

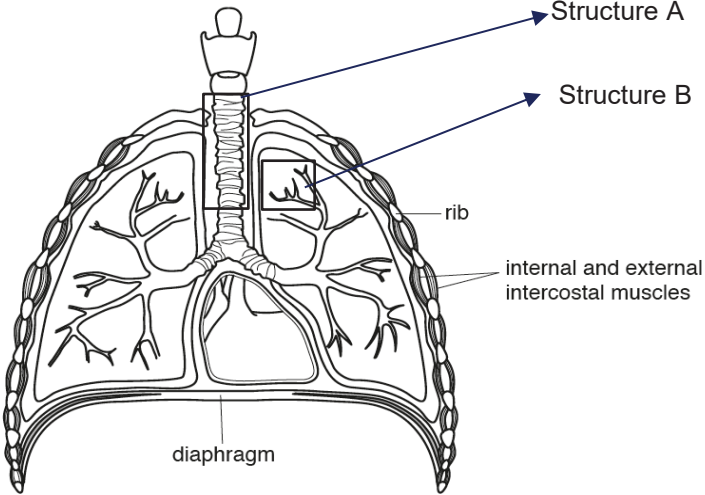
**Commonwealth Secondary School**  
**2020 Sec 4 Express**  
**6093 BIOLOGY PRELIM EXAMINATION ANSWERS**  
**MCQ (40m)**

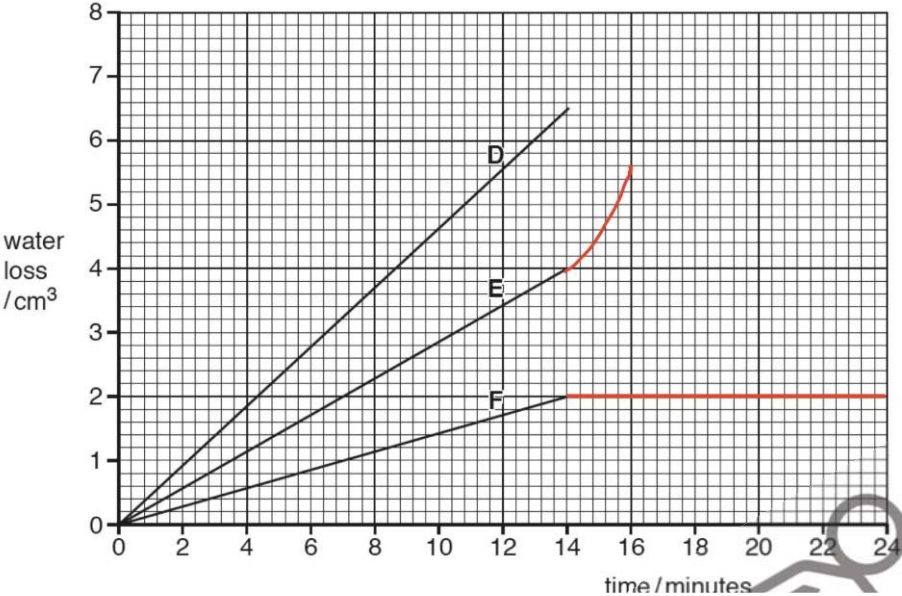
1	2	3	4	5	6	7	8	9	10
B	D	C	C	A	C	A	A	D	A
11	12	13	14	15	16	17	18	19	20
C	C	D	B	A	C	A	C	D	D
21	22	23	24	25	26	27	28	29	30
C	C	A	D	B	D	B	A	A	A
31	32	33	34	35	36	37	38	39	40
C	B	D	A	D	C	B	C	B	D

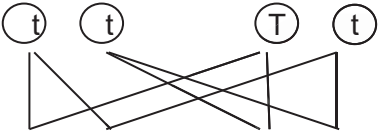
**2020 4 Express Prelim Paper 2**  
**Section A: Structured Questions [50 marks]**

