

Markscheme

Specimen paper

Biology

Standard level

Paper 2

16 pages

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The following are the annotations available to use when marking responses.

Annotation	Explanation	Shortcut
	Correct point (automatically awards 1 mark when stamped)	
             	These are annotations which can be used to show which marking point was used to award a mark. It is easier to use these than to pick up the tick stamp and then the text box (they each automatically award 1 mark when stamped)	
 	Quality marks awarded for clarity and structure (these each automatically award 1 mark when stamped)	
	Pointer (use when you want to delete an annotation or change colour)	
	Benefit of the doubt	
	Error carried forward	
	Irrelevant, a significant amount of material that does not answer the question	
	Contradiction	
	Omission/incomplete	
	Too vague	
	No working shown	
	Unclear	

Annotation	Explanation	Shortcut
	This is a dynamic annotation; it can be used to surround work	
	This is a dynamic, vertical wavy line that can be expanded (for instance, to highlight a section of irrelevant work)	
	This is a dynamic, horizontal wavy line that can be expanded (for instance, to highlight a section of irrelevant work)	
	Valid part (to be used when more than one element is required to gain the mark eg: drawings)	
	Same as	
	Or words to that effect	
	Advantage / pro (to identify elements in an unclear discussion when pairs are required)	
	Disadvantage / con (to identify elements in an unclear discussion when pairs are required)	
	Difference (to identify elements in an unclear comparison)	
	Similarity (to identify elements in an unclear comparison)	
	Highlight, stamp and drag out to highlight an area of the script	
	Text box used for additional marking comments. It can be linked to a specific tick if that is appropriate	
	Seen; to be stamped on parts of a question or option which have been left blank	
	Zero; to be used when a question part is not worthy of credit. Awards zero for the question part	

You **must** make sure you have looked at all pages. Please put the  annotation on any blank page, to indicate that you have seen it.

General Marking Instructions

Assistant Examiners (AEs) will be contacted by their team leader (TL) through RM™ Assessor, by e-mail or telephone – if through RM™ Assessor or by e-mail, please reply to confirm that you have downloaded the markscheme from IBIS. The purpose of this initial contact is to allow AEs to raise any queries they have regarding the markscheme and its interpretation. AEs should contact their team leader through RM™ Assessor or by e-mail at any time if they have any problems/queries regarding marking. For any queries regarding the use of RM™ Assessor, please contact emarking@ibo.org.

1. Follow the markscheme provided, award only whole marks and mark only in **RED**.
2. Make sure that the question you are about to mark is highlighted in the mark panel on the right-hand side of the screen.
3. Where a mark is awarded, a tick/check (✓) **must** be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark. **One tick to be shown for each mark awarded.**
4. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases use RM™ Assessor annotations to support your decision. You are encouraged to write comments where it helps clarity, especially for re-marking purposes. Use a text box for these additional comments. It should be remembered that the script may be returned to the candidate.
5. Personal codes/notations are unacceptable.
6. Where an answer to a part question is worth no marks but the candidate has attempted the part question, use the “ZERO” annotation to award zero marks. Where a candidate has not attempted the part question, use the “SEEN” annotation to show you have looked at the question. RM™ Assessor will apply “NR” once you click complete.
7. If a candidate has attempted more than the required number of questions within a paper or section of a paper, mark all the answers. RM™ Assessor will only award the highest mark or marks in line with the rubric.
8. Ensure that you have viewed **every** page including any additional sheets. Please ensure that you stamp “SEEN” on any additional pages that are blank or where the candidate has crossed out his/her work.
9. Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalizing them for what they have got wrong. However, a mark should not be awarded where there is contradiction within an answer. Make a comment to this effect using a text box or the “CON” stamp.

Subject Details: Biology SL Paper 2 Markscheme

Candidates are required to answer **all** questions in Section A and **one** out of **two** questions in Section B. Maximum total = **50 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.

Section B

Extended response questions - quality of construction

- ♦ Extended response questions for SLP2 carry a mark total of **[16]**. Of these marks, **[15]** are awarded for content and **[1]** for the quality of the answer.
- ♦ **[1]** for quality is to be awarded when:
 - ♦ the candidate's answers are clear enough to be understood without re-reading.
 - ♦ the candidate has answered the question succinctly with little or no repetition or irrelevant material.
- ♦ It is important to judge this on the overall answer, taking into account the answers to all parts of the question. Although, the part with the largest number of marks is likely to provide the most evidence.
- ♦ Candidates that score very highly on the content marks need not necessarily automatically gain **[1]** for quality (and *vice versa*).

Section A

Question			Answers	Notes	Total
1.	a	i	Breakfast cereals		1
1.	a	ii	12%	Allow 11 – 13	1
1.	b		<i>Similarity</i> e.g. a. both groups get most of their fibre from bread OR both get least from other sources OR both have similar % from vegetables. <i>Do not accept “amounts”</i> OR both have similar sources / show a similar pattern; <i>Difference</i> e.g. b. high gets bigger % from fruit etc.;	For differences allow any answer where the % are different so long as the candidates state which is bigger/smaller.	2
1.	c		a. the data shows % of their daily intake, not quantities they take in; b. although the graph shows the low group takes in a higher percentage of grains, it may be a higher percentage of a small amount / OWTTE;		2
1.	d		a. bread/fruit; b. it makes up a higher percentage of high-fibre diets than low-fibre diets;		2
1.	e		increasing fibre intake increases total energy intake and lowers the percentage of energy from fat		1

(continued...)

