

Pure Biology 6093
Set II — Marking Scheme

Paper 1 (40 marks)

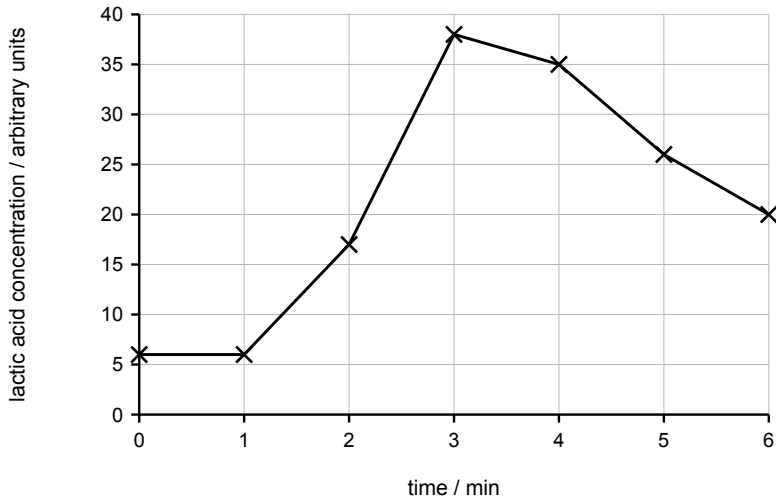
1	2	3	4	5	6	7	8	9	10
C	A	B	C	A	D	D	A	D	C
11	12	13	14	15	16	17	18	19	20
C	D	D	A	B	C	C	D	A	B
21	22	23	24	25	26	27	28	29	30
D	A	C	D	B	A	A	D	C	A
31	32	33	34	35	36	37	38	39	40
D	C	C	D	B	A	D	D	B	A

Paper 2 — Section A (70 marks)

1	a	Potato strips placed in 8 au sucrose solution had a decrease in mass of 3 au; Water potential of sucrose solution is lower than that of potato strips; Net movement of water molecules from potato strips to sucrose solution; By osmosis 4 pts – 3m, 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	3
	b	5 arbitrary units. When concentration of sucrose solution is 5 au, there is no change in mass of potato strips; There is no net movement of water molecules / osmosis between potato strips and sucrose solution	3
2	a	Duration of 1 heartbeat = 0.8 s Number of heartbeats per min = $60 / 0.8 = 75$ Working – 1m, Ans – 1m 1m for deriving answer from 1 heartbeat = 0.85 s	2
	b	R S P 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	2
	c	At Q, blood pressure of the left ventricle becomes higher than in the aorta. Semilunar / aortic valve opens Blood enters the aorta and blood pressure in the aorta increases. 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	2
3	a	Microvilli Lacteal	2
	b	X transports fats . *1m given for fatty acids and glycerol	1

	c (i)	W increases surface area to volume ratio of the epithelial cells to increase rate of absorption of nutrients.	1
	(ii)	Y is one cell thick to reduce distance for nutrients to pass through to enter the blood capillary / lacteal.	1
	(iii)	Z releases energy for absorption of nutrients by active transport	1
4	a	X T	2
	b	Carbon dioxide diffuses into intercellular air spaces through stomata; Carbon dioxide dissolves into thin film of moisture; Dissolved carbon dioxide diffuses into spongy mesophyll cells. No mention of diffusion, dissolving = 0m	3
	c	Both have cell wall / nucleus / mitochondria etc. Cell X has chloroplasts, while root hair cells do not. Cell X has a regular shape, while root hair cells have long and narrow root hair protruding out. Minimum 1 similarity or 1 difference. 3 pts – 2m, 2 pts – 1m, 1 pt – 0m. All comparisons lumped together – Must fulfil above criteria, and max 1m	2
5	a	Big fish – Primary consumer, Secondary consumer Crocodile – Secondary consumer, Tertiary consumer Smooth-coated otter – Secondary consumer, Tertiary consumer Accept any other suitable answer. No mention of the word ‘consumer’ – 1m if all correct. 0m for any mistakes. Trophic level 1, 2, 3, 4 etc. – 0m	2
	b	At each trophic level, around 90% of energy is lost As heat through respiration, through metabolic processes, and as chemical energy through waste products (at least 2) Moving up each trophic level, there will be insufficient energy to support a long food chain more than 4 trophic levels.	3
	c	Fiddler crabs are also decomposers Fig 5.1 does not show the transfer of energy from the other organisms in the food web to the fiddler crabs upon their death. Alternative answers: The organisms in Fig 5.1 can get their energy from other food sources not shown in the diagram – 2m	2
6	a	Branch of the renal artery Distal convoluted tubule	2
	b	P does not have valves, Q has valves; P has thicker, more muscular walls than Q P has a smaller lumen than Q	2
	c (i)	The partially permeable basement membrane of glomerulus is damaged / pores become larger / more permeable; It allows larger molecules such as proteins to pass through into the glomerular filtrate. S is affected (stated in the question already) – 0m Prevent S from working (how?) – 0m	2

