2225 – 6017

Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2025

Biology

Standard level

Paper 1B

8 pages

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		36 million/36 000 000/36 mbp;	*Do not accept just 36 without million or mbp.*	**1**
1.	b		a. nucleus; b. mitochondria; c. chloroplast/plastids/other named plastid type; d. ribosome;		**1 max**
1.	c		a. increasing speed/decreasing costs make it useful for sequencing any species; b. allows to determine evolutionary relationships/common ancestors/*OWTTE* ***OR*** provides evidence for evolution ***OR*** allows to classify/identify species/*OWTTE*; c. makes it easier to conserve/protect biodiversity ***OR*** helps to restore endangered/extinct species; d. allows to develop personalized medicine/specialized medicine for an individual patient/*OWTTE*; e. allows for the prevention/identification/treatment of diseases/named disease ***OR*** allows to detect mutations/predisposition towards disease; f. allows for genetic modification/editing/*OWTTE*;	*Do not accept reference to paternity testing, forensic investigations and cloning.* *b. Do not accept naming/comparing/ distinguishing between species.* *d. Do not accept specialized medicine on its own, without a reference to individual patients.* *e. Do not accept "identify cause of mutations" and "mutations in the genetic code".*	**3 max**

Question			Answers	Notes	Total
2.	a	i	(species) D and E ***OR*** (species) A and B;		1
2.	a	ii	(species) F;		1
2.	b		a. each species is best adapted to its station ***OR*** each species has advantageous traits for/is specialized to the different environments; b. species G has a wider range of tolerance/species A has a narrower range of tolerance ***OR*** species A and G have different ranges of tolerance; c. abiotic conditions/tides/water depth/pH/temperature/salinity/light/rocks are different (at the different stations); d. species A and G are subjected to different selection pressures / have different (realized/fundamental) niches; e. herbivores/primary consumers may prevent the growth of seaweed/species; f. interspecific competition/competition between species/competitive exclusion might prevent the growth of the seaweed/species ***OR*** less/lack of competition allows the growth of the seaweed/species;	*Do not accept answers discussing reasons why neither species is present at stations 3-9.* *e. Accept named herbivore e.g. crabs, but do not accept predator.* *f. Do not accept intraspecific competition.*	3 max
2.	c		oxygen;		1

Question			Answers	Notes	Total
3.	a		any value between 2.5 and 4.5 mg ml^{-1};	*Units required for the mark.* *Accept 2.5 mg ml^{-1} and 4.5 mg ml^{-1}*	1
3.	b		94(%);	*Allow answers between 90 and 98.*	1
3.	c		(suggests that) there is no significant difference in percent decolorization;		1
3.	d		a. positive/direct relationship/correlation ***OR*** directly proportional at low concentrations ***OR*** increasing enzyme concentration increases percent decolorization (of crystal violet); b. percent decolorization does not increase/levels off/plateaus after a concentration of 2.5/3 mg ml^{-1} ***OR*** percent decolorization does not increase/levels off/plateaus at higher concentrations;		2

Question			Answers	Notes	Total
3.	**e**		a. pH, as each enzyme has (optimum) pH at which it functions best ***OR*** pH out of optimum/*OWTTE* pH results in denaturation / change in enzyme shape/conformation/active site; b. temperature, as increased temperature results in enzyme denaturation / change in enzyme shape/conformation/active site ***OR*** low (too low) temperatures cause enzyme inactivity / less enzyme activity/molecule collisions ***OR*** higher temperatures cause more enzyme activity/molecule collisions; c. size/shape/surface area/volume/number of the alginate beads as this affects the ratio of exposure of enzyme to the substrate; d. volume/concentration of the (crystal violet) dye as concentration of substrate affects rate of reaction ***OR*** volume of the enzyme as the final concentration of substrate/enzyme depends on the volume of the two solutions; e. type of enzyme/dye as enzymes are substrate specific; f. time allowed for enzyme reaction as longer or shorter time will impact on the amount/percentage of substrate that will be catalysed / *OWTTE*;	*Naming a variable only is not sufficient for "discuss".* *a. Accept too acidic or basic.* *d. Do not accept enzyme/laccase concentration as this is the independent variable.*	**2 max**

Question			Answers	Notes	Total
4.	**a**		anaphase;		**1**
4.	**b**		(X)900;	*Accept answers between 800 and 1000 (these values included).*	**1**
4.	**c**		a. anther/stamen/pollen grain; b. ovary/ovule/carpel/pistil;		**2**
4.	**d**	**i**	the transfer of pollen from anther to stigma;		**1**
4.	**d**	**ii**	a. male and female reproductive organs/gametes can have different maturation times; b. separate male and female flowers/plants ***OR*** male and female reproductive organs within one flower far apart/*OWTTE*; c. pollen carried to other flowers/plants by animals/pollinators/wind; d. example of flower/pollen adaptation to animal pollination ***OR*** example of flower/pollen adaptation to wind pollination; e. self-incompatibility mechanisms/*OWTTE*;	*a. Accept a specific example of male/female reproductive organs, such as anthers, stigma or ovule.* *c. There must be a reference to pollen being carried to other flowers/plants.* *c. Accept specific examples of pollinators, but do not accept just the word "species" for animals.* *d. Examples include nectar, brightly coloured flowers or anthers hanging out.* *e. Accept examples.*	**2 max**