(Question 1 continued)

Question			Answers	Notes	Total
1.	f		the foods containing fibre must have energy rich molecules/carbohydrates in it		1
1.	g		<i>The study does support the hypothesis:</i> a. the data shows those with high fibre have more energy (required for growth and development/meeting daily needs); b. children with high fibre diets eat less fat (and less chance of heart disease/obesity);		1

Question			Answers	Notes	Total
2.	a		a. nucleus; b. mitochondria; c. Golgi apparatus; d. ER/rough ER; e. smooth ER; f. vacuole/vesicle;		2
2.	b	i	a. chloroplasts; b. large/central vacuole;		1
2.	b	ii	a. plasma membrane; b. ribosomes;		1

3	a		a. double stranded; b. thymine/T present / uracil/U absent; c. 1:1 A:T and C:G;		2
3.	b		a. can be used to explain the structure/dimensions of the molecule; b. (complementary base pairing means) adenine always with thymine AND cytosine always with guanine; c. ensures continuity of genetic information results from replication; d. stable arrangement of antiparallel strands; e. complementary base pairing provides a guide for (reliable) DNA transcription;	Accept A, T, C and G	3
3.	c		a. in prokaryotes circular whereas in eukaryotes linear; b. in eukaryotes associates with histones whereas in (most) prokaryotes not/naked DNA in prokaryotes;	Allow “in eukaryotes forms nucleosomes whereas in prokaryotes not” as this is HL only	2

Question			Answers	Notes	Total
4.	a		(beta-) glucose		1
4.	b		a. stable (covalent) bonds between monomers ensure that the molecule is strong/rigid/inelastic; b. absence of branching allows fibres to pack closely/form hydrogen bonds; c. cross linkages/hydrogen bonds provide strength/stability/resists digestion; d. chain molecules allow for structure / strength; e. (beta-) glucose molecules provide energy (to organisms that can digest cellulose);		3

5.	a		a. <u>interspecific</u> since it is between two species; b. <u>mutualistic</u> since both organisms benefit; c. (trophic relationship is) plant is a producer AND hummingbird is a primary consumer/herbivore;		2
5.	b		a. colour/patterns on flower parts; b. scent; c. providing nutrients/nectar;		1
5.	c		a. feed at a time when the predator is not active; b. remain very active/alert while feeding; c. mimic another organism; d. exaggerate their size;		1

Question			Answers	Notes	Total
6.	a		a. genetically determined/determined by (pair of) sex chromosomes/X and Y chromosomes; b. sperm carry either an X or a Y chromosome; c. egg is X and if fertilized by X sperm leads to a female child / XX female OR egg is X and if fertilized by Y sperm leads to a male child / XY male;		2
6.	b		a. recombination of parental alleles during fertilization; b. fertilized egg contains a mixture of paternal and maternal chromosomes; c. crossing over/meiosis gives rise to new combinations of alleles;		2

Section B

Question			Answers	Notes	Total
7.	a		a. mutations are random changes in the sequences of genes/DNA; b. (mutation) may involve addition/deletion/substitution/inversion of DNA bases; c. (mutations) in tumour suppressor genes/oncogenes; d. uncontrolled cell division/mitosis occurs; e. abnormal cells cannot perform their function; f. they divide repeatedly to form tumours;		4
7.	b		a. name of condition e.g. PKU / other example; b. mutation in the gene for (the enzyme) phenylalanine hydroxylase (PAH) / if other example used name of gene that is mutated; c. outline of inheritance pattern, e.g. both parents need to carry the recessive allele; d. (without dietary modification, result is) toxic build-up of phenylalanine in the blood / low levels of tyrosine / symptoms if other example used; e. phenylalanine is not converted to tyrosine (by the enzyme) / effect of the mutation on the protein/enzyme/metabolism if other example used; f. requires dietary modification (as treatment) / treatment for other example used;		4

(continued...)

(Question 7 continued)

Question			Answers	Notes	Total
7.	c		a. new phenotypes/traits may result from mutations; b. mutations increase variation/differences between individuals in a population/species; c. individuals with new phenotype/trait may have more chances of survival; d. (more chances of survival) in a changing environment / presence of selection pressures; e. (selection pressure can be) intraspecific competition/abiotic factor; f. natural selection occurs; g. individuals with (advantageous) mutation have longer life spans/live longer; h. (so) more chances of reproduction; i. mutated gene passed on to new generations; j. allele frequencies change in the population over time; k. evolution is a consequence of natural selection;		7

Question			Answers	Notes	Total
8.	a		a. normal body temperature is 37°C; b. peripheral thermoreceptors detect environmental temperature; c. supporting conscious behaviour to avoid temperature extremes, e.g. wearing more clothing; d. sends messages to hypothalamus/temperature control centre of the brain; e. the hypothalamus sends messages to pituitary gland; f. (pituitary) releases TSH; g. stimulating thyroxine release from thyroid; h. thyroxine controls metabolic rate / production of heat; i. muscle random contraction/shivering to generate heat; j. (brown) adipose tissue burns fat to generate waste heat; k. vasoconstriction to conserve heat / vasodilation to exchange heat with the environment;		7

(continued...)

(Question 8 continued)

Question			Answers	Notes	Total
8.	b		a. as temperature increases, the rate of molecular motion increases; b. increasing the frequency of collision between enzyme and substrate; c. increasing the rate of reaction; d. until an optimum temperature is reached; e. with further increase in temperature, enzymes denature;		4
8.	c		a. water has a (much) higher specific heat capacity (than air); b. water requires more energy gain/loss to change temperature; c. (water) provides more stable thermal habitats than air / temperature of water bodies remains more constant than air temperature; d. water has a higher thermal conductivity than air; e. more heat is transferred from organisms to water than to air; f. water is a good evaporative coolant and air is not; g. aquatic mammals have (proportionally) more body fat as insulation;		4
