Biology B Advanced Subsidiary Paper 2 (8BI0/02)

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	D (1 655 000)		**(1)**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	A (a group of organisms that produce fertile offspring)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
1(b)	An explanation that makes a reference to the following: • other scientists look at the information in the chart (1) • to confirm validity (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
1(c)	An explanation that makes a reference to the following: • because mutations take place and provide selective advantage (1) • organisms are reproductively isolated (1) • therefore, over time interbreeding not possible (1)		**(3)**

(Total for Question 1 = 7 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
2(a)	An explanation that makes reference to the following: • fungus infection { reduces development of / destroys } vascular bundles containing phloem and xylem (1) • reduced transport in phloem means less { sucrose / carbohydrate } supply (1) • therefore less { energy / carbohydrate } for cell wall manufacture (1) • reduced { transport in xylem / transpiration rate } means less { water / mineral } supply for a named growth effect (1)		**(4)**

Question Number	Acceptable Answer	Additional Guidance	Mark
2(b)(i)	An explanation that makes reference to the following: • high temperature increases rate (1) • because molecules have greater kinetic energy (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
2(b)(ii)	An explanation that makes reference to the following: • high light intensity increases rate (1) • because stomata open in the light (1)		**(2)**

(Total marks for question 2 = 8 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	A (left atrium → bicuspid valve → left ventricle)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
3(a)(ii)	An explanation that makes reference to the following: • more venom molecules delivered (1) • because mass transport is a faster process than diffusion (1) • one directional as opposed to spreading in all directions (1)		**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
3(b)(i)	*Oxyuranus scutellatus*		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
3(b)(ii)	An explanation that makes reference to the following: • blood clotting will occur (1) • because prothrombin changes to thrombin (1) • which catalyses fibrinogen to fibrin (1) • this blocks blood vessels preventing supply of { oxygen / glucose } to cells (1)		**(4)**

(Total for Question 3 = 9 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
4(a)	An explanation that makes reference to the following: • ethanol dissolves phospholipids in cell membrane (1) • therefore pigment released as a result of damage to the cell membrane (1) • concentration that causes most damage is between 20% - 40% (1)		**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
4(b)	An answer that makes reference to four of the following: • wash cubes more thoroughly so the control has zero absorbance / use the control to zero the colorimeter (1) • cut cubes to same shape / size so they have same surface area to volume ratio (1) • smaller range of concentrations between 20% and 40% to identify critical value / the lowest concentration that starts to disrupt membranes (1) • all test tubes must be at same temperature because diffusion affected by temperature (1) • same volume of ethanol solution must be used / all cubes must be submerged to dilute the pigment equally (1)		**(4)**

(Total for Question 4 = 7 marks)

Question Number	Answer	Additional Guidance	Mark
5(a)(i)	C (the time taken for the pressure to change from its lowest value to its highest value is greatest in the left ventricle)		**(1)**

Question Number	Answer	Additional Guidance	Mark
5(a)(ii)	C (open − closed)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(a)(iii)	• calculation of one cycle (1) • calculation of rate (1)	<u>Example of calculation</u> 0.72 s 60 ÷ 0.72 = 83.3 Allow 83 as correct answer Correct answer with no working gains full marks	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5b)(i)	0.3 s / 1.02 s		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(b)(ii)	An explanation that makes reference to the following: • the pressure in the aorta is higher than in the left ventricle during diastole (1) • therefore forcing blood around the body rather than flowing back into the ventricle (1)		**(2)**

(Total for Question 5 = 7 marks)

Question Number	Answer	Additional Guidance	Mark
6(a)	B (less salt increases the water potential of plasma)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
6(b)	An explanation that makes reference to the following: • high salt would cause an increase in blood volume (1) • causing high blood pressure which damages the endothelium in arteries (1) • this causes inflammatory response (1) • cholesterol deposits lead to atheroma / calcium ions involved in plaque formation (1) • therefore arteries {narrow / lose elasticity / harden} (1)		**(5)**