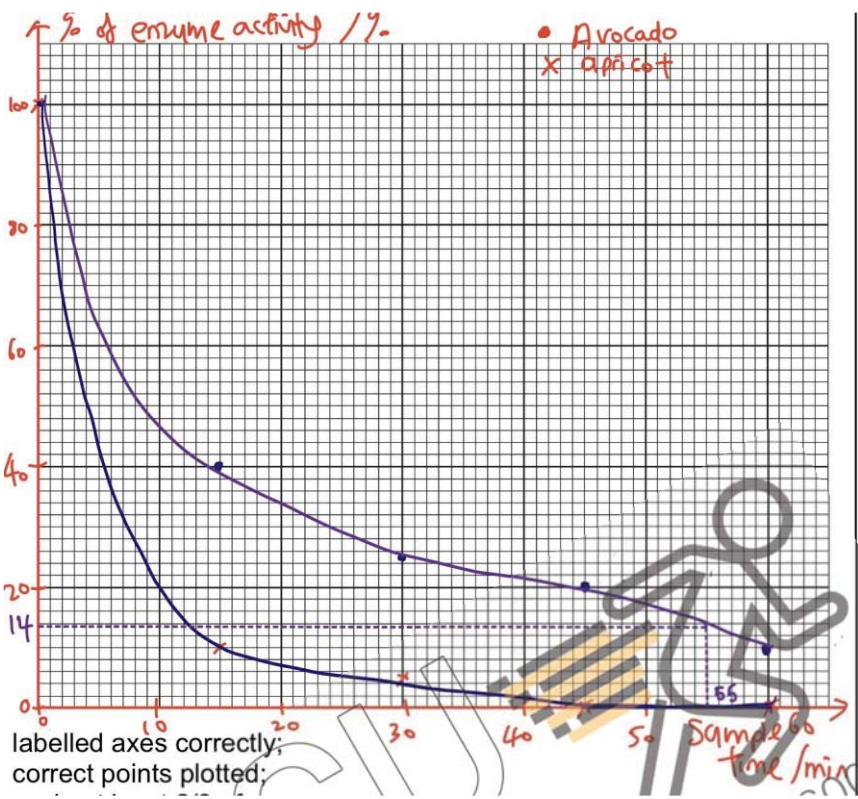
Qn	Expected Answers	Marks
<b>1(a)</b>	A: Cytoplasm, B: Nucleus	<b>2</b>
<b>1(b)</b>	Function: Involves in cell division / protein synthesis / control all the activities in a cell / contains the genetic information for growth and repair	<b>1</b>
<b>1(c)</b>	Presence of chloroplasts / Presence of cell wall / large central vacuole / more regular shape	<b>1</b>
<b>1(d)</b>	cytoplasm / on Rough Endoplasmic reticulum	<b>1</b>
<b>1(e)</b>	<b>Modification / repackaged</b> of protein before it gets released outside the cell	<b>1</b>
<b>1(f)</b>	<ol style="list-style-type: none"> <li>1. mitochondria are site of aerobic respiration / production of ATP ;</li> <li>2. mention liver cell / heart cell, is very active / use lots of energy / respire more ;</li> <li>3. Give one function to support liver cell or heart cell:               <ol style="list-style-type: none"> <li>a. Heart: Transport blood around the body</li> <li>b. Liver: Metabolise fats, proteins, carbohydrates, Production of bile, deamination</li> </ol> </li> <li>4. sperm cells, are active / swim / beating flagella ; sperm cells have few mitochondria, as they are small / less processes ;</li> <li>5. mention red blood cells, <b>full of haemoglobin</b> / more space for oxygen and use less energy / do not actively move ;</li> </ol>	<b>3</b>  <b>[max 3]</b>
<b>2(a)</b>	stomach	<b>1</b>
<b>2(b)</b>	intestinal <u>lipase</u>	<b>1</b>
<b>2 (c)</b>	Tube 2 has <u>complete digestion of oil</u> due to the presence of intestinal_lipase/enzyme present in Juice B [1]	<b>1</b>
	In tube 3, oil is not digested due to presence of Juice A which contains acid, <u>and this changes the pH of the solution</u> which the intestinal lipase can no longer work well in / <u>starts to denature</u> . Hence no hydrolysis of lipids occurs.	<b>1</b>
<b>2 (d)</b>	<p>The oil <u>remains undigested</u>/the layer of oil remains on clear solution;</p> <p>Adding a few drops of acid will <u>change the pH</u> of the mixture, this will lead to <u>denaturation</u> of the <u>intestinal lipase/enzymes</u> present in Juice B and loss of specific 3D shape of the active site;</p> <p>substrate (Fat molecules) can longer bind and fit to the active site/ complementary to the substrate, hence digestion of the oil can no longer take place / reaction is not catalysed.</p>	<b>1</b>  <b>1</b>  <b>1</b>



