

2015/ 5158 Biology

Suggested Answer Scheme – P2

Qn No	Answer	Mark	Feedback
1(a)	A: starch B: maltose C: salivary amylase	1 1 1	Question states that this reaction takes place in the mouth. Note that the only chemical digestion that occurs in the mouth is the digestion of starch.
1(b)(i)	Body temperature	1	
1(b)(ii)	pH	1	
1(c)	(BLOCKAGE) Lack of bile released into small intestines + As bile duct functions to transport bile from gall bladder to small intestines Bile functions to emulsify fats/break up fats globules into tiny fat droplets; (AFFECT) Lack of bile will reduce chemical digestion of fats into fatty acids and glycerol by lipase significantly + Due to reduced surface area to volume ratio of fats.	1 1 1	A clear understanding of the difference between physical digestion with chemical digestion was required. Break up (physical digestion VS break down (chemical digestion) Many recognised that lack of bile would slow down fat digestion, rather than prevent it altogether.
2(a)	The process involving the fusion of two gametes, formed through meiosis, to form a zygote. To produce genetically dissimilar offspring.	1 1 1	Candidates were aware of the fusion of gametes and the production of zygote. Good responses described the production of genetically dissimilar offspring and made reference to meiosis.

2(b)	(HOW) Pollen grain is spiky and highly patterned (ADAPTED) Allowing it to cling on the bodies of animals that visits the flower to obtain nectar	1	
	(DISPERSAL) When the animal visits the next flower and brushes against the stigma + the pollen grain is deposited on the stigma	1	
2(c)(i)	Pollen tube	1	
2(c)(ii)	(describe)(explain) Tip of part A secretes digestive enzymes that break down the surrounding tissue of the stigma and style → allowing the tube to burrow through towards the ovule;	1	
	pollen tube carrying the male nuclei enters the ovule through the micropyle	1	
	Tip then absorbs sap and burst → releasing the male nuclei into ovule where the female nuclei are located.	1	
3(a)	24° C	1	
3(b)	1. As the air temperature increases, the body temperature of the insect increases.	1	
	2. The insect body's temperature is not maintained at a certain temperature – instead, it takes on the same temperature as the surroundings/environment	1	

3(c)		2	
3(d)	When blood temperature increases above norm, the sweat gland becomes <u>more active</u> → More sweat is released onto the surface of skin; When <u>water in sweat</u> evaporates from the surface of skin → More latent heat of vaporisation is removed from the body Body temperature decreases back to norm → Sweat glands become less active	1 1 1	
4(a)	A: Aorta B: Pulmonary vein	1 1	
4(b)	C prevents backflow of blood from pulmonary artery to right ventricle during ventricular diastole	1	Some lacked precision in their response, which required consideration of the exact location of the valve.
4(c)	Deoxygenated blood enters right atrium from vena cava during atrial diastole (DESCRIBE) when pressure of right ventricle falls below right atrium, tricuspid valve opens (E) and blood passively fills right		Address both parts of the question – “describe” and “explain”

	ventricle + right atrium actively fills right ventricle with blood during atrial systole; (EXPLAIN)	1	
	ventricle contracts, shutting tricuspid valve (EXPLAIN) when ventricular pressure exceeds atrial pressure	1	
	semi-lunar valve opens when ventricular pressure exceeds pressure in pulmonary artery (REACH THE LUNGS)	1	
	blood leaves the heart forcefully through pulmonary artery and is transported to the lungs(DESCRIBE)	1	
5(a)	Insulin concentration decreases by 90 arbitrary units	1	
5(b)	Glucose is still in demand by cells for respiration; Since no glucose is absorbed into bloodstream at the small intestine during fasting; Less insulin is secreted to prevent the conversion of glucose into glycogen; Ensuring that <u>blood glucose concentration</u> does not decrease and is kept within norm	1 1	
5(c)	Exercise imposes stress on the body , triggering release of adrenaline into bloodstream ;	1	
	Increases heart rate and blood pressure to allow more blood to reach skeletal muscles quickly for increased respiration	1	
	Increases rate of breathing/ ventilation to bring in more oxygen into the lungs, allowing more oxygen to diffuse into blood	1	
	Raises blood glucose level by conversion of glycogen to	1	

	glucose, more respiratory substrates transported by blood		
6(a)(i)	I ^A I ^O	1	
6(a)(ii)	I ^B I ^O	1	
6(a)(iii)	Child 2: AB Child 4: O	1 1	
6(b)	I ^A <u>and</u> I ^B	1	Some examples of miswriting for this question: - I ^A I ^B (this shows genotype, not two separate alleles as asked for) - AB (this shows phenotype, not two separate alleles as asked for)
7(a)(i)	An organism that is unable to make its own food and obtains energy and nutrients by feeding on other organisms	1	Some candidates repeated the term in their definition without showing they understood the meaning of that term
7(a)(ii)	The position an organism occupies in a food chain	1	
7(b)(i)	plankton → small fish → large fish → fisherman	1	
7(b)(ii)	Plankton take in mercury compounds from seawater. Since mercury cannot be excreted, it is stored in plankton. Small fish feed on plankton, thereby transferring stored mercury into small fish. Each small fish would need to feed on <u>many plankton</u> to meet its energy needs. Concentration of mercury would consequently increase significantly, from 0.1 p.p.b in seawater to 200 p.p.b in the flesh of small fish.	1 1 1	

