

Markscheme

November 2025

Biology

Standard level

Paper 1B

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Subject Details: Biology SL Paper 1b Markscheme

Candidates are required to answer **all** questions. 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 | | (eyepiece) graticule; | | 1 |
| 1. | b | i | 42.5 μm OR 45 μm ; | <i>Accept any value within the range: 42 to 45 μm; Unit required.</i> | 1 |
| 1. | b | ii | 1000 +/- 200 (x); | <i>Accept any value within the range 800 to 1200. Allow ECF, but working must be shown and it must be around 45 mm divided by the result of 1bi.</i> | 1 |

| 1. | c | <p>a. both have cytoplasm OR both have ribosomes OR both have (plasma/cell) membrane OR both have DNA/genetic material;</p> <p>b.</p> <table border="1"> <thead> <tr> <th>Eukaryotic cells</th> <th>Prokaryotic cells</th> </tr> </thead> <tbody> <tr> <td>have 80s/bigger ribosomes</td> <td>have 70s/smaller ribosomes</td> </tr> <tr> <td colspan="2">OR</td> </tr> <tr> <td>have (DNA in) a nucleus / nuclear membrane</td> <td>have nucleoid/DNA free in the cytoplasm / lack a nucleus</td> </tr> <tr> <td colspan="2">OR</td> </tr> <tr> <td>are compartmentalized / have membrane-bound organelles/a named membrane-bound organelle</td> <td>are not compartmentalized / do not have membrane-bound organelles/a named membrane-bound organelle</td> </tr> <tr> <td colspan="2">OR</td> </tr> <tr> <td>have proteins/histones associated with DNA</td> <td>have no proteins/histones / have naked DNA</td> </tr> <tr> <td colspan="2">OR</td> </tr> <tr> <td>have linear chromosomes/DNA</td> <td>have circular chromosomes/(loops of) DNA;</td> </tr> </tbody> </table> | Eukaryotic cells | Prokaryotic cells | have 80s/bigger ribosomes | have 70s/smaller ribosomes | OR | | have (DNA in) a nucleus / nuclear membrane | have nucleoid/DNA free in the cytoplasm / lack a nucleus | OR | | are compartmentalized / have membrane-bound organelles/a named membrane-bound organelle | are not compartmentalized / do not have membrane-bound organelles/a named membrane-bound organelle | OR | | have proteins/histones associated with DNA | have no proteins/histones / have naked DNA | OR | | have linear chromosomes/DNA | have circular chromosomes/(loops of) DNA; | <p><i>Features common to all eukaryotes and all prokaryotes are needed, so reject reference to cell walls, pili and flagella.</i></p> <p><i>Award both marks if a similarity is implicit in the comparison, e.g. 'eukaryotic cells have bigger ribosomes than prokaryotic cells' or 'eukaryotes have DNA in the nucleus and prokaryotes free in the cytoplasm'.</i></p> <p><i>If more than one similarity or difference is given, award the mark even if one of them is incorrect unless there's a contradiction.</i></p> <p><i>b. Correct reference to both eukaryotic and prokaryotic cells for the same cell component or a comparative word required for the mark, e.g. 'eukaryotes have larger ribosomes' or 'only eukaryotes have the nucleus'.</i></p> | <p>2 max</p> |
|---|--|---|------------------|-------------------|---------------------------|----------------------------|-----------|--|--|--|-----------|--|---|--|-----------|--|--|--|-----------|--|-----------------------------|---|---|---------------------|
| Eukaryotic cells | Prokaryotic cells | | | | | | | | | | | | | | | | | | | | | | | |
| have 80s/bigger ribosomes | have 70s/smaller ribosomes | | | | | | | | | | | | | | | | | | | | | | | |
| OR | | | | | | | | | | | | | | | | | | | | | | | | |
| have (DNA in) a nucleus / nuclear membrane | have nucleoid/DNA free in the cytoplasm / lack a nucleus | | | | | | | | | | | | | | | | | | | | | | | |
| OR | | | | | | | | | | | | | | | | | | | | | | | | |
| are compartmentalized / have membrane-bound organelles/a named membrane-bound organelle | are not compartmentalized / do not have membrane-bound organelles/a named membrane-bound organelle | | | | | | | | | | | | | | | | | | | | | | | |
| OR | | | | | | | | | | | | | | | | | | | | | | | | |
| have proteins/histones associated with DNA | have no proteins/histones / have naked DNA | | | | | | | | | | | | | | | | | | | | | | | |
| OR | | | | | | | | | | | | | | | | | | | | | | | | |
| have linear chromosomes/DNA | have circular chromosomes/(loops of) DNA; | | | | | | | | | | | | | | | | | | | | | | | |

| Question | | Answers | Notes | Total |
|----------|---|---|--|-------|
| 2. | a | <u>transect</u> ; | | 1 |
| 2. | b | <p><i>Similarities:</i></p> <p>a. highest values at 219m and 780m in both OR lowest values at 1268m/highest altitude in both OR similar values at 219m and 780m in both OR values decrease at 405m in both;</p> <p><i>Differences:</i></p> <p>b. (all) values/value at a stated altitude for leaf litter lower than fresh leaves OR values for 405m and 1268m are similar in the litter but not in the fresh OR the highest value for fresh leaves is at altitude 780m, but 219m for leaf litter / OWTTE;</p> | <p><i>a. Do not accept answers referring to a general decrease in carbon isotope content with increasing altitude.</i></p> <p><i>b. Do not accept just stating values for litter and fresh leaves without a comparison.</i></p> <p><i>b. Accept vice versa.</i></p> <p><i>Accept any other valid similarity or difference.</i></p> | 2 |

