Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

November 2025

Biology

Higher level

Paper 1B

14 pages

Subject Details: Biology HL Paper 1B Markscheme

Candidates are required to answer **all** questions in Paper 1B. Maximum total = **35 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.

Question			Answers	Notes	Total
1.	**a**		(eyepiece) graticule;		**1**
1.	**b**	**i**	42.5 µm ***OR*** 45 µm;	*Accept any value within the range:* *42 to 45 µm;* *Unit required.*	**1**
1.	**b**	**ii**	1000 +/- 200 (x);	*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.*	**1**

Question			Answers	Notes	Total
1.	**c**		a. Y/(mitochondrion) releases ATP/carries out aerobic/cellular respiration; b. Z/(Golgi apparatus) packages/modifies proteins/carbohydrates/lipids / makes lysosomes/vesicles;	*a. Accept produces ATP / Krebs cycle.* *Accept correct function for Y/Z, even if incorrect organelle name is given.* *Do not accept packages substances/molecules/products – too vague.*	**2 max**

Question			Answers	Notes	Total
1.	d		*Similarities:* **[2 max]** a. in both lambda attaches to bacterial/host cell; b. both insert DNA into the bacterial/host cell ***OR*** both infect the bacterial/host cell; c. both use the bacterial/host cell (pathways) to replicate their DNA; *Differences* **[2 max]** d. in lytic (cycle), the viral DNA is replicated independently/remains separate from the bacterial/host DNA ***AND*** in lysogenic (cycle), the viral DNA integrates with the bacterial/host DNA; e. in lytic viral/virion assembly occurs ***AND*** in lysogenic it is delayed/dormant; f. in lytic, the bacterial/host cell is then destroyed/bursts/lysed ***AND*** in lysogenic it is delayed/not destroyed;	*Do not accept answers referring to RNA, genome or genetic material instead of DNA. Use ECF for continued use of the above terms.* *a. Do not accept that both cause cells to burst/die.* *b. Do not accept insertion of virus into host cell.* *c. Do not accept that the virus reproduces, it needs to be viral DNA replication.* *Accept statements saying 'only' as implying that the other cycle is the opposite.*	**3 max**

Question			Answers	Notes	Total
2.	**a**		towards the back of the hand/upwards/backwards;	*Accept movement to the side if the hand is identified e.g. towards the left in the left hand.* *Accept clear description of the movement relative to the hand e.g. away from the palm.* *Do not accept only bending or flexing the finger. Direction must be included.*	**1**
2.	**b**		(video and) computer/app analysis of images ***OR*** goniometer;	*Accept use a protractor on an image.* *Do not accept protractor on its own.*	**1**
2.	**c**		63 to 65 (for method 1 – lowest value) ***OR*** 79 to 81 (for method 1 – value on correlation line) ***OR*** 88 to 90 (for method 2);	*Angle unit not required.* *Mark first answer only.* *Accept a value in the ranges given.*	**1**
2.	**d**		ligaments/tendons;	.	**1**

Question			Answers	Notes	Total
2.	e		strong/good/high correlation ***OR*** the two methods have good agreement;		1
2.	f		***Structure*** a. <u>lignified</u>/<u>lignin</u> in walls provides support/prevents collapsing/resists (negative) pressure/tension; b. polar walls allow for the adhesion of water molecules (for capillary action); ***Transport*** c. no cell contents/empty/hollow so transport is not impeded; d. end walls absent/incomplete/perforated for unimpeded flow ***OR*** long continuous tubes allowing for continuous column of water; e. pits/gaps/pores in walls allow (lateral) movement/entry and exit of water/minerals; f. small diameter allows for capillary action/tension in water column;	*Each structure must include an explanation.* *a. Do not accept cellulose instead of lignin.* *b. Accept hydrogen bonding as indicating polar bonding to the walls through adhesive forces.* *e. Do not accept reference to osmosis but accept reference to water movement into/out of phloem.*	3 max

Question			Answers	Notes	Total
3.	**a**		*Ulva taeniata: violet/*blue; *Porphyra nereocystis:* green ***OR*** blue/green;	*For Ulva, accept either violet or blue.* *For Porphyra, do not accept only blue.*	**2**
3.	**b**		a. *P. nereocystis* because action spectrum/photosynthesis is very low in red light/longer wavelength ***OR*** *P. nereocystis* because action spectrum/photosynthesis is higher in green/blue light (which can penetrate deeper waters) ***OR*** *P. nereocystis* as it is not dependant on red light for photosynthesis but uses green/blue light; b. (theoretically) *U. taeniata* as it has the highest action spectrum at the shortest wavelengths/violet/blue;	*Do not accept answers referring to the absorption/reflection only.* *Accept answers referring to wavelength instead of colour.*	**1 max**