	(ii)	Platelets, Red blood cells, White blood cells, hormones (any two)	2												
	(iii)	<table><tr><td>substance</td><td>concentration in blood / arbitrary units</td><td>concentration in dialysis fluid / arbitrary units</td></tr><tr><td>glucose</td><td>5.5</td><td>5.5</td></tr><tr><td>urea</td><td>4.2</td><td>0</td></tr><tr><td>mineral salts</td><td>35.6</td><td>35.6</td></tr></table>	substance	concentration in blood / arbitrary units	concentration in dialysis fluid / arbitrary units	glucose	5.5	5.5	urea	4.2	0	mineral salts	35.6	35.6	2
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glucose		5.5	5.5												
urea		4.2	0												
mineral salts		35.6	35.6												
	3 pts – 2m, 2 pts – 1m, 1 pt – 0m														
7	a	P: Amniotic fluid R: Umbilical cord Umbilical artery / vein accepted.	2												
	b (i)	Cushions and protects fetus from physical injury	1												
	(ii)	The fetus will die Carbon dioxide and waste products cannot be transferred from fetus to placenta. Oxygen and food substances cannot be transferred from placenta to fetus.	3												
	c	Down syndrome Fetus has an extra copy of chromosome 21	2												
8	a	5 and 6 are Aa. 8 is aa, so it must inherit 1 copy of sickle cell allele from each parent. 5 and 6 are normal / not diseased, so they must be heterozygous. 5 is Aa because mother is either Aa or AA, and father is aa (does not explain why 6 is Aa) – 1m Usage of wrong symbols (Not A and a) – 1m deducted	3												
	b	50% Answer – 1 Labels – 1 Content of diagram – 1	3												
	c	Carry less haemoglobin and transport less oxygen OR Can get stuck in blood vessels and block bloodflow Less oxygen available for aerobic respiration for release of energy for muscle contractions. OR Fainting / sudden pains / death	2												

9	a	 lactic acid concentration / arbitrary units time / min S – Scale L – Line A – Axes P – Points	4
	b (i)	From 0 to 1 min, lactic acid concentration remained constant at 6.0 arbitrary units. From 1 to 3 min, it increased from 6.0 arbitrary units to 38.0 arbitrary units. From 3 to 6 min, it decreased from 38.0 to 20.0 min. 3 pts for 2m, 2 pts – 1m, 1 pt – 0m No data quoted – 1m (if all points are correct)	2
	(ii)	Exercise has stopped Lactic acid is gradually transported to the liver where oxygen is used to remove it from the bloodstream / broken down in the liver	2
	(iii)	It will gradually decrease and remain constant at 6.0 arbitrary units.	1
	c	Diaphragm is unable to relax and curve upwards; Volume of lungs does not decrease / remains constant Pressure in lungs does not increase / is similar to atmospheric pressure; Lower volume of air exhaled. 4 pts – 3m, 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	2

Paper 2 — Section B (10 marks)

10 EITHER	a	1 When there is wind, pollen is shaken from anthers and carried away; 2 Pollen is captured in the air by large, feathery stigma; 3 Sugary fluid on stigma causes pollen grain to germinate; 4 Pollen tube grows from pollen grain; 5 Pollen tube secretes enzymes to digest stigma and style; 6 Pollen tube grows into ovary, through micropyle, into ovule; 7 Tip of pollen tube absorbs sap and bursts, releasing male gamete; 8 Male gamete fuses with female gamete. 8 pts – 6m, 6-7 pts – 5m, 4-5 pts – 4m, 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	6
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	b	<u>Advantages</u> 1 Self pollination only requires one parent, while cross pollination requires two parents; 2 Self pollination requires less pollen to be produced, conserving energy, while cross pollination wastes more pollen and energy; 3 Self pollination is not dependent on external factors such as wind / insects for pollination, while cross pollination is dependent on them; 4 In self-pollination, beneficial qualities can be passed directly down from parent plant to offspring, while it is not possible in cross pollination; 5 Higher probability of self-pollination occurring due to close proximity of anthers to stigma, but lower probability of cross pollination due to larger distance between flowers; <u>Disadvantages</u> 6 Less genetic variation in self-pollination but cross pollination allows for more genetic variation; 7 Less viable seeds produced by self-pollination, but more viable seeds are produced in cross-pollination which can survive longer before germination; 8 Offspring may inherit beneficial qualities from both parents in cross pollination, while they can only inherit qualities from one parent in self-pollination 9 Offspring may inherit unfavourable traits directly from parents in self pollination, while they may be able to lose these traits during cross-pollination Max 4m - min 2 advantages / disadvantages. Max 3m – min 1 advantage / disadvantage Max 2m – Only advantage or disadvantage stated. 5 pts – 4m, 4 pts – 3m, 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	4
11	a	1 Receptors in his eye detect the ball rolling towards him and produce nerve impulses; 2 Nerve impulses are sent by sensory neurones; 3 To relay neurones; 4 To brain; 5 Brain generates another set of nerve impulses; 6 Nerve impulses are sent by relay neurones in spinal cord; 7 To motor neurones in leg; 8 To leg muscles to kick the ball 8 pts – 6m, 6-7 pts – 5m, 5 pts – 4m, 4 pts – 3m, 3 pts – 2m, 2 pts – 1m, 1 pt – 0m	6

	b <u>Differences</u> 1 Voluntary actions are consciously controlled, while reflex actions are not consciously controlled; 2 Voluntary actions are initiated in the brain, while reflex actions are initiated by stimulation of receptors; 3 Voluntary actions take a longer time to execute than reflex actions; 4 Nervous pathway is longer in voluntary actions than reflex actions; 5 In voluntary actions, the brain is involved, while in reflex actions, impulses do not need to travel to the brain. <u>Similarities</u> 6 Nerve impulses are generated; 7 Motor neurones carry the impulses to the effectors; 8 Responses are carried out by the effectors 9 Synapses are involved in transmission of nerve impulses 10 Both require use of sensory / motor / relay neurones Any 4 pts. Minimum 1 similarity and 1 difference. Max 3m – Only similarities or differences	4
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