2225 – 6020

Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2025

Biology

Higher level

Paper 1B

9 pages

Subject Details: Biology HL Paper 1B Markscheme

Candidates are required to answer **all** questions in Paper 1B. Maximum total = **35 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		3 / three;	*Accept Pan, Gorilla, Pongo*	1
1.	b		*(No)* a. the data only shows the two amino acids that differ between <u>humans</u> and *P. paniscus* or *G.gorilla* (in the FOXP2 protein); b. the data only shows the comparison of one <u>protein</u>; c. *P. paniscus* and *G. gorilla* protein could have more/fewer/other amino acids that differ (between them) ***OR*** the specific amino acid differences are unknown;		2 max
1.	c		a. length / size of chromosome 2 in humans and 12+13 in chimpanzees is approximately equal ***OR*** size of the human chromosome 2 is larger than either chromosomes 12 or 13; b. (bands/banding) patterns/(DNA) sequences on chromosomes 12 and 13 match chromosome 2; c. centromere sequences present in chromosome 2 where there is no centromere ***OR*** chromosome 2 has an additional centromere sequence (within the chromosome); d. telomere sequence present in chromosome 2 where there is no telomere ***OR*** chromosome 2 has an additional telomere sequence (within the chromosome); e. presence of telomere sequences at the predicted fusion point in human chromosome 2; f. chromosome 12 is inverted in the short arm of chromosome 2;		4 max

Question			Answers	Notes	Total
1.	d	i	small/fixed size; nucleic acid/DNA/RNA; capsid (made from protein); no cytoplasm; few or no enzymes; attachment protein;	*Do not accept genetic material.*	**1 max**
1.	d	ii	zoonosis/zoonoses/zoonotic;		**1**

Question			Answers	Notes	Total
2.	a		into the cell/cytoplasm / in / inwards;		**1**
2.	b	i	a. cells injected with mRNA have (more) aquaporins (in the membrane); b. aquaporins transport water by osmosis ***OR*** down the water potential gradient / from high to low water potential ***OR*** from hypotonic to hypertonic solution; c. aquaporins (are protein channels) facilitate the uptake of water; d. increased/excess water uptake causes cell size to increase/(ultimately) burst;	*a. Allow vice versa.*	**2 max**

Question			Answers	Notes	Total
2.	**b**	**ii**	a. ADH is secreted (by the pituitary gland); b. aquaporins released from intracellular vesicles; c. aquaporins inserted into the <u>plasma</u> membrane; d. more water reabsorbed (into blood) / water content of blood increased; e. more concentrated urine produced;	*e. Do not accept smaller volume of urine.*	**3 max**
2.	**c**		eggs will be of different initial volumes/sizes/shape;	*OWTTE* *Answers should include both the idea of different and initial/starting/beginning volume.* *Ignore fair test or fair comparison.*	**1**
2.	**d**		the investigation is reliable as it was repeated 10 times / there were multiple trials/readings ***OR*** the investigation is not reliable as there were not enough trials / 10 trials may not be enough ***OR*** reliability cannot be assessed as no error bars / standard deviation;		**1**

Question			Answers	Notes	Total
2.	**e**		a. (time required for) assembly of ribosomal-mRNA complex; b. mRNA must be translated; c. post-translational modifications are necessary ***OR*** valid example of modification; d. protein needs to be transported to (and inserted into) the plasma membrane;	*b. Do not award if transcription is mentioned.* *b. Accept description of translation.*	**2 max**

Question			Answers	Notes	Total
3.	**a**	**i**	type of antibiotic/inhibitor **AND** concentration of antibiotic/inhibitor;	*Accept concentration of oligomycin **AND** concentration of bedaquiline.*	**1**
3.	**a**	**ii**	use a (thermostatically controlled) water bath/incubator;		**1**
3.	**a**	**iii**	a. enzyme concentration is a controlled variable; b. changing enzyme concentration will affect the rate of reaction; c. increasing enzyme concentration increases the number of active sites allowing more reactions to occur (vice versa); d. (constant enzyme concentration) allows effect of varying the inhibitor concentration to be measured ***OR*** allows for valid comparisons to be made (between inhibitor types and their concentrations) ***OR*** ensures that results are not due to other factors;		**3 max**
3.	**b**	**i**	logarithmic;		**1**
3.	**b**	**ii**	data is spread out for viewing / would be too clustered on a normal scale ***OR*** allows for a wider range of concentrations to be shown;	*Accept data/trend/results can be seen more clearly.*	**1**
3.	**c**		the (size of the) error bars;		**1**
3.	**d**		cristae/ inner membrane;		**1**

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Notes</th><th>Total</th></tr>
<tr><td>4.</td><td>a</td><td>i</td><td>range / minimum and maximum / measure of dispersion / uncertainty / standard deviation / standard error;</td><td></td><td>1</td></tr>
<tr><td>4.</td><td>a</td><td>ii</td><td>(–)52.3 (%);</td><td>Accept values between 52 and 53%.</td><td>1</td></tr>
<tr><td>4.</td><td>b</td><td></td><td>a. use a goniometer/goniometer app
OR
use computer analysis of a joint image/app on phone/computer;
b. move/bend/flex/extend the joint
OR
take an image of/find view of the bent/flexed/extended joint on the screen;
c. align the centre of the goniometer/computer analysis tool on the centre of the joint/image
OR
place the goniometer arms/computer analysis tool along the limb;
d. measure/record the angle in degrees;
e. repeat to obtain several values;
f. (depending on the joint) repeat with the joint in a different/opposite position;</td><td></td><td>3 max</td></tr>
<tr><td>4.</td><td>c</td><td></td><td><table><tr><th></th><th>Vertebrates</th><th>Arthropods</th></tr><tr><td>a.</td><td>endoskeleton/internal</td><td>exoskeleton/external;</td></tr><tr><td>b.</td><td>muscles attach outside the bones/skeleton</td><td>muscles on the inside of the skeleton;</td></tr><tr><td>c.</td><td>bones and cartilage</td><td>chitin / no bones or cartilage;</td></tr></table></td><td>Both contrasting statements need be given about one aspect to obtain a mark.
Accept answers not in tabulated form.</td><td>2 max</td></tr>
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