National
Qualifications
2026

2026 Biology

Higher - Paper 1

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.

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

Qualifications Scotland
Teisteanasan Alba

Marking instructions for each question

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

[END OF MARKING INSTRUCTIONS]

National
Qualifications
2026

2026 Biology

Higher - Paper 2

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.

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

Qualifications Scotland
Teisteanasan Alba

General marking principles for Higher Biology

Always apply these general principles. Use them in conjunction with the marking instructions, which identify the key features required in candidates' responses.

(a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

(b) If a 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.

(c) Do not award half marks.

(d) Where a candidate makes an error in the first part of a question, award marks for subsequent answers that are correct with regard to this original error. Do not penalise candidates more than once for the same error.

(e) Unless a numerical question specifically requires evidence of working to be shown, award full marks for a correct final answer (including units, if appropriate) on its own.

(f) Candidates should not use bulleted lists to answer extended-response questions. They must respond to the 'command' word as appropriate and provide extended answers to communicate fully their knowledge and understanding. Candidate responses in the form of bulleted lists may not be able to access the full range of available marks.

(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 response can be negated if the candidate includes:
- an extra, incorrect, response
- additional information that contradicts the correct response

(j) Where the candidate is instructed to choose one question to answer but instead answers two questions, mark both responses and award the higher mark.

(k) Unless otherwise required by the question, the use of abbreviations (for example DNA, ATP) or chemical formulae (for example CO2, H20) are acceptable alternatives to naming.

(l) 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, do not penalise candidates repeatedly.

(m) If incorrect spelling is given:
- If the correct word is recognisable then award the mark.
- If the word can easily be confused with another biological term then **do not** award the mark, for example glucagon and glycogen.

(n) Presentation of data:

- If a candidate provides two graphs, in response to one question, mark both and award the higher mark.
- If a question asks for a particular type of graph/chart and the candidate gives the wrong type, do not award full marks. 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 award the scale and label mark.
- If the graph uses less than 50% of the axes then do not award the scale and label mark.
- If 0 is plotted when no data for this is given, then do not award the plot mark — candidates should only plot the data given.

(o) Only award marks 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, justify,** 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

Question			Expected response	Max mark	Additional guidance
1.	(a)	(i)	Double helix	**1**	
		(ii)	Phosphate	**1**	
	(b)	(i)	Strand B is replicated continuously. **OR** Replication is continuous. **OR** Strand B is the leading strand.	**1**	NOT: It's not replicated in fragments alone
		(ii)	G C U U A G C A	**1**	
	(c)		**Enzyme**: DNA polymerase **(1)** **Function**: Adds nucleotides to the 3′ end of the primer/new strand. **or** Adds nucleotides (to the primer/new/growing strand) in a 5' to 3′ direction. **(1)** **OR** **Enzyme**: (DNA) ligase. **(1)** **Function**: Joins fragments in the lagging strand. **(1)**	**2**	
	(d)		20	**1**	

Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	**Region P:** Amino acid attachment site **(1)** **Region Q:** Anticodon **(1)**	**2**	
		(ii)	Hydrogen	**1**	
	(b)		Carries a specific amino acid. **OR** Carries/takes an amino acid to the ribosome. **(1)** Anticodon binds to codon. **OR** Anticodons are complementary to codons. **OR** To ensure amino acids are in the correct order. **(1)**	**2**	
	(c)		**Frameshift:** (All) amino acids are changed after the mutation. **(1)** **Nonsense:** There are fewer amino acids (in the polypeptide/protein). **OR** Shorter polypeptide/protein **(1)**	**2**	NOT: premature stop codon is produced alone NOT: short polypeptide

Question			Expected response	Max mark	Additional guidance
3.	(a)	(i)	Expresses/switches on certain genes. **OR** Genes for that cell type are expressed/switched on. **OR** (Only) produces proteins characteristic of that type of cell.	**1**	
		(ii)	They only differentiate change into neurons. **or** one type of cell. **or** cells of the tissue they came from. **OR** They are multipotent.	**1**	
		(iii)	Involves the repair/regeneration of (damaged) organs/tissues/spinal cord. **OR** Involves replacing damaged cells.	**1**	NOT: repair of damaged cells
		(iv)	Using tissue stem cells does not involve destruction/killing of a potential life/embryo. **OR** Using embryonic stem cells involves destruction/killing of a potential life/embryo.	**1**	
	(b)	(i)	1920	**1**	
		(ii)	27.2	**1**	
		(iii)	1440	**1**	

