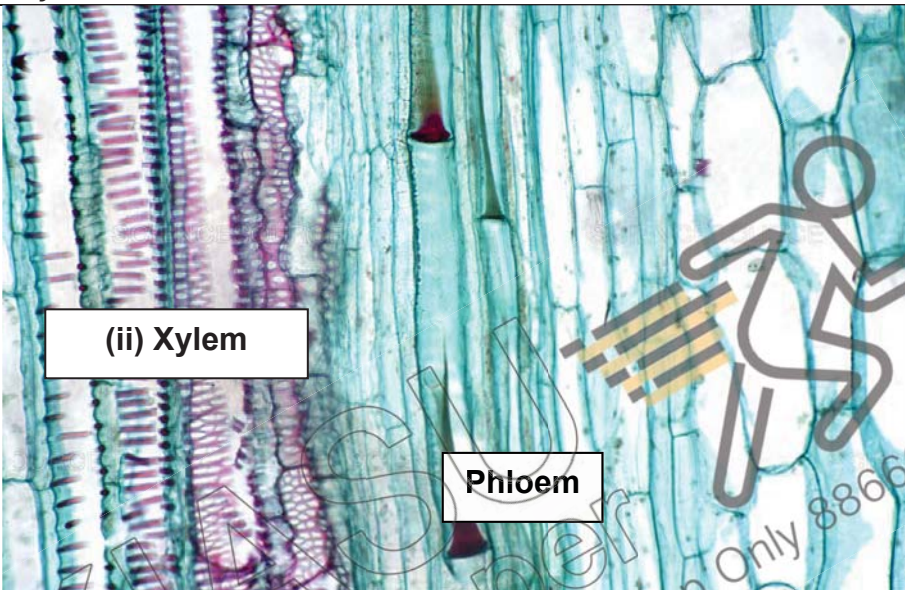


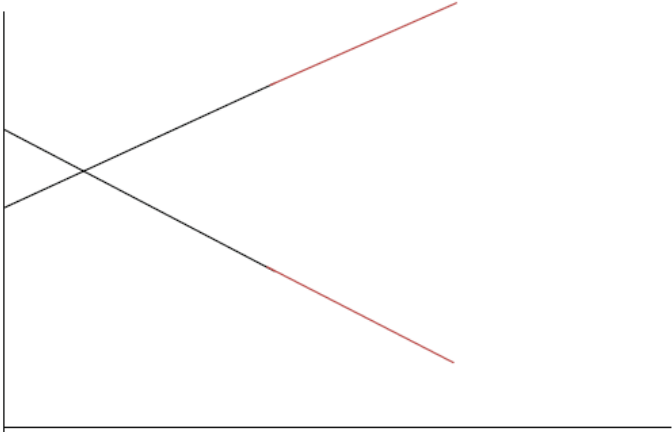
Mark Scheme
Sec 4 Express Prelims 6093/1 – 2020

