2225 – 6011M

Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2025

Biology

Standard level

Paper 1B

7 pages

Subject Details: Biology SL Paper 1B Markscheme

Candidates are required to answer **all** questions in Paper 1B. Maximum total = **25 marks**.

1. A markscheme often has more marking points than the total allows. This is intentional.

2. Each marking point has a separate line and the end is shown by means of a semicolon (;).

3. An alternative answer or wording is indicated in the markscheme by a slash (/). Either wording can be accepted.

4. An alternative answer is indicated by "***OR***". Either answer can be accepted.

5. An alternative markscheme is indicated under heading ***ALTERNATIVE 1*** etc. Either alternative can be accepted.

6. Words in brackets ( ) in the markscheme are not necessary to gain the mark.

7. Words that are underlined are essential for the mark.

8. The order of marking points does not have to be as in the markscheme, unless stated otherwise.

9. 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 markscheme 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).

10. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.

11. 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.

12. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the markscheme.

Question			Answers	Notes	Total
1.	**a**		any guard cell correctly labelled;	*Line must touch part of guard cell.* *Do not allow a circle around the whole stoma.*	**1**
1.	**b**		magnification of both lenses multiplied together (eyepiece/ocular and objective lens);		**1**
1.	**c**	**i**	(count) number of stomata (within field of view / image) **AND** divide by the area / field of view;		**1**
1.	**c**	**ii**	repeat with other areas of cast/leaf **AND** calculate the mean/average ***OR*** repeat/replicate with more leaves **AND** calculate the mean/average;		**1 max**
1.	**d**		a. aerial/upwards/vertical roots/pneumatophores / lenticels/pores; b. for gas exchange/respiration; **ALTERNATIVE 1** c. thick impermeable outer layer/suberin; d. reduce salt absorption; **ALTERNATIVE 2** e. (root) cells can accumulate solutes; f. reduce water loss due to osmosis/dehydration; **ALTERNATIVE 3** g. buttress/prop/stilt roots; h. increase stability in swampy/muddy soils;	*Max 1 mark for correct feature or explanation alone.* *Explanation must match adaptation for 2 marks.* *a: Accept surface roots or roots out of the water.* *e: Accept reverse osmosis.* *g: Do not accept deep/long/tangled roots.*	**2 max**

Question			Answers	Notes	Total
2.	**a**	**i**	22.0-22.9 (µm);		**1**
2.	**a**	**ii**	22.0-22.9 (µm);		**1**
2.	**b**		a. (it shows) <u>continuous</u> variation; b. as there are many intermediate lengths between the two extremes / normally distributed ***OR*** no distinct categories ***OR*** all shell lengths are possible (between the extremes);	*b. bell shape curve is not sufficient.*	**2 max**
2.	**c**		<u>*Similarity:*</u> a. both involve changes in the sequence of DNA/bases/nucleotides/triplets ***OR*** both may cause the production of a different amino acid/protein/polypeptide; <u>*Difference:*</u> b. substitution changes a base/nucleotide while insertion adds a base/nucleotide ***OR*** substitution changes one triplet while insertion changes more / causes frameshift ***OR*** substitution may not change protein/polypeptide function while insertion usually does;	*Accept codon in place of triplet.* *b. the contrast between substitution and insertion must be clear.*	**2 max**
2.	**d**		they feed as autotrophs **AND** heterotrophs/saprotrophs/holozoic ***OR*** able to photosynthesise **AND** feed on organic chemicals ***OR*** they are (both) producers **AND** consumers;	*OWTTE*	**1 max**

Question			Answers	Notes	Total
3.	**a**	**i**	as axon diameter increases, the speed of transmission increases too / positive correlation/relationship;		**1**
3.	**a**	**ii**	a. R^2 is the coefficient of determination; b. R^2 compares variation between dependent and independent variables; c. R^2 represents the (percentage of) data that is closest to the line of best fit/regression line; d. 0.92/R^2 is close to 1 / is highly significant; e. 92% of the variation in conduction velocity can be explained by variations in axon diameter;	*e. 92% must be mentioned.*	**2 max**
3.	**b**		sensory (neurons) transmit impulses to CNS/spinal cord/brain/interneurons while motor transmit away from CNS/spinal cord/brain/interneurons ***OR*** sensory receive impulses from sense organs/receptors while motor stimulate effectors/muscles/glands;	*Accept an annotated diagram eg reflex arc with both neurons.*	**1 max**
3.	**c**		a. ATP is stable/soluble in the cytoplasm; b. (ATP) stores/supplies energy / is energy currency; c. when ATP is converted to ADP / a phosphate group is released (from ATP); d. <u>hydrolysis</u> produces ADP; e. the small amounts of energy involved means little energy is wasted; f. ATP is easily/rapidly regenerated (from ADP and P);		**3 max**

Question			Answers	Notes	Total
4.	**a**		a. somatic cells because all chromosome numbers are even; b. somatic cells have full/two sets of chromosomes / diploid/2n; c. somatic cells because the <u>diploid/2n</u> number of humans is 46;	*c. accept other examples*	**1 max**
4.	**b**		by length/ centromere position/banding pattern;	*Accept size* *Do not accept shape*	**1**
4.	**c**		coiling/condensing of chromosomes/DNA (for cell division/mitosis/meiosis);	*OWTTE* *Do not accept references to stability or structure.*	**1**
4.	**d**		*(They may be positively correlated because:)* a. bees may be the least complex animal species and have the smallest genome size (among the animals shown in the table) ***OR*** humans may be the most complex animal species and have the largest genome size (among the animals shown in the table); *(They may not be positively correlated because:)* b. *P.japonica/P.sylvestris/*the two plant species have a much larger genome than the animal species but they are possibly less complex organisms ***OR*** humans may be the most complex species, however have a smaller genome than the two plant species; c. complexity is not defined / is subjective / insufficient data in the table;		**2 max**