GCE BIOLOGY - BY2

Mark Scheme - January 2013

Question			Marking details	Marks Available
1	*(a)*		A species is a group of organisms that {can interbreed/ reproduce}; (under natural conditions) produce fertile offspring;	2
	(b)	(i)	birds;	1
		(ii)	Borneo {1.61/ 1.62/1.6};	1
		(iii)	(Least at poles to) {greatest/ increasing} at equator;	1
	(c)	(i)	X at second split from left or anywhere along that line;	1
		(ii)	Same genus(but different species)/ tells us the genus;	1
	(d)	(i)	homologous;	1
		(ii)	analogous;	1
			Question 1 total	**[9]**

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Question			Marking details	Marks Available
2	*(a)*		Thin – small diffusion distance; Accept small diffusion distance/ pathway Large surface area- (large contact with air) for <u>diffusion/ gas exchange</u>/ OWTTE; Moist- allow gases to <u>dissolve/ gases go into solution</u> (to cross membrane); Not diffuse into Permeable-to allow <u>gases</u> to pass through (the respiratory surface); NOT blood supply	3 max
	(b)	(i)	Through {(general) body surface/skin}; NOT gills	1
		(ii)	<u>Fast</u> flowing; maintains {concentration/ diffusion} gradient/absorbs more oxygen at surface/ OWTTE;	2
		(iii)	They dry out/ unable to remain moist/ lose water; They clump together (because of surface tension.)/ collapse/ lie on top of each other;	2
	(c)		Blood flows (across gill) in <u>opposite</u> direction to water; NOT different direction {Concentration/ diffusion} gradient is maintained across whole surface/ {concentration/ diffusion} gradient is maintained constantly/ blood always meets water with a higher oxygen concentration/ equilibrium is never reached ; NOT concentration gradient maintained for longer/ maintains a high concentration gradient A greater concentration of oxygen in the blood is achieved/ allows more oxygen to diffuse in/ higher % saturated blood/ allows more {diffusion/ exchange} of gases/ more take up of oxygen/ ORA; NOT makes it more efficient alone	3
			Question 2 total	**[11]**

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Question			Marking details	Marks Available
3	*(a)*		A – Cortex/ parenchyma B – Endodermis; C – Xylem; D – Phloem. 2 marks for all 4, 1 mark for 2 or 3	2
	(b)	(i)	Xylem **Both** correct for 1 mark	1
		(ii)	Phloem; NOT letters only	
	(c)	(i)	{Translocation/ movement/ transport/ carry NOT flow} of {products of photosynthesis/ sucrose/organic compounds/ sugars/ amino acids}/ description of source to sink/ translocation; (NOT nutrients/ other named sugar/ named ions)	1
		(ii)	Carry out {metabolism/respiration} /to supply (sieve cells) with {energy/ATP}/ contain mitochondria for {ATP/ active transport}; NOT contain organelles that the sieve cells do not have/ not loading sieve cell	1
	(d)	(i)	Apoplast; – via cell walls; NOT plasmodesmata	2
			Symplast; – via {cytoplasm/ plasmodesmata};	2
			[1 mark for name, 1 mark for correct route, for each]	
		(ii)	Makes the water pass through {symplast/living part of cell/ cytoplasm}/ prevents it going through {apoplast/ cell walls}; NOT impermeable alone/ makes water take another route	1
			Question 3 Total	**[10]**

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Question			Marking details	Marks Available
4	*(a)*	(i)	A- incomplete metamorphosis B-complete metamorphosis **BOTH**;	1
		(ii)	X- {nymph/ larva/ instar} Y- pupa (accept chrysalis/ cocoon/ pupal stage) **BOTH**;	1
	(b)		(Exoskeleton is) {rigid/ hard/ non- living/ does not grow/ owtte}; They shed (the exoskeleton)/ ecdysis/ moult; Then grow (a new one)/ allows growth/ vulnerable whilst hardening ;	3
	(c)		Fluid filled cavity (surrounded by a membrane); {Protective/ hard/ leathery} {shell/ outer covering/ coat}; (embryo within) yolk sac/ food store/ yolk for nutrition/ own internal nutrient supply; [any 2]	2
	(d)		(the young are retained) for a {considerable/ longer} time in the mother's womb or uterus; (The embryo is) nourished there from {the mother's blood supply /the placenta}/ {unlimited nutrients/ OWTTE}; Protection – qualified; The young are {born in a relatively advanced state of development/ well developed/ more advanced growth in womb}; [Any 3] NOT parental care/ ref to number of offspring	3
			Question 4 Total	**[10]**