Question			Expected response	Max mark	Additional guidance
3.	(b)	(iv)	The (total) number of patients showing improvement is higher than the (total) number of patients in the study. **OR** Motor plus sensory improvement is more than the total number of patients/2500. **OR** 1760 in motor and 1620 in sensory but only 2500 patients in total so some had improvement in both.	**1**	

Question			Expected response	Max mark	Additional guidance
4.	(a)	(i)	Prevents gene flow between the populations. **OR** Prevents breeding between the populations.	**1**	NOT: prevent gene flow between species NOT: prevents breeding
		(ii)	Allopatric	**1**	
		(iii)	If one population breeds with the other their offspring will be fertile. **OR** Check if their DNA sequences are similar.	**1**	
	(b)		Saddleback/high shelled tortoises get more/a lot of food **and** (more likely to) survive. **(1)** They pass on favourable/beneficial alleles/genes to offspring.	**2**	NOT: pass on favourable/beneficial characteristics to offspring
	(c)	(i)	98.75	**1**	
		(ii)	19 900	**1**	
5.	(a)		X – carbon dioxide/CO_2/Hydrogen/ NADH/ATP **(1)** Y – Oxaloacetate **(1)**	**2**	
	(b)		Matrix of the mitochondria.	**1**	
	(c)		Dehydrogenase: removes hydrogen ions and electrons. **(1)** NAD: carries hydrogen ions and electrons to the electron transport chain/inner mitochondrial membrane. **(1)**	**2**	NOT: carries hydrogen ions and electrons to the ETC
	(d)	(i)	No/little oxygen	**1**	
		(ii)	Ethanol and carbon dioxide (and ATP)	**1**	

Question			Expected response	Max mark	Additional guidance
6.	(a)	(i)	Hypothalamus	**1**	
		(ii)	Electrical impulses through nerves/neurons.	**1**	NOT: electrical signals/messages through nerves
	(b)		Vasoconstriction **(1)** Less blood flow to skin so less heat loss. **OR** Shivering **(1)** Muscle contraction generates heat. **OR** Hair erector muscles contract. **(1)** Traps layer of insulating air. **OR** Increased/higher metabolic rate/metabolism. **(1)** More heat produced from respiration. **(1)**	**2**	NOT: prevents blood flow to skin NOT: hair stands on end alone NOT: High metabolic rate/metabolism
	(c)		For optimum enzyme activity. **OR** So enzymes are at their optimum temperature. **OR** For high diffusion rate. **(1)** To maintain metabolism/metabolic rate. **(1)**	**2**	NOT: so enzymes do not denature NOT: to allow diffusion increased diffusion rate NOT: Increases metabolic rate
	(d)		Negative feedback	**1**	

Question			Expected response	Max mark	Additional guidance
7.	(a)		To produce complementary sticky ends.	**1**	
	(b)		(DNA) Ligase	**1**	
	(c)		Selective agent – antibiotic. **(1)** Explanation – only cells containing the plasmid/Bt toxin gene/antibiotic resistant gene survive/grow. **OR** Cells that did not take up the plasmid/Bt toxin gene/antibiotic resistant gene would be killed. **(1)**	**2**	NOT: antibiotic resistance gene
	(d)		Less pests/invertebrates eating/damaging leaves/plants. **OR** Less leaves/plants being eaten/damaged by pests/invertebrates. **OR** Kills pests/invertebrates that feed on/damage leaves/plants. **(1)** More photosynthesis/energy/glucose for growth. **(1)**	**2**	

Question			Expected response	Max mark	Additional guidance
8.	(a)		From 0.0M to 0.04M the rate of oxygen produced decreases from 92cm^3 per minute to 12cm^3 per minute. From 0.04M to 0.05M the rate of oxygen produced remains constant/levels off at 12cm^3 per minute. **(1)**	**2**	To gain **2 marks** both units must be mentioned at least once. A full correct description with values without units award **1 mark**. Award **1 mark** for decreases to 0.04M then remains constant – units must be included.
	(b)		0.00/0	**1**	
	(c)		Non-competitive (inhibition) **(1)** As the concentration of hydrogen peroxide/substrate increases inhibition is not reversed/reduced. **OR** As the concentration of hydrogen peroxide/substrate increases the rate of oxygen production/enzyme activity does not increase. **OR** Increasing hydrogen peroxide/substrate concentration does not have any effect on inhibition/rate of oxygen production/enzyme activity. **(1)**	**2**	
	(d)	(i)	6	**1**	
		(ii)	0.04 to 0.05 inclusive	**1**	