Question			Answers	Notes	Total
3.	**c**		a. expose algae to different light wavelengths/colour/filters; b. at a fixed distance/intensity; c. (measure) levels of oxygen/carbon dioxide/pH; d. per/over (a fixed period of) time; e. other named controlled variable: temperature/mass of seaweed/volume of water/salt concentration; f. plot wavelength (x-axis) against the named/dependent variable (y-axis);	*[**Max 2**] if different wavelengths/colours/filters are not mentioned.* *c. and d. Accept oxygen produced per time, also in a formula or 'rate of oxygen production' for 2 marks.* *c. Do not accept bubbles only.* *e. Only 1 variable required. Do not accept controlled environment.* *Do not accept rate of photosynthesis as it's in the stem.*	**3 max**
3.	**d**		***Location:*** a. located in <u>thylakoid</u> (membranes); b. photosystem/PS II is linked to Photosystem/PS I (by electron carriers) ***OR*** PS II is located before PS I OWTTE; ***Structure:*** c. reaction center/chlorophyll/primary pigment ***AND*** accessory pigments / light harvesting complex/antenna; d. P680/P700/special chlorophyll (a) as the reaction centre;	*b. Do not accept only the names of the photosystems without reference to linkage or order.* *c. Accept 'various' or 'an array of' pigments for accessory pigments.*	**2 max**

Question			Answers	Notes	Total
3.	**e**		(thin layer/paper) chromatography;		**1**

Question			Answers	Notes	Total
4.	**a**		(-) 64 (%);	*Allow 62 – 66 (%).* *(28 000 – 10 000) / 28 000 x 100* *Working is not required.*	**1**
4.	**b**		satellite imagery has improved over time (allowing smaller areas to be discerned) ***OR*** small scale farming/agriculture/clandestine logging has become more common ***AND*** government control has increased / become more effective ***OR*** laws/global pressures have reduced largescale industry/logging;	*Accept other reasonable responses that address both factors for the marking point e.g. more regulation on large clearings **and** little/none on small clearings.* *Accept larger areas are being reforested/disused, **and** smaller ones are farmed/ used more.* *Accept focus on reforestation of larger areas **and** smaller ones ignored.*	**1**

Question			Answers	Notes	Total
4.	**c**		(vaporization/evaporation) cools the atmosphere /(increased) rainfall/precipitation ***OR*** affects air flow ***OR*** increases in greenhouse effect/global warming;	*Accept only the first answer.* *Do not accept increased humidity or climate change.* *Accept increases global/earth's temperature.* *Accept increased <u>infrared</u> radiation absorbed.*	**1**

Question			Answers	Notes	Total
4.	**d**		a. geographic isolation prevents populations from interbreeding ***OR*** (leads to) reproductive isolation ***OR*** smaller populations promote inbreeding (within fragment) ***OR*** decrease in geneflow/gene pool; b. different environmental conditions/selection pressures in the fragmented areas; c. some characteristics/traits/phenotypes more advantageous/disadvantageous; d. natural selection occurs; e. frequency of some alleles increases ***OR*** some alleles may be lost from the gene pool; f. may decrease genetic variety/diversity (in each gene pool) ***OR*** may lead to <u>allopatric</u> speciation;	*a. do not accept 'changes in gene pool' – too vague.* *a. and f. the idea that the gene pool/genetic variety decreases is essential.* *b. Accept specific examples of selective pressures as OWTTE.* *b and c. Do not accept references merely to adaptation to the environment – too vague.* *d. Do not accept references to evolution.* *e. Accept decreases/changes in allele frequencies but not changes in 'genes' or 'mutations'.*	**3 max**

Question			Answers	Notes	Total
4.	**e**		a. increased (named) greenhouse gases increases global warming / vice versa; b. increased deforestation increases atmospheric CO_2; c. warmer ocean water releases carbon dioxide (because it is less soluble); d. melting of snow/ice so less reflection/more radiation absorbed; e. increased (peat) decomposition releases methane/CO_2; f. melting of permafrost releases methane/CO_2; g. increased forest fires/burnt fossil fuels release CO_2; h. increasing <u>cellular</u> respiration (in cellular organisms) increases CO_2 production ***OR*** increased livestock increases release of methane;	*Accept greenhouse gases as CO_2.* *a. Do not accept increased CO_2 decreases ozone layer.* *a. Do not accept an increase in temperature as an increase in global warming.* *b. Accept deforestation (decreases carbon sink so) more CO_2 remains in the atmosphere.* *b. Accept other examples of loss of algae/plants as 'deforestation'.* *d. Do not accept melting icebergs increase ocean levels. Accept albedo as a measure of reflection.*	**4 max**