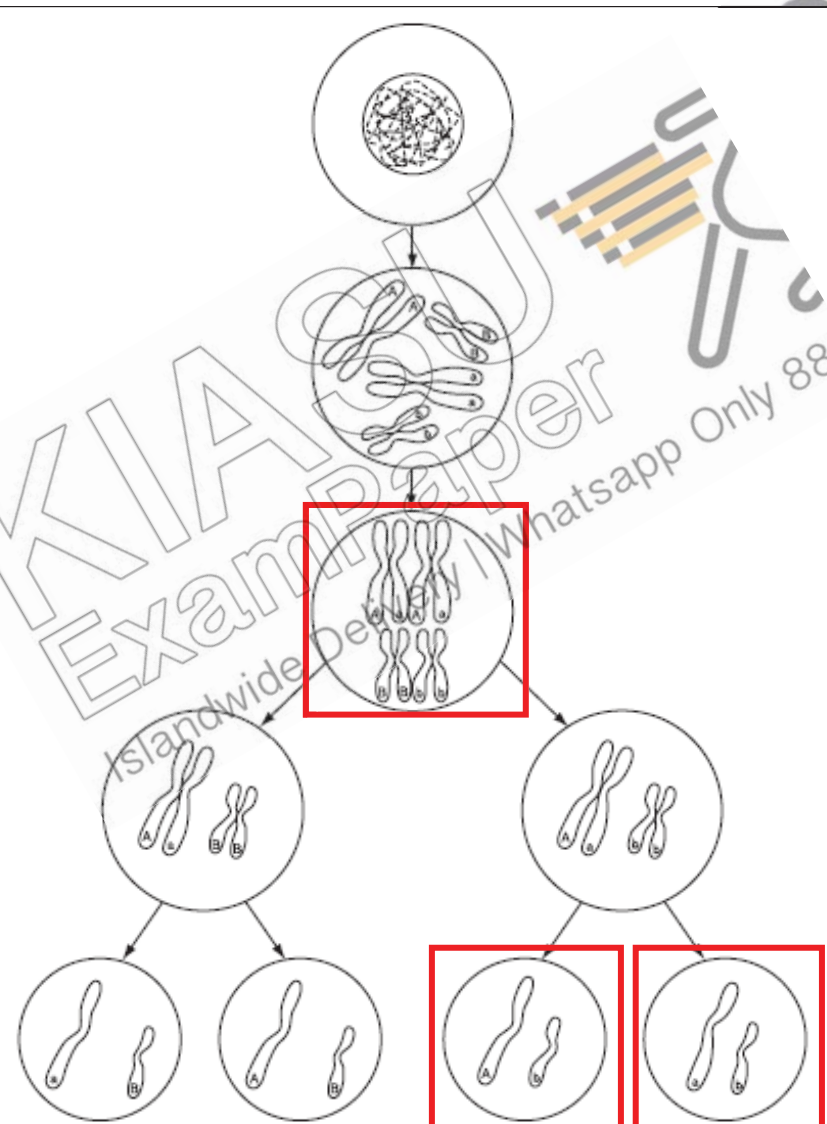
No.	Answer
1	D
2	C
3	C
4	D
5	B
6	A
7	A
8	B
9	B
10	D
11	B
12	D
13	D
14	C
15	C
16	C
17	B
18	A
19	D
20	D
21	D
22	B
23	D
24	C
25	A
26	A
27	D
28	C
29	C
30	A
31	B
32	B
33	C
34	B
35	C
36	A
37	D
38	D
39	C
40	B

Section A: (50 marks)

1	(a)i	Mitochondrion	[1]
	ii	- modification of, proteins / polypeptides ; - packaging into vesicles / formation of Golgi vesicles / formation of secretory vesicles ; A 'budding off' / 'breaking off' / transport proteins in Golgi vesicles - AVP e.g. modification of lipids; synthesis of, phospholipids / glycolipids Any 2	[2]
	(b)	 (ii) Xylem Phloem	[2]
	(c)	- Leaves contain stomata on their surface, that open to allow exchange of gases, in particular CO₂ in & O₂ out. - Many long thin leaves with numerous stomata to increase surface area for exchange. - Cavity inside leaf in close proximity to the cells/air spaces between the spongy mesophyll cells, which maintains a high concentration gradient and ensuring efficient internal gaseous exchange. - The internal surface of the leaf cavity is coated in a layer of moisture. This allows for the dissolving of the gases. Any 2. Must have both structure and function.	[2]
2	(a)	- At 15 °C the mark should be higher than the 37 °C mark. - At 75 °C mark would be even higher than the one they drew for 15 °C <i>Students could indicate their value either as a bar/line/cross on the graph</i>	[1] [1]
	(b)	15 °C: The reaction occurs at a slower rate as it is lower than the optimum temperature or there are few effective collisions occurring between the enzyme and substrate molecules. 75 °C: The enzyme is denatured.	[1] [1]
	(c)i	Large intestine [1];	[2]

