

BEDOK SOUTH SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2020
Secondary 4 Express
Biology 6093/1 and 6093/2
Marking Scheme

Paper 1

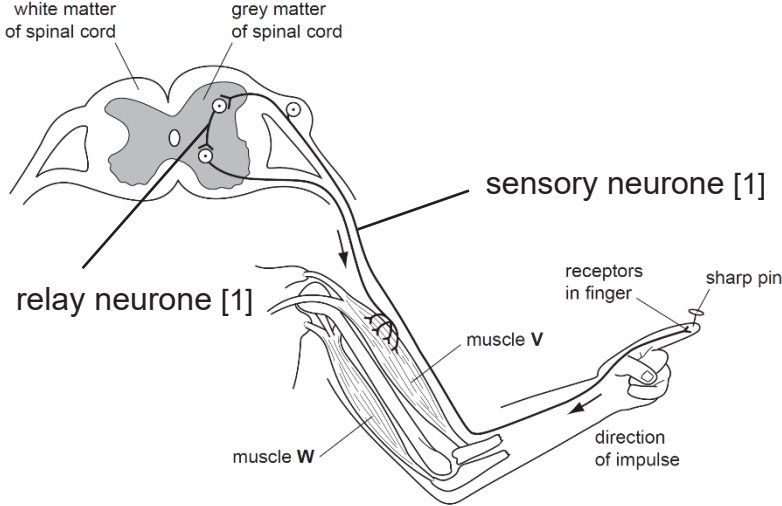
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
A	B	B	B	D	D	B	C	B	A
Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
D	A	B	C	C	D	C	D	D	D
Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
C	B	D	C	A	C	A	C	A	C
Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40
D	A	B	D	A	A	A	B	D	C

Paper 2

Section A (50 marks)

Qn no.	Suggested answer	Comments to markers	Marks
1	- Products drawn in correct absorptive vessel. One correctly drawn and labelled product is 1 mark/ 2 correctly drawn 1 mark. *All molecules must be completely digested and a minimum of 2 products of each type is required to get the mark*		3
	<i>Most able to recall the regions of absorption for each nutrients but unable to show complete digestion of molecules.</i>		
	hepatic portal vein [1]		1
	<i>Well answered.</i>		
	- Excess <u>amino acids</u> undergo deamination in the liver [1] - and are broken down to form urea and glucose [1]. - Excess glucose in the blood is converted by insulin into glycogen which is stored in the liver [1]		3
2	<i>Some stated excess proteins that undergo deamination.</i> <i>A few were still confused between the action of insulin and glucagon.</i> <i>Some gave very brief and incomplete which are not specific enough.</i>		
	- source of carbon dioxide; - carbon dioxide is a substrate/ raw material of photosynthesis; [1]		1

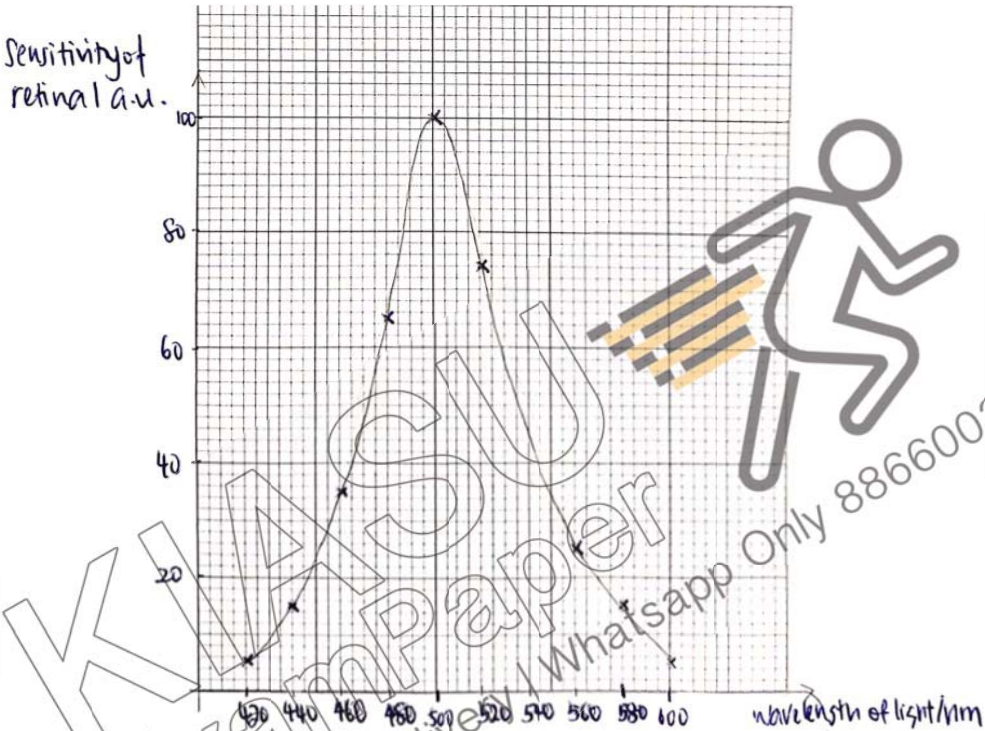
	•		
	b (i)	• distance moved by air bubble / 5 minutes; [1]	1
	•		
	b (ii)	• as light intensity increases the rate of photosynthesis increases / ora; [1] • data quote (two values of rate of movement of air bubble plus two values of distance of lamp from pond, plus units); [1]	2
	•		
	b (iii)	• At less than 10 cm between the lamp and the pond plant, enzymes could be denatured. [1] • Other factors become limiting e.g. temperature.	1
	•		
3	a (i)	• Any answer from <u>0.18s - 0.2s</u>	<i>R: answers without units</i> 1
	•		
	a (ii)	• From <u>0.1s to 0.3s</u>, <u>pressure</u> in the ventricle <u>increases</u> • From <u>1 kPa to 16 kPa</u>; [1] • As the <u>muscles</u> of the ventricle <u>contract</u>; [1] (<i>>1m if no data quoted</i>)	2
	•	• <i>Most did not quote data from diagram to support answer.</i> • <i>Those who gave a general trend did not explain.</i>	
	a (iii)	• The right ventricle only needs to pump blood <u>to the lungs</u> over a <u>shorter distance</u>; [1] • Has <u>thinner muscular walls</u> compared to left ventricle as less force, less pressure required; [1]	2
	•	• <i>Most left out on the distance to be pumped</i>	
	b	• The left ventricle is <u>unable to relax</u> and <u>fill with sufficient blood</u> / <u>smaller volume in left ventricle</u>; [1] • <u>Less oxygen</u> is pumped around the body; [1]	2
	•		

