Biology B Paper 2 Mark Scheme

Question Number	Correct Answer	Additional guidance	Mark
1(a)	cerebrum (1)		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
1(b)	An explanation that makes reference to one of the following pairs: • less cerebral cortex (1) • so individual has inability to do everyday tasks (1) **or** • smaller hippocampus (1) • so loss of memory / incapacity or inability to perform everyday tasks (1)	control movement	**(2)**

Question Number	Correct Answer	Additional guidance	Mark
1(c)	A description that makes reference to three of the following: • binds to active site of cholinesterase (1) • acetylcholine remains / not broken down (1) • depolarisation of post synaptic membrane continues (1) • nerve impulse continues / action potential continues (1)		**(3)**

(Total for Question 1 = 6 marks)

Question Number	Correct Answer	Additional guidance	Mark
2(a)	B		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
2(b)(i)	A		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
2(b)(ii)	C		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
2(c)	5 squares = 1 beat • 1 beat per second x 60 (1) • 60 beats per minute (1)	Correct answer gains full mark	**(2)**

Question Number	Correct Answer	Additional guidance	Mark
2(d)	A description that makes reference to four of the following points: • increased pressure / CO_2 concentration / decreased pH detected by baroreceptors / chemoreceptors (1) • medulla oblongata (1) • sympathetic nerve stimulated (1) • release of noradrenaline (1) • excitation at SAN (1)		**(4)**

(Total for Question 2 = 9 marks)

Question Number	Correct Answer	Additional guidance	Mark
3(a)	An answer that makes reference to one of the following: • poached by humans for their horn (1) • *Arenga pinnata* outcompetes the food source/less food for rhino (1) • disease (1)		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
3(b)	An explanation that makes reference to two of the following: • difficulty in finding mates (1) • so population growth is affected (1) **or** • loss of genetic diversity / small gene pool (1) • so less resistance to environmental change (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
3(c)	An answer that makes a reference to two of the following: • habitat maintenance / restoration / clearing *Arenga pinnata* (1) • locate breeding sites for reproduction (1) • protect the rhinos from poachers (1) • ensuring that the food source is maintained/plant more food source (1) • breeding programme outside of national park (1)		**(2)**

(Total for Question 3 = 5 marks)

Question Number	Correct Answer	Additional guidance	Mark
4(a)	A		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
4(b)	B		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
4(c)	An explanation that makes reference to three of the following: • same energy in glucose molecule as in fructose molecule (1) • fructose is sweeter than glucose so less needs to be used (1) • produce products that reduce the risk of developing obesity (1) • cost savings for food industry (1)		**(3)**

(Total for Question 4 = 5 marks)

Question Number	Correct Answer	Additional guidance	Mark
5(a)	both species look alike and are active at night (1)	morphologically and behaviourally similar	**(1)**

Question Number	Correct Answer	Additional guidance	Mark
5(b)	A description that makes reference to the following: • sample of {cells / DNA} (1) • DNA polymerase chain reaction (1) • procedure repeated several times (1) • temperature requirements (1)	 e.g. 55 °C, 72 °C, 95 °C	 **(4)**

Question Number	Correct Answer	Additional guidance	Mark
5(c)	An explanation that makes reference to the following points: • increases biodiversity / index of diversity increases (1) • as the value for {N / numerator} increases in the index of diversity (1)	Accept justification consistent with formula Correct answer gains full marks	 **(2)**

(Total for Question 5 = 7 marks)

Question Number	Correct Answer	Additional guidance	Mark
6(a)	56 - 36 = 20 (1)		**(1)**

Question Number	Indicative content		
6(b)*	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 • Dissociation curve for mouse haemoglobin is to the right of the curve for elephant haemoglobin • Mouse haemoglobin has a lower affinity for oxygen • Mouse haemoglobin allows more dissociation • Mouse has bigger surface area to volume ratio • Mouse loses more heat / needs to regenerate more heat • Maintenance of body temperature • Mouse has higher metabolic rate • Mouse needs more oxygen • Accept converse answers for elephant		
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.