		- virus cause the lining to be unable to reabsorb water [1] that is why there is diarrhea. OR Stomach [1]; - presence of virus cause the stomach to churn drastically [1] to cause vomiting, either as a reaction to remove toxins/virus (OWTTE)	
	(ii)	Stimulus – increase in blood temperature immune response to viral infection; [1] Receptor/control center – hypothalamus of the brain is stimulated and sends nerve impulses to the various effectors; [1] Corrective mechanism [x2] - arterioles in skin dilate and the shunt vessels constrict, more blood flows to the blood capillaries in the skin and more heat is loss by conduction and convection [1] - sweat glands become more active, more sweat is produced and more latent heat is loss. [1] Blood temperature will decrease to the norm and the fever will be reduced.	[4]
3	(a)	Green [1] Photosynthesis is occurring thus chlorophyll is present [1]	[2]
	(b)	Tube A  When the lights are turned off photosynthesis stops but aerobic cellular respiration continues. Therefore production of oxygen stops but continues to be used in respiration therefore the level of oxygen continues to decrease and carbon dioxide stops being used due to lack of photosynthesis. Because of ongoing respiration, the level of carbon dioxide continues to increase.	[1]
		Tube B	[1]

		 Organism B is only respiring and NOT photosynthesising therefore the rate of respiration remains the same regardless of whether the light is on or off. Therefore, both lines will continue in the same direction.	
	(c)	To prevent the carbon dioxide and oxygen from diffusing in/out of the tube, so that an accurate measurement can be taken. Or Any change in amount of gas is due to the reaction (by organism)	[1]
	(d)	Glucose [1] is the substrate for respiration; Enters by diffusion [1] as there is a higher concentration of glucose outside of the cells/organisms [1]	[3]
4	(a)	liver	[1]
	(bi)	Any two of: urea, glucose, amino acids, salts	[1]
	ii	It is all reabsorbed back into blood/capillaries from proximal convoluted tubule.	[1]
	iv	- Large quantities of water are reabsorbed back into the blood stream [1]. - Urea is not reabsorbed (actively) back into the blood stream [1] or urea can be secreted (actively) into the tubule from the blood (rare but can happen) (1). - Other substances in the glomerular filtrate such as glucose were also reabsorbed further reducing the volume of liquid increasing the concentration.	Max [2]
	(c)	- Large numbers of mitochondria - provide energy for active reabsorption - Microvilli (folds in inner wall) - increase the surface area of the tubule to increase the rate of reabsorption. - Capillary and tubule wall in close proximity - to facilitate reabsorption. - Wall of tubule/capillary only one cell thick - reducing the diffusing distance. Must have feature with related explanation – 1mark Other relevant reasons were also considered if they related to an increased rate of diffusion/active transport.	Max [3]

5	(a)		Glucagon	Adrenaline	[2]
		Stimulus that trigger its release	Drop in <u>blood</u> glucose level/Fasting	Stress/Fear/Anxiety	
		Organ/gland released from	Pancreas	Adrenal gland	
		Correct stimulus and organ to get 1 mark			
	(b)	- light sensitive/receptor (cells) or named/retina receive the stimulus/increase in light intensity [1] - neurones/nerve cells or fibres [1] A: optic nerve transfer the - nerve impulses [1] - contraction + circular muscles and relaxation + radial muscles [1]			[4]
6	(a)				[3] 1m ea
	(b)	In meiosis, there is a reduction division. Chromosome pairs line up together and one of each pair goes into the daughter cells. For each pair, this process is independent – hence a large number of combinations are possible.			[2]
	(c)i	Amniotic fluid			[1]

	ii	44	[1]
7	(a)	The gene for spider silk is isolated and cut out from the spider genome using a restriction enzyme.	[1]
	(b)	Stage 5	[1]
	(c)	The spider silk gene is <u>expressed</u> in the mammary cells of the goat. [1] The milk produced contains the spider silk protein, [1] which is purified/filtered and spun into thread.	[2]

Section B: (30 marks)