8(a)	(a) Plot these data on the graph paper. <table border="1"><thead><tr><th>Time of day</th><th>Carbon dioxide concentration (percentage by volume)</th></tr></thead><tbody><tr><td>4:00</td><td>0.032</td></tr><tr><td>6:00</td><td>0.320</td></tr><tr><td>8:00</td><td>0.016</td></tr><tr><td>10:00</td><td>0.012</td></tr><tr><td>12:00</td><td>0.010</td></tr><tr><td>14:00</td><td>0.014</td></tr><tr><td>16:00</td><td>0.016</td></tr><tr><td>18:00</td><td>0.020</td></tr><tr><td>20:00</td><td>0.032</td></tr></tbody></table>	Time of day	Carbon dioxide concentration (percentage by volume)	4:00	0.032	6:00	0.320	8:00	0.016	10:00	0.012	12:00	0.010	14:00	0.014	16:00	0.016	18:00	0.020	20:00	0.032	4	Ensure that x-axis : time of day (as stated in question stem)
Time of day	Carbon dioxide concentration (percentage by volume)																						
4:00	0.032																						
6:00	0.320																						
8:00	0.016																						
10:00	0.012																						
12:00	0.010																						
14:00	0.014																						
16:00	0.016																						
18:00	0.020																						
20:00	0.032																						
8(b)(i)	Difference: $0.32 - 0.014$ = 0.306 percentage by volume	1																					
8(b)(ii)	(D) Concentration of carbon dioxide increases steeply by 0.280 units to reach maximum at 6:00. From 6:00 – 8:00, concentration of carbon dioxide decreases by 0.294 units. Thereafter, the concentration of carbon dioxide drops by a mere 0.012 units to reach a minimum of 0.014 units at 14:00.	1 1																					

	Driving under influence of alcohol increases reaction time/ worsens judgement Unable to react/ brake in time to avoid accidents	1 1													
10E (a)	Both xylem and phloem are part of the vascular bundle; That function to transport useful substances (in solution form) from one part of the plant to another Although both tissues play an important role in transport, they differ in the following ways: <table border="1"><thead><tr><th></th><th>Xylem</th><th>Phloem</th></tr></thead><tbody><tr><td>Type of substances transported</td><td>Water and mineral salts through dead structure containing a hollow lumen</td><td>Solution of sucrose and amino acids transported in living cells (sieve tube cell with degenerate protoplasm)</td></tr><tr><td>Force driving transport</td><td>Functions to transport water and mineral salts by transpiration pull</td><td>Transports sucrose and amino acids by hydrostatic pressure</td></tr><tr><td>Direction of substances transported</td><td>Transport water and mineral salts from roots to leaves → one direction only</td><td>Transport sucrose and amino acids from source(where they are manufactured at) to sink (where they are needed at) → bi-directional depending on demand</td></tr></tbody></table>		Xylem	Phloem	Type of substances transported	Water and mineral salts through dead structure containing a hollow lumen	Solution of sucrose and amino acids transported in living cells (sieve tube cell with degenerate protoplasm)	Force driving transport	Functions to transport water and mineral salts by transpiration pull	Transports sucrose and amino acids by hydrostatic pressure	Direction of substances transported	Transport water and mineral salts from roots to leaves → one direction only	Transport sucrose and amino acids from source(where they are manufactured at) to sink (where they are needed at) → bi-directional depending on demand	1 1 1 1 1 1	
	Xylem	Phloem													
Type of substances transported	Water and mineral salts through dead structure containing a hollow lumen	Solution of sucrose and amino acids transported in living cells (sieve tube cell with degenerate protoplasm)													
Force driving transport	Functions to transport water and mineral salts by transpiration pull	Transports sucrose and amino acids by hydrostatic pressure													
Direction of substances transported	Transport water and mineral salts from roots to leaves → one direction only	Transport sucrose and amino acids from source(where they are manufactured at) to sink (where they are needed at) → bi-directional depending on demand													

	Support	Xylem has lignified walls for mechanical support to prevent collapse of vessel when transporting water and mineral salts during high transpiration rate	Phloem has no special features that could offer mechanical support to the plant		
10E (b)	As humidity increases, there is a high concentration of water vapour in the air → reduces concentration gradient of water vapour between intercellular air spaces and environment Less water vapour diffuses out via stomata → reduces transpiration rate As wind speed increases, water vapour accumulating outside the stomata is blown away → creates steep concentration gradient of water vapour between intercellular air spaces and environment More water vapour diffuses out via stomata → increases transpiration rate As light intensity increases, stomata widen More water vapour diffuses out per unit time → increases transpiration rate As temperature increases, rate of evaporation of water from mesophyll cells increases → increases rate of transpiration			1 1 1 1	
10O (a)	When light intensity increases, photoreceptors are stimulated			1	involuntary/reflex action

	Nerve impulses are sent to the brain → brain sends impulses to iris muscles	1	
	Circular muscles contract and radial muscles relax	1	
	Pupil constricts and reduces amount of light entering the eye, preventing excessive light from damaging the eye	1	
100 (b)	When a blurred image is obtained, nerve impulse is sent to brain from retina to initiate the response of accommodation in the eye;	1	
	If the object is far,		
	- ciliary muscles relax, pulling on the suspensory ligaments	1	
	- suspensory ligaments become taut, pulling on the edge of the lens	1	
	- lens become thinner and less convex → increases focal length	1	
	- light rays from the distant object are refracted by cornea, aqueous humour, lens and vitreous humour to be sharply focused on the retina	1	
	If object is near,		
	- ciliary muscles contract, relaxing their pull on the suspensory ligaments		
	- suspensory ligaments slacken, relaxing their pull on the lens		
	- lens becomes thicker and more convex → decreases focal length		
	- light rays from the near objects are refracted by cornea, aqueous humour, lens and vitreous humour to be sharply focused on the retina		
	Impulses sent to the brain → brain interprets the image	1	

