

GCE BIOLOGY - BY2

MARK SCHEME - SUMMER 2014

Question	Marking details	Marks Available										
1 (a)	A = Capillary (network)/ capillaries ; B = Epithelial cell/ epithelium/ epithelial layer; C = Lacteal/ lymph vessel; NOT lymph node	3										
(b)	<table border="1"> <thead> <tr> <th>Feature</th> <th>Explanation</th> </tr> </thead> <tbody> <tr> <td>Microvilli/ folded epithelium;</td> <td><u>Increase/ large</u> surface area/ greater {absorption/diffusion} (of digested products); increase catalytic surface area for digestion</td> </tr> <tr> <td>(Dense/large) <u>capillary network/</u> {good/rich} blood supply/ lots of capillaries;</td> <td>{Transport/absorb} {glucose/amino acids} / maintain a {diffusion/concentration} gradient;</td> </tr> <tr> <td>Presence of lacteal/ lymph vessel;</td> <td>Absorb {lipids/fats/ fatty acids};</td> </tr> <tr> <td>Thin epithelium/ epithelium one cell thick;</td> <td>Short diffusion pathway;</td> </tr> </tbody> </table>	Feature	Explanation	Microvilli/ folded epithelium;	<u>Increase/ large</u> surface area/ greater {absorption/diffusion} (of digested products); increase catalytic surface area for digestion	(Dense/large) <u>capillary network/</u> {good/rich} blood supply/ lots of capillaries;	{Transport/absorb} {glucose/amino acids} / maintain a {diffusion/concentration} gradient;	Presence of lacteal/ lymph vessel;	Absorb {lipids/fats/ fatty acids};	Thin epithelium/ epithelium one cell thick;	Short diffusion pathway;	Max 4
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Thin epithelium/ epithelium one cell thick;	Short diffusion pathway;											
(c) (i)	Mucus;	1										
(c) (ii)	{Lubricates/ reduces friction} (for passage of food); Prevents {auto digestion of /digestion of/ autolysis of/ the effect of acid/ enzymes on} the gut wall;	2										
(d)	Peristalsis; Correct action of circular <u>and</u> longitudinal muscles/ wave of muscle contraction; {Forces/pushes/ propels} food along/mixes food (for more efficient digestion/absorption); NOT move	3										
(e)	Deamination/ amino group removed; (amino groups) to urea; remainder to {carbohydrate/ glycogen};	Max 2										
Question 1 Total		[15]										

Question	Marking details	Marks Available
2 (a)	(i) Loss of water <u>vapour</u> /evaporation of water; From leaf/stomata/lenticels;	2
	(ii) Cooling effect/{supply/movement} of {mineral (ions)/water} /maintains transpiration {pull/stream} /required for photosynthesis /allows water to reach aerial parts;	1
(b)	(i) Prevent entry of air into <u>xylem</u> / prevent formation of air bubble in <u>xylem</u> ; Which would break {transpiration stream/ cohesive forces}/ block movement of water;	2
	(ii) Diameter of capillary tube; Distance travelled by bubble; Time taken;	Max 2
(c)	(i) Xerophytes;	1
	(ii) {High humidity/ humid atmosphere} in <u>air chamber</u> ; Because {water <u>vapour</u> /humid air} not removed by wind/ water <u>vapour</u> trapped; This produces a {less steep / reduces} {water potential/ diffusion/concentration} gradient; Between inside of leaf and air chamber/ inside and outside of stoma;	Max 3
	(iii) {Smaller/less/ rolled} leaves/spines + reduced <u>surface area</u> (exposed to environment); {Reduced number/closure of stomata} + <u>less openings</u> for water to be lost through; {Hairs on leaves/rolled leaves} + {increases humidity/ reduces {water potential/ diffusion/ concentration} gradient/ traps water <u>vapour</u> }; <u>Thick</u> cuticle + reducing <u>evaporation</u> from surface of leaf;	Max 2
Question 2 Total		[13]

Question	Marking details	Marks Available
3	(a) (i) Adaptive radiation;	1
	(ii) Mutation (in common ancestor); (Leads to) variation/ change of beak (shape); Becomes specialised/ adapted {to occupy a particular {niche/environment}/eat particular food}; Have a selective advantage/ are better {suited/ adapted} to a particular environment/ better chances of survival/OWTTE; (More) reproduce and pass on {genes/ alleles};	Max 4
	(b) (i) Humans closely related to gorillas; More amino acids <u>in common</u> / gorilla has 572 <u>in common</u> with Humans while horse has 557/ gorilla has 2 <u>different</u> from human while horse has 17 <u>different</u> ; Share <u>more recent</u> common ancestor;	3
	(ii) Chromatography/electrophoresis;	1
	(iii) Reduces mistakes made in classification due to convergent evolution;	1