| Question | | | Answers | Notes | Total |
|----------|---|--|---|--|----------|
| 2. | c | | temperature / rainfall/humidity/water (availability) / light (intensity) / oxygen (concentration) / carbon dioxide (concentration) / <u>soil</u> pH/composition/minerals/nutrients; | <i>Accept the first answer only.</i> | 1 |
| 2. | d | | a. through stoma/stomata / opening between guard cells; b. <u>air spaces</u> ; c. (spongy/palisade) mesophyll (cells) OR across <u>membrane</u> of chloroplast; | <i>a. Do not accept pores alone for stomata, but accept stomatal pores.</i> <i>c. Do not accept across membrane alone, without reference to chloroplasts.</i> | 2 max |

| Question | | Answers | Notes | Total |
|----------|---|--|---|-------|
| 3. | a | oximeter/oxygen meter/probe/sensor OR respirometer; | <i>Do not accept spirometer.</i> <i>Do not accept respiration measurer and respirator.</i> <i>Do not accept oxygen detector.</i> <i>Do not accept carbon dioxide meter/probe/sensor.</i> | 1 |
| 3. | b | CO ₂ /carbon dioxide / pH/acidity/acid; | <i>Ignore oxygen.</i> <i>Do not accept carbon alone.</i> | 1 |
| 3. | c | (-) 6 (°C); | <i>Units not required for the mark.</i> | 1 |

| Question | | Answers | Notes | Total |
|----------|---|---|--|--------------------------------|
| 3. | d | <p>a. <i>A. limbata</i>/Pacific species/<i>A. aurita</i>/Atlantic species because respiration rate increases (at higher temperature);</p> <p>b. (which results in) more energy/ATP (for growth/reproduction/cell division);</p> | <p><i>a. It must refer to an increase in respiration rate, not a comparison of respiration rates in the two species.</i></p> <p><i>Do not accept references to maximum respiration at higher temperatures/stated higher temperature if no increase in respiration rate mentioned.</i></p> <p><i>Do not accept answers referring to a positive correlation without naming the correlated variables.</i></p> | <p>2 max</p> |

| Question | | Answers | Notes | Total |
|----------|---|--|---|-------------------------|
| 3. | e | <p>a. (it is) active transport; b. protein pump/carrier used OR Na⁺- K⁺/sodium-potassium pump used;</p> <p>c. (3) Na⁺/sodium (ions) moved out and (2) K⁺/potassium (ions) in OR (3) Na⁺/sodium (ions) and (2) K⁺/potassium (ions) moved against their concentration gradients / OWTTE;</p> <p>d. membrane is polarized / outside (of the axon) is positive, whereas inside is negative OR resting potential is -70 mV;</p> | <p><i>Ignore reference to action potential, depolarization and repolarization.</i></p> <p><i>b. Do not accept membrane channels.</i></p> <p><i>b. Do not accept proteins alone.</i></p> <p><i>c. Both ions and both directions required for the mark.</i></p> <p><i>c. Ignore reference to diffusion/channels if the ions and directions are correct.</i></p> <p><i>d. Allow answers in the range of -80 mV to -50 mV. The correct unit is required if a value is stated.</i></p> | <p>2 max</p> |

| Question | | Answers | Notes | Total |
|----------|---|---|--|----------|
| 4. | a | prophase; | | 1 |
| 4. | b | <p>a. (plasma/cell) membrane pulled inwards OR membrane/cell pinched together (around the equator of the cell);</p> <p>b. (by) ring of proteins / contractile ring/proteins OR (by) actin and myosin;</p> <p>c. cytoplasm is split / cell divides;</p> <p>d. organelles are distributed between the two cells OR organelles are pulled by microtubules to opposite poles;</p> | <p>a. Accept OWTTE, including cleavage furrow or an invagination forming.</p> <p>b. Do not accept proteins unqualified. b. Both actin and myosin required for the mark in the second alternative.</p> <p>c. Accept OWTTE.</p> | 2 max |
| 4. | c | 168-169/169-170/168-170 (cm); | <p>Units not required for the mark.</p> <p>Accept the first range given.</p> <p>Accept answers with decimals, e.g. 168-169.9.</p> <p>Accept answers joined by 'and' or 'to' rather than a dash, e.g. 168 and 170 or 168 to 170.</p> <p>Do not accept individual numbers.</p> | 1 |

| Question | | Answers | Notes | Total |
|----------|---|---|---|-------------------------|
| 4. | d | <p>a. <u>multiple alleles</u> OR (the alleles are) I^A, I^B, i;</p> <p>b. I^A and I^B (alleles) are codominant to each other OR $I^A I^B$ (genotype) gives blood group/type AB;</p> <p>c. i (allele) is recessive to both I^A and I^B (alleles) OR I^A and I^B (alleles) are dominant to i (allele) OR $I^A i$ (genotype) gives blood group/type A and $I^B i$ (genotype) gives blood group/type B;</p> <p>d. 4 blood groups/types: A, B, AB, O;</p> <p>e. there are no intermediate blood groups/types;</p> | <p>a. Correct symbols required for the mark, but can be stated in different parts of the answer. Do not accept I for i for this mark.</p> <p>a., b. and c. Do not accept blood groups/types / genes for alleles.</p> <p>d. All four blood groups needed for the mark, but can be stated in different parts of the answer.</p> <p>e. Accept OWTTE.</p> | <p>3 max</p> |