Question Number	Acceptable Answer	Additional Guidance	Mark
6(c)(i)	• correct reading from graph (1) • calculates correct probability (1)	Example of calculation = 41% deaths =100 ÷ 41 =2.44 Probability = 1 in 2.4 Allow 2.44 Correct answer gains full marks, with no working shown	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
6(c)(ii)	An answer that makes reference to the following: • reliable data because {17 000 / large number of people} used (1) • conclusion only valid for males because only males used (1) • invalid because other named lifestyle factors that affect life expectancy should be controlled (1) • no indication of ethnicity / culture (1)	Ignore salt / high blood pressure	**(4)**

(Total for Question 6 = 12 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
7(a)	An explanation that makes reference to the following: • larger insects have an increased distance from the air to cells / have a smaller surface area to volume ratio (1) • therefore rate of diffusion of oxygen / carbon dioxide decreases (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	A (carbon dioxide)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
7(b)(ii)	A description that makes reference to the following: • not leaving insect in gas mixtures for long periods of time (1) • allow insect to recover between treatments (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
7(c)(i)	• measures diameter of tracheole on diagram and divides by diameter in mm (1) • correct answer (1)	3 ÷ 0.001 = 3000 Correct answer gains full marks, with no working shown	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
7(c)(ii)	An explanation that makes reference to the following: • lactic acid from increase in activity decreases the water potential in the cytoplasm (1) • causing an increase in the concentration gradient for water (1) • therefore {water / fluid} moves from tracheole into cell by osmosis (1) • less distance for diffusion of gases / gases move {more easily / faster} through air than through fluid (1) • causing an increase in gas exchange (1)		**(5)**

(Total for Question 7 = 12 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
8(a)	An answer that makes reference to the following: • some resistant insects in population (1) • application of insecticide causes increase in percentage of resistant insects (1) • because resistant insects possess alleles for resistance that enable them to survive and reproduce (1) • insecticide effect is {unstable / not permanent} because non-resistant insects {compete / reproduce} to reduce percentage of resistant insects (1) • frequent application cause a greater increase in resistant insects because non-resistant insects never fully recover in number (1)		**(5)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(b)(i)	• correct use of formula (1) • correct answer (1)	<u>Example of Calculation</u> (98 x (98 − 1)) ÷ ([2x(2-1)] + [2x(2-1)] + [1x(1-1)] + [93x(93-1)]) / 9506 ÷ 8560 = 1.11 Correct answer gains full marks, with no working shown	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(b)(ii)	A description that makes reference to two of the following: • only four species counted (1) • only one type of insecticide used (1) • only one type of habitat investigated (1)		**(2)**

(Total marks for Question 8 = 9 marks)

Question Number	Answer	Additional Guidance	Mark
9(a)	B (Eucaryota – *Peromyscus*)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(b)(i)	A description that makes reference to the following: • four {polypeptide / protein} {chains / sub-units} (1) • (each chain attached to) iron / prosthetic group / haem group (1)	Allow two alpha and two beta chains	**(2)**

Question Number	Indicative content
***9(b)(ii)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • **Similarities** – curve is S-shaped / sigmoid – at steep part of curve small change in pO_2 causes large change in percentage saturation – at low pO_2 mice release same amount of oxygen / curves are the same / curves are close because it is important not to restrict supply of oxygen to tissues • **Differences** – high altitude curve is left of low altitude mice – high altitude mice need to have greater affinity for oxygen / hold oxygen more readily because there is less oxygen available at high altitude – at higher pO_2 high altitude mice obtain more oxygen than low altitude mice

Level	Mark	Descriptor
	0	No awardable content
Level 1	1-2	Demonstrates isolated elements of biological knowledge and understanding to the given context with generalised comments made. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context
Level 2	3-4	Demonstrates adequate knowledge and understanding by selecting and applying some relevant biological facts/concepts to provide the explanation being presented. Lines of argument occasionally supported through the application of relevant evidence (scientific ideas, processes, techniques and procedures) The explanation shows some linkages and lines of reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of biological facts/concepts to provide the explanation being presented. Line(s) of argument supported throughout by sustained application of relevant evidence (scientific ideas, processes, techniques and procedures). The explanation shows a well-developed and sustained line of reasoning which is clear, coherent and logically structured.

(Total for Question 9 = 9 marks)