

Biology BY2

Question		Mark Scheme
1	(a) (i)	Species. 1
	(ii)	Ventilation. 1
	(iii)	Hydrophytes. 1
		(not: aquatic / hygrophytes)
(b)	[For 'distinguish' must refer to both terms]. Apoplast is pathway (for water) via cell walls, symplast via living protoplast / cytoplasm / plasmodesmata / cell membrane 1 mark each pathway, no mark if only 1 mentioned (not: ref. gaps between cell walls) allow: between cell walls 2	
5 MARKS		
2	(a) (i)	Drawing showing 2 guard cells curved and pore open AND drawing showing guard cells inner edge straighter and pore closed (1); Wall adjacent to pores thicker (1). Touching top + bottom 2
	(ii)	Chloroplasts. (right + wrong = 0) 1
	(b)	Stomata will be open to allow carbon dioxide in / gas exchange for photosynthesis. 1 closed at night to avoid water loss. / transpiration reduced 1
(c)	1. K^+ / Potassium <u>ions</u> pumped into <u>guard cell</u> (by active transport) (not: diffused) 2. Starch to malate. 3. Solute/ water potential in the (guard cells) lowered. (not: WP) 4. Water moves in by <u>osmosis</u> / down a water potential gradient 5. (Turgor increases) as cells expand they curve/bend (because inner walls are thicker than outer walls) [4/5] 4	
9 MARKS		

Question		Mark Scheme										
3	(a) linked marks	(i) <u>B</u> iconcave (discs)/no nucleus. (allow: no organelles / labelled diag) allow: full description (not: diagram alone)	1									
		(ii) Biconcave (discs) - increase SA:vol/flexibility/no nucleus-room to pack in haemoglobin.	1									
	(b)	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>96</td> </tr> <tr> <td></td> <td></td> <td>20</td> </tr> </tbody> </table>		A	B			96			20	1
	A	B										
		96										
		20										
	(c)	(i) Increased carbon dioxide/increased acidity/lower pH (not: ref. oxygen/temperature)	1									
		(ii) Bohr shift/effect.	1									
		(iii) Makes more oxygen available (during increased activity)/dissociates more easily/owtte/lowers affinity for oxygen (not: ref speed/taking up O ₂)	1									
	(d)	(i) Curve drawn to left of A. (start + end at same point as A + B)	1									
		(ii) At low levels of oxygen/low partial pressures; Hb has greater affinity/will become fully saturated/Hb will be able to absorb more oxygen from environment. (not: lower amount/ref. llamas having affinity)	1									
		(iii) More red blood cells/higher Hb concentration/more Hb (Not: ref. affinity/viscous)	1									

10 MARKS

Question		Mark Scheme
4	(a) Chordata/chordates (accept vertebrata/vertebrates).	1
	(b) (i) Pentadactyl (limb).	1
	(ii) B.	1
	(ii) Phoca.	1
	(c) (i) Homologues/homologous. (not: analogous/adaptive radiation)	1
	(ii) They suggest the existence of shared/common ancestors (not: similar ancestors)	1
	(d) (i) 6.	1
	(ii) Macroderma gigas.	1
(e)	<p style="margin-left: 40px;"> B. acutorostrata P. vitulina M. gigas </p>	1

9 MARKS

Question	Mark Scheme
5 (a) (i) Meiosis (correct spelling).	
(ii) Fertilisation.	
(iii) Zygote. (allow: mitosis)	
(iv) Mitosis. (correct spelling)	
[4 correct = 2, 3 correct = 1]	2
(b) X - haploid, Y - diploid. Colonise area quickly/reduce parasite transmission	1
(c) (i) <u>Rapid</u> increase in <u>numbers</u> /energy for mating is saved/where environment is stable/ useful features maintained. (not: its quicker/one parent needed/clones)	1
(ii) Variation/variety in offspring needed to <u>adapt</u> to new conditions or example/survival advantage; (sexual reproduction) leads to <u>variation</u> .	1 1
(d) (i) Joining together gametes/ <u>fusing</u> of <u>sperm</u> and eggs (sperms introduced) inside (female's) body/reference to intromittent organ. (not: zygote formation)	1
(ii) Reduced number of gametes produced/more chance of gametes meeting/fertilisation/less chance of gametes being wasted; allows (male) gamete to become independent of water ref. prevent dehydration; embryo/zygote can be better protected; (not: it/offspring/baby) resistant stage in life cycle/ref. shelled egg. (any 3)	3
(iii) Embryo can receive nutrition during development.	1