Question 3 Total [10]

Question	Marking details	Marks Available
4	(a) Increases surface area; <u>Diffusion</u> takes place (over whole area);	2
	(b) (i) Mouth opens/floor of buccal cavity lowered; Volume of {buccal cavity/inside the mouth} increases/pressure lowered inside {buccal cavity/mouth}; Water {pulled in from outside/ enters due to pressure difference}; Mouth closes and {buccal cavity then contracts/ floor of buccal cavity raises}; Water forced {across/through} gills (into gill cavity); Pressure in gill cavity increases; Forces open the operculum / gill slits;	Max 4
	(ii) Blood flows across (gills/ filaments/ lamellae/ gill plates) in <u>opposite</u> direction to water; Blood always meets water containing a <u>higher</u> oxygen concentration/{diffusion/ concentration} gradient maintained/ equilibrium is never reached; Across entire {gill/ gas exchange surface}; <u>Higher</u> saturation of blood with oxygen achieved;	Max 3
	(c) (i) Diffusion pathway would be too long/ ensures a short diffusion pathway; Speed of diffusion too slow; To supply sufficient oxygen;	Max 2
	(ii) Less fluid/ fluid moves into muscle fibres/ fluid level decreases; More area for gaseous exchange/ shorter diffusion pathway;	2
Question 4 Total		[13]

Question	Marking details	Marks Available
5 (a)	(Phloem) parenchyma; (Phloem) fibres;	2

Feature	Explanation
Presence of <u>sieve</u> {plates/pores};	Permits bidirectional flow/ permits flow {from cell to cell/ through the plant};
{Few/no} organelles/ {thin/peripheral} cytoplasm;	No obstruction to flow of solutes;
Plasmodesmata;	Allows transport of {molecules/ ATP/ sucrose} from <u>companion cell</u> (to sieve tube element);

Max 4

Maximum of two features with matched explanation

Explanation mark only given if feature correct

(c)	Mass flow is {a passive process/ not an active process}; From high to low {concentration/pressure}/ down a concentration gradient; {Mitochondria/energy/ATP} not required (in a passive process);	3
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Question 5 Total [9]

Question	Marking details	Marks available
6 (a)	<p>A (some) CO₂ {<u>dissolves</u> directly/ <u>in solution</u>} in the plasma;</p> <p>B (some)CO₂ {diffuses into/absorbed by} {red blood cells /erythrocytes};</p> <p>C (some) CO₂ combines with haemoglobin/ to form carbamino {haemoglobin/ compounds};</p> <p>D (most) CO₂ combines with water to give carbonic acid;</p> <p>E (catalysed) by carbonic anhydrase;</p> <p>F carbonic acid dissociates into hydrogen carbonate and hydrogen ions;</p> <p>G hydrogen carbonate ions pass out (into plasma);</p> <p>H (chloride shift) allows movement of Cl⁻ into red blood cells;</p> <p>I to maintain {electrical/ electrochemical} neutrality;</p> <p>J <u>increased</u> {conc/partial pressure} of CO₂ (dissolved in blood);</p> <p>K lowers pH of blood/blood becomes more acidic;</p> <p>L oxyhaemoglobin {accepts H⁺/acts as a buffer};</p> <p>M reduces <u>affinity</u> of haemoglobin for oxygen;</p> <p>N <u>more</u> oxygen is released (from oxyhaemoglobin)/ <u>more</u> oxyhaemoglobin dissociates;</p> <p>O oxygen dissociation curve moves to the right/Bohr {shift/effect}; Accept credit from graph/ diagram</p>	

Question	Marking details	Marks available
(b)	<p>A Both are tubular/contain a lumen/ OWTTE;</p> <p>B Both have movement by mass flow/OWTTE;</p> <p>C Both movement along pressure gradients;</p> <p>D Both movement in one direction only;</p> <p>E Artery transports blood, xylem water;</p> <p>F Movement of liquid pulsatile in arteries, smooth in xylem;</p> <p>G Arteries living, xylem dead;</p> <p>H Pressure generated by heart in arteries, no pump for xylem;</p> <p>I Xylem vessels contain lignin;</p> <p>J Xylem has support function;</p> <p>K {Adhesive forces/ hydrophilic lining} in xylem;</p> <p>L Arteries have {muscle/elastic tissue}; can be shown on diagram</p> <p>M Arteries distend/recoil;</p> <p>N Smooth endothelium of artery/ endothelium reduces friction;</p> <p>O Artery <u>walls</u> composed of layers;</p>	10
Question 6 Total		[10]