8	(a)	Correct axis with labels; Appropriate scale & accurate plotting; Best fit line/curve.	[3]
	(b)	- glycogen content decreases with exercise / all workloads cause glycogen content to decrease; - the heavier the workload, the quicker the glycogen content decreases; / the heavier the workload the greater the decrease in glycogen content; - athlete becomes exhausted quicker with the heavier workload; - workload C so intense that glycogen runs out before 60 minutes/athlete exhausted before 60 minutes/AW; correct use of figs.; use of calculated gradients;	[4]
	(c)	High protein – Increase formation of muscles/ repair wear and tear on muscles that occur during training; [1] High carbohydrates - increase source of energy for greater speed/endurance/store as glycogen store in muscles;[1] Low fat - gets stored as fat, less easy to access / enough present in normal foods Hydration/Drink lots of water - to replenish water loss Must have diet + rationale for 1mark 1m – 3 options of diet without rationale.	[3]
9	(a)	Difference 1: Frog- ventricles not separated/only one ventricle/partial or no septum/three chambers/left and right side not separated/single circulation; human- four distinct chambers/median septum/double circulation Reason: Result in the mixing of oxygenated and deoxygenated blood , less oxygen transported to other parts of the body	[4]

		Difference 2: Frog- single vessel from heart; Human – 2 vessels: aorta to pump blood to other parts of body and pulmonary artery to pump blood to lungs Reason: Lesser volume of blood leaves to the rest of the body since blood can go to either lungs or body. OR deoxygenated blood may be transported to the body instead of the lungs, thus less oxygen is transported to other parts of body. Difference 3: Frog- ventricle wall of uniform thickness. Humans - ventricles are thicker than frog's; left ventricle wall is thicker than right ventricle Reason: Lower pressure generated to push blood over a long distance in frog, hence less efficient in transporting blood. <i>Each difference 1m each. (max 2). Explanation (max 2) Must be point-to-point comparison</i>	
	(b)	Atrial systole: The atria contract, forcing blood into the ventricles. [1] Ventricular systole; atrial diastole After atrial systole, the atria relax. The ventricles begin to contract and pressure within the ventricles become higher than that in the atria, [1] hence the AV valves close to prevent backflow of blood into the atria. [1] The pressure within the ventricles become higher than that of the aorta/pulmonary artery [1], hence the semi-lunar valves present in the vessels open [1] and blood leaves the heart. Ventricular diastole; atrial diastole After the ventricles are fully contracted, they start to relax. The pressure in ventricles drops lower than in the blood vessels [1] and the semi-lunar valves close, preventing backflow of blood into the ventricles [1]. Blood passively enters the atria and the ventricles. [1] and pressure within the atria and ventricles slowly increase.	Max [6]
10	(a)	• Oestrogen secreted by the follicular cells and causes the <u>repair and growth</u> of the <u>uterine lining</u>. [1] The uterine lining becomes thick and spongy with blood vessels. • High levels of oestrogen will trigger ovulation [1], as it inhibits FSH production and stimulate LH production; • Progesterone (secreted by the corpus luteum) <u>maintains the uterine lining</u> by causing it to <u>thicken</u> further and be supplied with blood capillaries, [1] preparing it for the fertilised egg • High level of progesterone will inhibit ovulation [1] as it inhibits FSH production which will prevent the development/growth of primary follicle. • In the absence of a fertilised egg, the corpus luteum will breakdown and the levels of progesterone will drop. The uterine lining will breakdown and be removed as menses (OTTWE). [1]	Max [4]

	(b)	In natural selection, reproduction ensures that there is variation amongst the offspring / population; [1] Once the fittest survive, reproduction will allow the passing on of the beneficial gene/traits to the offspring/next generation. [1]	[2]
	(c)	1. <u>Stigma</u> secretes <u>sugary fluid</u> to stimulate the <u>growth</u> of the <u>pollen tube</u>. [1] 2. <u>Growth of pollen tube</u> is controlled by the <u>pollen tube nucleus</u>. [1] 3. <u>Generative nucleus divides</u> into <u>two male gametes</u>. [1] 4. <u>Pollen tube</u> grows down the style and <u>enters the ovule</u> through the <u>micropyle</u>. [1] 5. <u>One male gamete fuses</u> with the <u>ovum</u> to form the <u>zygote</u>, while the other <u>fuses</u> with the <u>definitive nucleus</u> to form the <u>endosperm</u>. [1] Max 4	[4]

--End of Answer Sheet--