Question Number	Correct Answer	Additional guidance	Mark
6(c)	A		**(1)**

(Total for Question 6 = 8 marks)

Question Number	Correct Answer	Additional guidance	Mark
7(a)	An answer that makes reference to three of the following: • wide/large cross-sectional area to transport large volume of water (1) • empty cells/no cytoplasm so low resistance to flow (1) • thickening of the wall / lignification that strengthens the wall to prevent collapse (1) • annular/spiral thickening to allow xylem tissue to stretch during growth (1)		**(3)**

Question Number	Correct Answer	Additional guidance	Mark
7(b)	D		**(1)**

Question Number	Answer	Additional guidance	Mark
7(c)	An explanation that makes reference to the following: • transpiration rate is greater than absorption rate from 6am to 5pm because stomata are open (1) • between 5pm and midnight, the absorption rate is greater than the transpiration rate because stomata are closed (1) • lag effect because the uptake of water depends on transpiration (1) • the cohesion-tension effect (1)		**(4)**

(Total for Question 7 = 8 marks)

Question Number	Correct Answer	Additional guidance	Mark
8(a)	A description that links the following: • phospholipid bilayer (1) • sodium-potassium pump (1) • voltage-gated sodium ion channels (1) • (voltage-gated) potassium ion channels (1)		**(4)**

Question Number	Correct Answer	Additional guidance	Mark
8(b)(i)	velocity of myelinated axon = 76 m s^{-1} (1) 0.8 ÷ 76 = 0.01 (1)	Accept answer derived from range 74 to 76 m s^{-1} Accept 0.011 or answers with more decimal places Correct answer gains full marks	**(2)**

Question Number	Indicative content	
***8(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. • Increase in diameter increases conduction velocity in both axon types • More surface area for ion movement and therefore depolarisation • Conduction velocity is greater in the myelinated axon compared to the unmyelinated axon • Myelinated axons have a much smaller diameter than unmyelinated • Greater efficiency of myelinated neurones compared to unmyelinated axons • Impulse jumps from node to node / saltatory conduction • The myelin insulates • The insulation is discontinuous at nodes of Ranvier • Depolarisation only at nodes	
Level	Mark	Descriptor
	0	No awardable content
Level 1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	3-4	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.
Level 3	5-6	An explanation is made, which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.

(Total for Question 8 = 12 marks)

Question Number	Correct Answer	Additional guidance	Mark
9(a)	An explanation that makes reference to the following: • reference to electron transport chain (1) • oxygen as final proton and electron acceptor (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
9(b)(i)	• 25% of 8 g = 2 g and 10% of 8 g = 0.8 g (1) • 2 g – 0.8 g = 1.2 g (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
9(b)(ii)	An answer that makes reference to the following: • *T. indica* because eats fewer plant roots (1) • plant roots contain more water than insects (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
9(c)	B		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
9(d)	C		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
9(e)	An explanation that makes reference to the following: • desert mammals have long loops of Henle (1) • which allows for a greater counter current multiplier effect (1) • therefore a higher concentration of solute / sodium chloride at base of the medulla (1) • which causes greater amounts of water to be reabsorbed from collecting ducts (1)		**(4)**

(Total for Question 9 = 12 marks)

Question Number	Correct Answer	Additional guidance	Mark
10(a)	A		**(1)**

Question Number	Correct Answer	Additional guidance	Mark
10(b)(i)	• 55% of 12 million = 6,600,000 (1) 91.4% of men have normal vision so: • 100 – 91.4 = 8.6% population with CB (1) • 8.6% of 6,600,000 = 567, 600 (1)	Correct answer gains full marks	**(3)**

Question Number	Correct Answer	Additional guidance	Mark
10(b)(ii)	An explanation that makes reference to one of the following: • males inherit one X chromosome (1) • recessive allele will always be expressed in males (1) **or** • females inherit 2 X chromosomes (1) • so if they inherit one recessive and one dominant allele, the recessive allele will not be expressed (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
10(b)(iii)	An explanation that makes reference to the following: • the highest percentage of defects in cones are in the L and M cones (1) • L cone is sensitive to long wavelengths of light in the red part of the visible spectrum (1) • M cone is sensitive to medium wavelengths of light in the green/ red part of the visible spectrum (1) • therefore a defect in these cones will lead to a person not being able to see light in the red/green spectrum (1)	Accept manipulation of data regarding percentage of cone defects	**(4)**

(Total for Question 10 = 10 marks)

Question Number	Correct Answer	Additional guidance	Mark
11(a)	An explanation that makes reference to four of the following: • red stimulates by converting P_R to P_{FR} (1) • far red inhibits by converting P_{FR} to P_R (1) • the last wavelength received determines the form of phytochrome present because the process is reversible (1) • P_{FR} is the active phytochrome (1) • genes involved in germination are switched on (1) • enzymes involved in germination are synthesised (1)		**(4)**

Question Number	Correct Answer	Additional guidance	Mark
11(b)	An explanation that makes reference to the following: • sea plantain (1) • idea of different latitudes have different (mean) temperatures (1) • sea plantain grows {better / eq} at all (three) temperatures / bog sedge does not grow very well at {lower temperatures / 10 °C and 14 °C} (1) • credit appropriate comparative manipulated figures (1)		**(4)**

(Total for Question 11 = 8 marks)