Question			Expected response	Max mark	Additional guidance
9.	**A**		1. occurs on the inner mitochondrial membrane 2. electron transport chain is a series/sequence of carrier proteins 3. electrons are passed along the electron transport chain releasing energy 4. energy allows hydrogen ions to be moved across the inner mitochondrial membrane/electron transport chain **or** hydrogen ions are pumped across the inner mitochondrial membrane/electron transport chain **or** hydrogen ions move across the inner mitochondrial membrane/ electron transport chain by active transport 5. (return) flow of hydrogen (ions) through ATP synthase results in ATP production 6. hydrogen ions and electrons combine with oxygen to form water	**4**	NOT: producing energy

Question			Expected response	Max mark	Additional guidance
9.	**B**		1. micro-organisms can be grown in fermenters/liquid broth/petri dishes/agar (plates) **or** all 4 growth phases named: lag, log/exponential, stationary and death 2. micro-organisms require raw materials for synthesis and an energy source 3. energy source can be chemical/glucose or light (for photosynthetic organisms) 4. some micro-organisms produce complex molecules/amino acids/vitamins/fatty acids (required for synthesis) **or** some micro-organisms require complex molecules/amino acids/vitamins/fatty acids to be added to the culture medium 5. any 2 from: • temperature • sterility • pH • oxygen concentration are monitored/controlled /maintained/required 6. sterile conditions reduce/prevent competition (with desired organism for nutrients) **or** sterile conditions reduce/prevent spoilage/contamination of the product.	**4**	Both chemical/glucose **and** light required.

Question			Expected response	Max mark	Additional guidance
10.	(a)	(i)	77	**1**	
		(ii)	Contains a higher concentration of carotenoids/carotene/xanthophyll/ accessory pigments **(1)** which absorb wavelengths/colours of light not absorbed by surface plants. **OR** Energy passed to chlorophyll for photosynthesis. **(1)**	**2**	NOT: contains a high concentration of carotenoids/carotene/ xanthophyll/accessory pigments
	(b)		J – Carbon dioxide/CO_2 **(1)** K- G3P/glyceraldehyde-3-phosphate **(1)**	**2**	
	(c)	(i)	RuBP is converted to 3PG and is regenerated from substance K/G3P.	**1**	
		(ii)	No ATP/Hydrogen to convert/react with 3PG. **OR** No ATP/Hydrogen/NADPH to make/produce substance K/G3P. **OR** No ATP to phosphorylate 3PG.	**1**	NOT: No ATP/Hydrogen/NADPH to break down 3PG

Question			Expected response	Max mark	Additional guidance
11.	(a)	(i)	Mass of nitrate fertiliser	**1**	NOT: mass of nitrate alone NOT: mass of fertiliser alone NOT: nitrate fertiliser alone
		(ii)	Variety/cultivar/species/type of rice/plants/seeds. **OR** Brand/type/concentration of fertiliser. **OR** Concentration of nitrate/phosphate/ other nutrients in fertiliser. **OR** Planting density/sowing density. **OR** Number of plants/seeds per plot. **OR** Volume of water applied (through irrigation.)	**1**	NOT: light intensity NOT: soil moisture NOT: pH NOT: temperature NOT: soil type/quality NOT: concentration of nitrate in soil NOT: number of plants/seeds alone
		(iii)	Mass of nitrate fertiliser – 150 **(1)** Justification – at 200 g increased cost of higher mass/amount of fertiliser and no increase in number of spikelets/yield. **OR** 150 g (per plot) gives the same number of spikelets/yield as 200 g but costs less/uses less fertiliser. **(1)**	**2**	Ignore any reference to environmental impact.
	(b)		Suitable scale and labels. **(1)** Points plotted correctly. **(1)**	**2**	
	(c)		As mass of nitrate fertiliser increased number of spikelets (per plant) increased and then remained constant/levelled off.	**1**	

