

Markscheme

November 2025

Biology

Standard level

Paper 2

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Subject Details: Biology SL Paper 2 Markscheme

Candidates are required to answer **all** questions in Section A and **one** out of **two** questions in Section B. Maximum total = **50 marks**.

1. Each row in the “Question” column relates to the smallest subpart of the question.
2. The maximum mark for each question subpart is indicated in the “Total” column.
3. Each marking point in the “Answers” column is shown by means of a semicolon (;) at the end of the marking point.
4. A question subpart may have more marking points than the total allows. This will be indicated by “**max**” written after the mark in the “Total” column. The related rubric, if necessary, will be outlined in the “Notes” column.
5. An alternative word is indicated in the “Answers” column by a slash (/). Either word can be accepted.
6. An alternative answer is indicated in the “Answers” column by “**OR**”. Either answer can be accepted.
7. An alternative markscheme is indicated in the “Answers” column under heading **ALTERNATIVE 1** etc. Either alternative can be accepted.
8. Words inside brackets () in the “Answers” column are not necessary to gain the mark.
9. Words that are underlined are essential for the mark.
10. The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.
11. If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **OWTTE** (or words to that effect) in the “Notes” column.
12. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
13. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script.
14. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.

Section B

Extended response questions - quality of construction

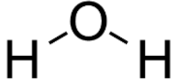
- ◆ Extended response questions for SLP2 carry a mark total of **[16]**. Of these marks, **[15]** are awarded for content and **[1]** for the quality of the answer.
- ◆ **[1]** for quality is to be awarded when:
 - ◆ the candidate's answers are clear enough to be understood without re-reading.
 - ◆ the candidate has answered the question succinctly with little or no repetition or irrelevant material.
- ◆ It is important to judge this on the overall answer, taking into account the answers to all parts of the question. Although, the part with the largest number of marks is likely to provide the most evidence.
- ◆ Candidates that score very highly on the content marks need not necessarily automatically gain **[1]** for quality (and *vice versa*).

Section A

Question			Answers	Notes	Total
1.	a		<i>Kennedia coccinea</i> / <i>K. coccinea</i> ;	<i>Italics and underlining are not required.</i>	1
1.	b		10 / 9.5 °C OR 20 to 30 °C / 20-30 °C OR 30 to 20 °C / 30-20 °C;	<i>Accept answers in the range of 9 to 10 °C.</i> <i>Accept range of 20 to 29°C, 21 to 30°C</i> <i>Units required.</i> <i>Working (30 – 20 = 10) not required</i> <i>because only one mark can be earned.</i>	1
1.	c		larger gap/wider tolerance between T_{opt} and T_{max} in Group 2 / vice versa / OWTTE OR the species in group 2 show a higher germination rate than the species in group 1 OR (generally)species in group 2 can tolerate warmer temperatures than group 1;		1 max
1.	d	i	a. fluctuates more in winter (than in summer); b. higher in winter (than in summer);	<i>Allow vice versa statements.</i>	2

Question		Answers	Notes	Total
1.	f	<p>a. group 1 because there is less gap between T_{opt} and T_{max}</p> <p>OR</p> <p>group 1 is more likely to be adversely affected by increase in soil temperature because they have a narrow range of tolerance for higher temperatures than in group 2;</p> <p>b. group 1 because T_{max} is lower in most species;</p> <p>c. if global warming heats up the soil temperature, the seeds will germinate earlier which may be adverse (in either group);</p> <p>d. group 2 because T_{opt} is (generally) lower (than group 1);</p> <p>e. however, some species in group 2 have as low a T_{max} as group 1, therefore some species in group 2 will be adversely affected;</p> <p>f. species (regardless of group) may be adversely affected because increasing soil temperature means less water available for germination;</p>		2 max

Question		Answers	Notes	Total
2.	a	a. essential amino acids cannot be synthesized (by human cells) OR essential amino acids are required to be obtained by diet / OWTTE; b. non-essential amino acids can be made (from other amino acids);		2
2.	b	X = (small subunit of) ribosome; Y = <u>m</u> RNA / <u>messenger</u> RNA;	<i>Do not accept RNA without messenger or m.</i>	2
2.	c	a. ribosome moves along the mRNA molecule/structure X moves along Y; b. amino acids added (to the polypeptide) one by one OR some polypeptides are still in formation / OWTTE; c. more amino acids added to the polypeptide by the ribosome on the right;		2 max

Question		Answers	Notes	Total
3.	a	a. mitochondria/lysosome; b. approximate size relative to other organelles; c. shape is correct (other membrane-bound organelles/ER/Golgi have a different shape);	a. <i>Is for the organelle and additional marking points are for reasons.</i> a. <i>Accept the first answer given if a list is provided by the answer.</i>	2 max
3.	b	eukaryotic because there are nuclei/membrane-bound organelles/compartimentalized organelles;		1
3.	c	chitin/glycoprotein/glucans;	<i>Do not accept cellulose</i>	1
3.	d	aseptate/not divided up into cells/more than one nucleus (in the cell);	<i>Accept the first answer given.</i>	1
3.	e	a. two hydrogens and one oxygen; b. (2 hydrogen and 1 oxygen) linked by single lines to represent bonds placed at an angle;		2

