	
	(d)		1. produce a large number of small offspring 2. reproduce early in lifetime often only once 3. each of which receives only a small energy input 4. limited parental care 5. most offspring will not survive/reach adulthood. Any 3	3	

Question			Expected response	Max mark	Additional guidance
10.	(a)		Multifactorial	1	
	(b)	(i)	Wild guppies would have no previous experience of training/captivity.	1	
		(ii)	To minimise the number of fish harmed/stressed. OR Still have enough fish to draw a valid conclusion.	1	NOT: refinement
	(c)		These are confounding variables that could have an effect on the dependent variable.	1	
	(d)	(i)	It makes all the judgements consistent. OR Removes the subjectivity.	1	
		(ii)	Positive: removes outliers that lead you to draw invalid conclusions. OR Negative: this removes results that have not been accounted, biasing the sample.	1	Accept: smaller sample reduces reliability.
		(iii)	There is natural variation in biological material so calculating a mean mitigates for this.	1	
	(e)		Identifying independent variable. (1) Identifying dependent variable. (1)	2	Example combinations IV: colour/no colour DV: time taken to solve maze IV: colour/no colour DV: number of mistakes IV: variety of colours DV: directions taken for specific colours

Question			Expected response	Max mark	Additional guidance
11.	(a)	(i)	Co-evolved intimate relationships between two different species.	1	
		(ii)	They have more than one host/reduced specificity of host. OR They have a wide niche.	1	
	(b)		In wrens the number of host eggs punctured during parasitism is lower (1) because the SCN gets more parental visits when reared in mixed broods . (1) OR In mockingbirds the number of host eggs punctured during parasitism is higher (1) because the SCN gets more parental visits when reared alone . (1)	2	
	(c)		SCB eggs being similar to cardinal eggs reduces the selection pressure. OR Shiny cowbird eggs that look the most like cardinal eggs are less likely to be ejected from the nest. (1) Increased frequency of (SCB) individuals with eggs that look like the host (cardinal's) eggs. (1)	2	

Question			Expected response	Max mark	Additional guidance
12.	A	(i)	1. the electrochemical gradient is the combination of concentration gradient and the electrical potential difference 2. the sodium-potassium pump transports ions against a (steep) concentration gradient 3. using energy from ATP hydrolysis 4. the pump has high affinity for sodium ions inside the cell 5. sodium ion binding occurs 6. phosphorylation by ATP and conformation changes 7. affinity for sodium ions decreases/affinity for potassium ions increases 8. sodium ions released outside of the cell 9. potassium ions bind outside the cell 10. dephosphorylation and conformation changes 11. potassium ions taken/released into cell	6	Pt.1 membrane potential = electrical (potential) difference.
		(ii)	a. glucose transporter/symporter b. sodium ion and glucose transported at the same time in the same direction c. sodium enters the cell down their concentration gradient d. glucose is pumped/transported into the cell against its concentration gradient	2	

Question			Expected response	Max mark	Additional guidance
12.	B	(i)	1. the retinal-opsin complex is called rhodopsin 2. retinal absorbs a photon of light 3. rhodopsin changes conformation /becomes photoexcited rhodopsin 4. a cascade of proteins amplifies the signal 5. (photoexcited rhodopsin) activates hundreds of G proteins /transducin 6. each activated transducin activates one phosphodiesterase (PDE) 7. each PDE hydrolyses thousands of cyclic GMP/cGMP per second 8. the reduction in cGMP concentration 9. results in the closure of ion channels in the membrane of the rod cells 10. which triggers nerve impulses in neurons in the retina	6	If pts.5, 6 & 7 not awarded, award 1 mark for correct sequence without numbers.
		(ii)	a. cones are responsible for colour perception b. different forms of opsin combine with retinal to give different photoreceptor proteins c. each has a maximal sensitivity to specific wavelengths d. red, green, blue and UV sensitive opsins	2	

[END OF MARKING INSTRUCTIONS]