Question			Expected response	Max mark	Additional guidance
12.	(a)		Inbreeding	**1**	
	(b)		Inbreeding depression **(1)** Increase in frequency of homozygous recessive deleterious/harmful alleles (leading to lower survival and reproduction). **(1)**	**2**	
	(c)	(i)	Vigour	**1**	
		(ii)	Crossing two chugs will result in/produce too much variation. **OR** F_2/offspring will show too much/a lot of variation. **OR** Ensures the F_1 will have the best/desired characteristics from each parent.	**1**	
	(d)		50	**1**	
13.	(a)		Biological (control)	**1**	
	(b)	(i)	Stoats compete with/outcompete native species. **OR** Stoats prey on/kill native species. **OR** Stoats hybridise with native species. **OR** Diseases spread by stoats that native species are not resistant/immune to.	**1**	
		(ii)	None of the predators/parasites/pathogens/ competitors found in their native habitat/UK.	**1**	NOT: No predators /parasites/ pathogens/competitors
	(c)	(i)	10:7	**1**	
		(ii)	204	**1**	

Question			Expected response	Max mark	Additional guidance
13.	(c)	(iii)	Between 1930 and 1940 the bush wren population increased and the stoat population was increasing. **OR** Between 1930 and 1940 both populations increased.	**1**	NOT: Between 1930 and 1940 the bush wren population increased despite no decrease in stoat population
		(iv)	Bush wren species population falls to 0/becomes extinct (in 1960). **OR** Stoats have eliminated the bush wrens.	**1**	
14.	**A**	(i)	1. weeds compete with crop plants and reduce productivity/yield 2. annual weeds have: • rapid growth • short life cycle • high seed output • long-term seed viability **Any 2** 3. additional 2 named from Pt 2. 4. perennial weeds have storage organs/vegetative reproduction 5. (invertebrate) pests include: • Insects • nematode (worms) • molluscs **Any 2** 6. pests/invertebrates damage/eat crop plants/leaves and reduce productivity/yield 7. pests/invertebrates are vectors of/carry diseases/pathogens **or** diseases/pathogens can spread from weeds to crops.	**5**	

Question			Expected response	Max mark	Additional guidance
14.	**A**	(ii)	a. chemical control/pesticides include: • insecticides • molluscicides • nematocides • fungicides • herbicide **Any 2** b. selective herbicides are more effective on broad leaved weeds c. systemic herbicides spread through (the vascular system of) the weed/plant and prevent regrowth/kills the whole plant **or** systemic insecticide/molluscicide /nematocide spread through (the vascular system of) the plant and kill pests d. using/applying fungicide based on fungal/disease forecasts is more effective than treating diseased crops e. pesticides/herbicides/ insecticides/molluscicides/ nematocides/fungicide/chemicals are toxic/harmful to/affect non-target species **or** cause bioaccumulation/biomagnification **or** produce resistant populations of pests **or** are persistent in the environment/do not degrade	**3**	

Question			Expected response	Max mark	Additional guidance
14.	**B**	(i)	1. parasitism/it is a form of symbiosis **or** parasitism is a co-evolved intimate relationship between (members of) different species 2. parasite benefits/gains and host is harmed/loses 3. gain/loss of energy/food/nutrients 4. parasites (often) have limited metabolism 5. (some) parasites cannot survive out of contact with/outside of their host **or** parasites require/need a host to survive 6. parasites are transmitted/spread by: • direct contact • vectors • resistant stages **Any 2** 7. (some) parasites have intermediate/secondary hosts where they complete/have part of their life cycles	**5**	NOT: recipient benefits and donor is harmed

Question			Expected response	Max mark	Additional guidance
14.	**B**	(ii)	a. social insects are: • bees • wasps • ants • termites **Any 2** b. (only) queens and drones breed/mate/reproduce **or** drones fertilise the queen's eggs c. workers are sterile/infertile d. workers: • defend hive • collect/look for pollen/nectar/food • carryout waggle dances to show direction/location of food • care for young/raise relatives **Any 2** e. workers show kin selection **or** roles of workers increases/ensures survival of shared genes **or** roles of workers increase the chances of shared genes being passed on to the next generation/offspring	**3**	

[END OF MARKING INSTRUCTIONS]