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Question			Marking details	Marks Available
5	*(a)*	(i)	(Oxygen) dissociation (curve);	1
		(ii)	similar shaped curve drawn to left of given curve; (must start/ end at same points) NOT above 100%	1
		(iii)	{Foetal haemoglobin/ it} has {higher greater} affinity for oxygen (than adult)/ picks up oxygen easier/ more readily forms oxyhaemoglobin/ reaches saturation at lower partial pressures; NOT more quickly (this ensures) <u>oxygen moves from mother('s</u> blood) <u>to foetus</u> (in the placenta);	2
	(b)	(i)	Move to right;	1
		(ii)	Bohr;	1
		(iii)	(Muscles/ cells give off) more carbon dioxide/ higher partial pressure of carbon dioxide; carbon dioxide dissolves to make carbonic acid/lowering pH; which reduces affinity of Haemoglobin for oxygen/reference to Hydrogen displacing Oxygen from Haemoglobin/ oxygen dissociates more readily; (more) oxygen is released added demand when <u>muscles</u> need it (for aerobic respiration)/ OWTTE;	4
			Question 5 Total	**[10]**

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Question			Marking details	Marks Available
6	*(a)*		Parasites are organisms that (live on or in another organism called the host and) {obtain nourishment / feed on it}; at the expense of /causing harm to the host; NOT negative effect unqualified	2
	(b)	(i)	Hooks+ suckers **both**;	1
		(ii)	Any 2 Attach the worm (to the wall of the gut)/ for attachment; the worm does not get moved along/ resisting peristalsis; passed out with undigested food remains/ prevents it being egested;	2
	(c)		(It lives surrounded by) food that has been digested/ broken down by the {host/ human's digestive system/ OWTTE}; (It is very long –) gives a large surface area (to absorb digested food); (It is flat/ thin –) short distance for diffusion; NOT thin membrane	3
	(d)		Any 2 It lays large numbers of {eggs/ larva/ embryos/ offspring}; eggs can resist adverse conditions/ OWTTE; correct reference to hermaphroditism; Not asexual reproduction	2
			Question 6 Total	**[10]**

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Question			Marking details	Marks Available
7	*(a)*	A	In buccal cavity/ mouth;	
		B	teeth (and tongue) {mechanically/ physically} break down food /to provide large surface area;	
		C	(Saliva added from) salivary glands;	
		D	(saliva) contains mucus to lubricate;	
		E	Amylase substrate is starch, product is maltose/ disaccharides;	
		F	Stomach adapted for protein digestion/ protein digestion {starts/ begins} in stomach/ proteins are partially digested in the stomach;	
		G	Produces hydrochloric acid/ low pH in stomach;	
		H	Peptidase/Pepsin's substrate is {protein/ polypeptides}, products are {polypeptides/peptides}; reject ref to other enzymes	
		I	Small intestine (is adapted to) completes (protein /carbohydrate) digestion/ Description of {disaccharide/ polpeptide} digestion in small intestine;	
		J	Named enzyme produced by small intestine;	
		K	Two named enzymes produced by pancreas;	
		L	correct reference to endo- exo- peptidases;	
		M	Absorption takes place in the ileum/small intestine;	
		N	Villi / microvilli increase surface area;	
		O	Glucose/ monosaccharides/ products are absorbed by diffusion <u>and</u> active transport;	

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Question			Marking details	Marks Available
7	*(b)*	A	Heart (muscle) is myogenic;	1
		B	It can contract without any nerve stimulation;	1
		C	The stimulus to contract originates in the sinoatrial node (SAN);	1
		D	Which controls the rate of beating / acts as pacemaker;	1
		E	It is situated in the wall of right atrium/auricle. (on diagram);	1
		F	Electrical impulse from the SAN causes the two atria/auricles to contract;	1
		G	Thin layer of connective tissue prevents the stimulus spreading to the ventricles;	1
		H	At the bottom of the wall separating the two atria /auricles is the atriventricular node AVN. (on diagram);	1
		I	This delays the impulse (about 0.1 sec) before passing it to the ventricles;	1
		J	The impulse is sent to the apex /tip of the ventricles;	1
		K	Along bundle branches / Bundle of His;	1
		L	And is conveyed upwards along Purkinje/ Purkyne fibres;	1
		M	Causing (a wave of) ventricular contraction starting from the lowermost part of the ventricles;	1
		N	The SAN may be stimulated by various factors to change its pacing;	1
		0	One example – hormones (adrenalin), exercise, body temperature, etc. (allow ref. autonomic nervous system;	1
			Question 7 Total	**[10]**

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