4	a (i), (ii)		[1] each	2
		Well answered.		
	b	(skin / receptor) → sensory neurone → relay neurone (in spinal cord); [1] → motor neurone → arm muscle; [1]		2
5	a	A – anther / stamen [1] B – style [1] C – ovule [1] D – stigma [1]	[1] each	4
	b (i)	- insect visits not necessary, if no / few insect visits, self-pollination occurs / pollen from anther is transferred to stigma of the same flower; [1] - stigma able to bend and touch pollen on style / anther and stigma comes into contact; [1]		2
		Most did not make reference to the information from Fig. 5.1.		
6	b (iii)	- many visits likely to result in greater variation; ora [1] - more likely for cross-pollination / AW; [1] OR - little / no difference in variation; [1] - if insects transfer pollen within the same plant; [1]		2
	a	- Genes are heredity factors found on a particular locus in a chromosome that controls a particular characteristic [1]; - Alleles are different forms of a gene that occupy the same relative positions on a pair of homologous chromosome [1]		2
		Most are still not sure of the terms.		
	b	- labels; [1] - parent phenotype, parent genotype, alleles/gametes, offspring genotype, offspring phenotype		5

		- pure-breed guinea pig with smooth hair = rr + guinea pig offspring with rosette hair = Rr; [1] - correct offspring genotypes: 2 Rr and 2 rr; [1] - correct offspring phenotypes; [1] - Rr = rosette, rr = smooth - correct ratio (both genotype and phenotype); [1] - genotype ratio = Rr : rr = 1 : 1 - phenotype ratio = rosette : smooth = 1 : 1s														
		Well answered. Only 2 students gave the wrong genotype for parents.														
	c (i)	phenotype;		1												
	c (ii)	- change in gene structure / nucleotide sequence in the DNA; - transcription in nucleus produces an mRNA of a different sequence; - translation of mRNA in ribosome; - produces polypeptide with different amino acid sequence (resulting in a different protein produced, giving rise to less formation of hair);	Max: 3M [1] each	3												
		Most unable to answer this question, unable to make the linkage between mutation, transcription and translation.														
7	a (i)	meiosis		1												
	a (ii)	ovule / anther / ovary		1												
	a (iii)	1 E 2 C 3 D 4 F 5 A 6 B		1												
	b	<table><tr><td></td><td>C / metaphase I</td><td>A / metaphase II</td></tr><tr><td>1.</td><td>Chromosomes are one either side of the equator.</td><td>Chromosomes are on the equator.</td></tr><tr><td>2.</td><td>Chromosomes are paired.</td><td>Chromosomes are not paired.</td></tr><tr><td>3.</td><td>Centromere are not on the equator.</td><td>Centromeres are on the equator.</td></tr></table>		C / metaphase I	A / metaphase II	1.	Chromosomes are one either side of the equator.	Chromosomes are on the equator.	2.	Chromosomes are paired.	Chromosomes are not paired.	3.	Centromere are not on the equator.	Centromeres are on the equator.	Correct identification of stages A and C. [1] Any two marking points [2]	3
	C / metaphase I	A / metaphase II														
1.	Chromosomes are one either side of the equator.	Chromosomes are on the equator.														
2.	Chromosomes are paired.	Chromosomes are not paired.														
3.	Centromere are not on the equator.	Centromeres are on the equator.														