Question		Answers	Notes	Total
4.	a	a. active transport (across membranes); b. synthesis of proteins/polysaccharides/nucleic acids/macromolecules OR (any) condensation reactions / anabolic reactions; c. movement of the cell/muscle contraction OR movement of chromosomes/cell components;	Accept more precise examples of active transport, synthesis or movement such as sodium potassium pump, DNA synthesis, photosynthesis, glycolysis, protein synthesis. Accept the first two answers given in a list.	2 max
4.	b	a. (ATP) is synthesized during (cell) respiration; b. anaerobic makes less ATP than aerobic; c. (ATP) is produced from carbon compounds/glucose; d. glucose + oxygen produces carbon dioxide + water + ATP; e. glucose changing to lactic acid (produces ATP); f. (ATP) is produced in mitochondria OR (ATP) is produced in the cytoplasm by anaerobic respiration;	b. Accept vice versa.	3 max

Question		Answers	Notes	Total
5.	a	neurotransmitter/acetylcholine/another verified example of neurotransmitter;		1
5.	b	a. (only) pre-synaptic membrane has calcium channels/allows calcium to diffuse across OR (only) pre-synaptic membrane releases neurotransmitters from their axon terminals; b. (only) post-synaptic membrane has receptors for neurotransmitter OR (only) accept neurotransmitter in their dendrites/post-synaptic membrane; c. the presynaptic membrane is at the axon terminal, but the post synaptic membrane is at a dendrite;	<i>Accept other verified differences.</i>	2 max
5.	c	short distance for diffusion of neurotransmitter; synaptic transmission is faster;		1 max

Section B

Clarity of communication: [1]

The candidate's answers are clear enough to be understood without re-reading. The candidate has answered the question succinctly with little or no repetition or irrelevant material.

Question		Answers	Notes	Total
6.	a	<p><i>Negative feedback max 3</i></p> <p>a. negative feedback used in homeostasis</p> <p>OR</p> <p>negative feedback to maintain equilibrium;</p> <p>b. negative feedback returns level of variable to the set point/norm;</p> <p>c. negative feedback used to keep level of variable constant/within (narrow) limits;</p> <p>d. negative feedback causes increase following a decrease / decrease following an increase;</p> <p><i>Positive feedback</i></p> <p>e. positive feedback amplifies changes;</p> <p>f. positive feedback disrupts equilibrium;</p> <p>g. positive feedback is generally for a short time;</p>	<p><i>Use of an example to illustrate a marking point may be given credit.</i></p> <p><i>d. Allow a labelled graph.</i></p>	<p>4 max</p>

Question		Answers	Notes	Total
6.	b	a. pancreas cells monitor blood glucose concentrations; b. glucagon secreted by alpha cells and insulin secreted by beta cells; c. glucagon/insulin/hormones secreted into/transported by bloodstream; d. insulin secreted when glucose concentration rises/is high; e. insulin stimulates uptake of glucose by liver/muscle/body cells; f. insulin stimulates conversion of glucose to glycogen (in liver/muscle cells); g. insulin stimulates body cells to use glucose instead of fat in cell respiration; h. glucagon secreted when glucose concentration falls/is low; i. glucagon stimulates breakdown of glycogen to glucose (by liver/muscle cells); j. negative feedback (is used to regulate blood glucose concentration);		7 max
6.	c	a. pH decreases when there is too much carbon dioxide in the blood OR removal of carbon dioxide from blood increases the pH; b. lower pH detected by chemoreceptors (in the brainstem/carotid artery/aorta); c. brainstem/medulla controls ventilation/breathing rate; d. diaphragm/intercostal muscles contract more often/more powerfully; e. (these muscle contractions) increase ventilation rate; f. carbon dioxide concentration of blood is reduced in the alveoli; g. heart muscles contract more often/more powerfully/heart rate increased; h. blood pressure increased / rate of blood flow increases;		4 max

Question		Answers	Notes	Total
7.	a	<p>a. evolution occurs by natural selection;</p> <p>b. analogous structures come from convergent evolution;</p> <p>c. analogous structures have similar functions or structures evolved from different ancestry;</p> <p>d. similar conditions/environments have similar selective pressures favouring similar adaptations;</p> <p>e. similar functions/functional requirements result in similar adaptations/structures;</p> <p>f. e. g. torpedo shaped body in sharks and whales to facilitate swimming/ another verified example;</p>		4 max

7.	b	<p>a. wide-spreading roots allow water collected from large area;</p> <p>b. water storage tissue/thick leaves/stem survival during (long) droughts/periods without rainfall;</p> <p>c. deep roots to collect water from greater depths/underground sources;</p> <p>d. vertical stems to reduce exposure to sun at midday/heating when the sun is overhead/hottest</p> <p>OR</p> <p>pleated stems to allow shrinkage and reswelling/to store water;</p> <p>e. few stomata transpiration reduced/minimizes;</p> <p>f. waxy cuticle conserves water;</p> <p>g. stomata open at night reduces transpiration;</p> <p>h. no leaves/narrow leaves/leaves as spines/scales decreases surface area/reduces stomata/transpiration/water loss;</p> <p>i. rolled leaves/hairs around stomata harness humidity/decrease water loss;</p> <p>j. pitted/sucken stomata reduces transpiration/water loss;</p>		<p>7 max</p>
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Question		Answers	Notes	Total
7.	c	<ul style="list-style-type: none">a. piercing mouthparts/stylet for feeding on/sucking out sap;b. chewing mouthparts/mandibles for eating leaves/stems/wood;c. grinding teeth/ridged molars;d. multiple stomachs/long caecum/intestine for better digestion;e. able to detoxify plant toxins;f. make cellulase to digest cellulose/harbour cellulase producing microbes;g. e.g. some birds/hummingbirds have long beak/tongue for extracting nectar / any verifiable adaptation for feeding or digestion;		4 max