10 MARKS

Question		Mark Scheme
6	(a) (i)	P - herbivore, Q - carnivore. [Both for 1] 1
	(ii)	P <u>incisors</u> in lower jaw only (with horny pad) for cutting plants/interlocking (W-M) <u>molars</u> for <u>grinding</u> (tough fibrous material) /enamel ridges/tooth continues to grow/diastema/bolus formation/ tongue action/AVP (not: large molars) 1
		Q - sharp incisors to grip and tear flesh from bone/large canines for seizing or killing prey/tearing flesh/carnassials for shearing flesh/ slicing/crushing bones 1
	(b) (i)	Short gut in carnivore reflects ease with which <u>protein</u> is digested compared with <u>cellulose</u> . (or reverse argument). (not: meat/plant material) 1
	(ii)	(cud mixed with) cellulose digesting bacteria/cellulase produced by bacteria; (allows cud to be) regurgitated and (chewed again); allows water to be <u>re</u> -absorbed; correct use of term rumen; i.e. presence of bacteria/first chamber some absorption e.g. of fatty acids/keratinised lining [Any 4] 4
	(iii)	Carnivores catch prey only periodically and can use stomach to store catch until next time they make a kill/diet mainly protein and stomach is where protein is digested/can take in large quantities in one go. (not: ref. chewing) 1
	(iv)	P has a longer colon. (allow: ref. large intestine) (not: small intestine) 1
	(c) (i)	One layer (has fibres) arranged <u>longitudinally</u> , one has <u>circular</u> fibres. 1
	(ii)	Peristalsis. 1
	(iii)	S - sub-mucosa, T - mucosa. [Both for 1] 1

4

(iv)

Structure	Function
Blood vessels/capillaries.	Carry/transport dissolved, products of digestion (to liver) or specific example
Lymph vessels/lymphatics.	Transport lipids.
Nerves.	Co-ordinate muscular Control secretion contractions in peristalsis.
Glands/gastric/brunners	Secretion of enzymes or named/alkali/acid secrete mucus/gastic juice/intestinal juice

[Any 2, 1 for each structure and 1 for each corresponding correct function]

17 MARKS

(not: lacteals/goblet cells/crypts of lieberkuhn/elastic fibres/absorption)

Question		Mark Scheme
7	(a)	
A	Leaves (are flat) and have large surface area to <u>absorb</u> maximum light/CO ₂ /gas exchange	1
B	Leaves can grow towards/orientate with light/sun to expose maximum area.	1
C	Leaves thin to allow light to penetrate to lower layers.	1
D	Cuticle and/or epidermis are transparent to allow light to penetrate to mesophyll.	1
E	Palisade cells elongated to reduce number of cross walls to absorb light.	1
F	Palisade cells packed with chloroplasts to increase photosynthetic capacity/light absorption.	1
G	Chloroplasts can move/circulate inside cells to gain best positions for absorbing light.	1
H	Spongy mesophyll cells are moist/wet surface or have large surface area for gas exchange/absorption of gases.	1
I	Xylem to supply water and/or phloem to remove sugar.	1
J	Leaves thin (i.e. overall thickness) to reduce distance for diffusion.	1
K	Air spaces in spongy mesophyll allow circulation of gases/ cut down distance for diffusion into cells/gradient for uptake.	1
L	Stomatal pores permit entry and exit of gases/sub stomatal/intercellular spaces in spongy mesophyll allow supply of carbon dioxide and removal of oxygen/gas exchange between outside and inside leaf.	1
M	Waxy cuticle on upper surface reduces water loss (by evaporation) or waterproofs the leaf.	1
N	Stomatal pores in <u>lower</u> epidermis reduce water loss (by evaporation).	1
O	Guard cells can close stomatal pores/control opening to reduce water loss.	1
(allow: ecf for ref. 'traps' light or 'stops/prevents' water loss)		10 MAX

Question			Mark Scheme
7	(b)	A	Xylem transports water (and mineral salts) (from the roots to leaves). 1
		B	Phloem transports the soluble products/sucrose/sugars/organic molecules/amino acids/source to sink of photosynthesis from leaves to other parts of the plant. (not: glucose) 1
		C	Xylem is made of vessels and tracheids. 1
		D	Xylem vessels form continuous tubes/ lose end walls (to carry water throughout the plant). 1
		E	Their (secondary) wall is lignified to waterproof and/or strengthen/or support them/stop them (collapsing under suction/tension). 1
		F	Mature Xylem vessels are dead and cytoplasm has gone so there is nothing to impede flow. 1
		G	Tracheids have tapered ends that fit together and/or pits to allow transfer of water between cells. 1
		H	Phloem is made of sieve tubes and companion cells. 1
		I	Sieve tube cells lose most of their organelles/are still alive when mature. 1
		J	Sieve tube cells have perforated sieve/end plates that allow solutes/sugar to pass through. 1
		K	(Sugar solution) flows in both directions. 1
		L	Companion cells have all the organelles/communicate by plasmodesmata/are responsible for keeping sieve tube cells alive/provide ATP 1
		M	Any reference to fibres or parenchyma in either. 1
		N	Cohesion-tension/capillarity/adhesion in xylem. Correct use of terms with ref. water molecules. 1
		O	Correct use of terms in correct context: Reference to mass flow/cytoplasmic streaming/protein filaments in phloem. 1

10 MAX