		•	
c	- Crossing over occurs during prophase I. [1] - Random assortment occurs during metaphase I and II and anaphase I and II. [1]		2
	• <i>Brief answers without the stages of division were given.</i>		

Section B (30 marks)

Qn no.	Suggested answer	Comments to markers	Marks
8	a  • appropriate scale used [1] • line of best fit [1] • correct label of axes [1] • points plotted correctly/ accurately [1]	Max [3]	3
	•		
b	$100 - 15 = 85$ arbitrary units [1]		1
	•		
c	- As the wavelength of light increases from 420-500 nm, the sensitivity of the retina increases from 5 to 100 a.u. [1]. - From 500 to 600 nm, the sensitivity of the retina decreases from 100 to 5 a.u. [1]. *only award 1 mark if they give general trend and no data from the graph/table*		2
	•		

	d	• 42 ± 2 [1]	refer to graph for ECF	1						
		•								
	e	• The change in wavelength is detected by the retina, which sends nerve impulses to the brain through the optic nerve [1]. • The brain then sends nerve impulses to the iris through the motor neuron [1]. • The circular muscles of the iris will contract, while the radial muscles relax [1] and this causes the pupil to constrict.		3						
		• <i>Answers were incomplete and lacking in explanation of how the stimulus was received.</i>								
9	a	<table><tr><th>Suggestion:</th><th>Explanation:</th></tr><tr><td>Person may experience watery stool / diarrhoea ;</td><td>without absorption of water, egested material may still contain higher amount of water ;</td></tr><tr><td>Person may suffer from dehydration (initially after the surgery) ;</td><td>Colon functions to absorb water from undigested food back into the blood stream ;</td></tr></table>	Suggestion:	Explanation:	Person may experience watery stool / diarrhoea ;	without absorption of water, egested material may still contain higher amount of water ;	Person may suffer from dehydration (initially after the surgery) ;	Colon functions to absorb water from undigested food back into the blood stream ;		3
Suggestion:	Explanation:									
Person may experience watery stool / diarrhoea ;	without absorption of water, egested material may still contain higher amount of water ;									
Person may suffer from dehydration (initially after the surgery) ;	Colon functions to absorb water from undigested food back into the blood stream ;									
		•								
	b	• Lock (enzyme) refers to the neuraminidase and key (substrate) refers to the glycoproteins on cell membrane; [1] • Enzymes (neuraminidase) are specific in nature binding only to one type of substrate (glycoproteins) at the active site; [1] • Once the enzyme binds to the substrate, to form the enzyme-substrate complex, it will be able to catalyse the breakdown of the substrate; [1] OR • When the cell membrane's structure is disrupted, the cell will lyse / break down; [1]		3						
		• <i>Most did not mention which is the lock and which is the key.</i> • <i>Most left out the term "enzyme-substrate complex".</i>								
	c	• Relationship: When air temp increased, quantity of urine produced decreased; [1] • OR vice versa • Heat receptors in our skin are stimulated as temperature increases, negative feedback mechanism (homeostasis) sets in to regulate the internal body temperature ; [1] • Warmer temperature increased rate of sweating for removal of heat; [1] • More water lost via sweating means less excess water to be excreted in urine ; [1]		4						

		• (Accept 1m for ref. to increased ADH secretion and water reabsorption at the nephron)		
		•		
10	a	2.5 – 4 + minutes for pulse (A any within range); 4 + minutes for breathing (A anything within range);		2
		•		
	b	muscles; For the remaining marks in this part, there must be the use somewhere of a word that indicates enhancement of at least one of the factors (i.e. more / greater, faster etc.). Thus, for example, 'more oxygen' scores, and so, then, would any ref. to CO ₂ removal or energy, even if 'more' is not repeated. more / faster blood transported to (muscles); [1] more oxygen / glucose + respiration; [1] ref. more CO ₂ removed / lactic acid; [1] more energy (R produced, made, manufactured, etc.) for muscular contraction; [1]		4
		•		
	c	(max 2m if students never indicate who they are talking about) *student F is fitter / exercises regularly AW; *more efficient muscles / better breakdown of lactic acid; *more efficient circulation / no or limited cholesterol in blood vessels; *more efficient lungs / respiratory system; *exercised less vigorously; *more haemoglobin / more RBCs; (*A reverse arguments for Student E) student E was a smoker, F was not; student E was obese / overweight AW (R large mass); emphysema; (b) suffered from asthma / bronchitis / heart problems / lung infection AW;		4
		•		

- END OF PAPER -