<p>4 (b)</p>	 <p><b>structure A</b> correctly identified on trachea / bronchus;  <b>structure B</b> identified at end of a bronchiole ;</p>	<p>1 1</p>
<p>4 (c)</p>	<p>The <u>wall</u> of the <u>alveolus is one-cell thick</u> to reduce the distance for diffusion of oxygen;          (Note: need to mention the wall, one cell-thick answer is not accepted)</p> <p>The alveoli are <u>lined with a thin film of moisture</u>, which serves as a medium for the gases to dissolve in and diffuse;</p> <p>The wall of the alveoli is <u>well supplied with blood capillaries</u>, hence maintaining the concentration gradient for <u>gas diffusion</u>; (this last point is usually missed out. A better answer than stating that there are many alveoli as the question is about the adaptation of alveolus)</p>	<p>1 1 1</p>
<p>5 (a)</p>	<p>transpiration / evaporation / diffusion</p>	<p>1</p>
<p>5 (b)</p>	<p>due to different in numbers / size / surface area of the leaves;          different numbers of stomata ;          sizes of stomata / degree to which stomata are open ;          different rates of water uptake / different number of root hairs ;          sizes of plant might be different ;          thickness of cuticle of the plants could be different ;          some of the leaves might have hairs / sunken stomata ;          [any 1 of the above]</p>	<p>1</p>

Qn	Expected Answers	Marks
5 (c)(i)	 <p data-bbox="252 846 1204 913"><b>Plant E</b> (drawing) gradient increases for minimum of 2 minutes to 16 min; <b>Plant F</b> line with a reduced gradient / horizontal line to 24 minutes ;</p>	<p data-bbox="1433 853 1457 882">1</p> <p data-bbox="1433 887 1457 916">1</p>
5 (c) (ii)	<p data-bbox="240 947 1342 1115"><b>Plant E:</b> Due to the introduction of stream of air blowing at the leaves, there is an increase of water loss / transpiration / evaporation / diffusion ; water (vapour) removed more effectively/ humidity decreases ; this has led to increased concentration gradient ; higher rate of water loss</p> <p data-bbox="240 1149 1249 1417"><b>Plant F:</b> Placing a plastic black bag over plant F will lead to a decrease in water loss / transpiration / evaporation / diffusion ; rate of photosynthesis decreases / stops ; guard cells lose their turgidity ; stomata close / stomata not open ; overall humidity increases ; decreased concentration gradient of water vapour ;</p>	<p data-bbox="1433 981 1457 1010">1</p> <p data-bbox="1433 1249 1457 1279">1</p>
5 (d)	<p data-bbox="240 1447 1361 1615"><b>AB</b> is the vascular bundle. It contains <u>xylem and phloem tissues</u>; A: Xylem which are involved in the transport of <u>water and mineral salts</u> from the root to the stem and leaves with lignified wall B: Phloem <u>transport manufactured food</u> (sucrose and amino acids) from the leaf to other parts of the plant, presence of companion cells</p>	<p data-bbox="1433 1447 1457 1476">1</p> <p data-bbox="1433 1581 1457 1610">1</p>
6 (a)	petals 4 ; filaments 8 ;	1
6 (b)	Structure A: Ovary	1
6 (c)(i)	Mode of Pollination: by insects;	1

Qn	Expected Answers	Marks
6 (c) (ii)	the petals help to attract insects ; landing platform for insects <b>AW</b> ; contact with stamens / anther / pollen / stigma ;	1
6(d)	stamen / anther / filament / androecium ; carpel / pistil / stigma / style / gynoecium ; correct length or height comparison between pin and thrum ;	2
6(e)	type of pollination: Cross Pollination <b>advantage:</b> Promotes genetic / genes / alleles ; variation / different ; which will Enable organisms to be able to adapt to new environment	1 1
6(f)	<p><i>Hint: Pin type of flower (X) crossed with Thrum Type (Y) produced a mixture of pin and thrum type flowers. This implies that X must be tt, and Y must be Tt.</i></p> <p>Parents' Phenotype: Plant X (Pin) X Plant Y (Thrum)</p> <p>Parents' Genotype: tt Tt [1]</p> <p>Gamete:  [1]</p> <p>Offspring   Tt tt Tt tt [1]</p> <p>Genotypes:</p> <p>Offspring Phenotypes: <b>Thrum Pin Thrum pin</b> [1]</p> <p>Offspring Phenotypes: 50% Pin 50% Thrum</p> <p>Offspring's genotypic ratio: 2 out of 4 / 50%</p>	4
Qn	Expected Answers	Marks
7 (a)	factor: oxygen conc /pH/ / mass of the fruits / vol of fruit extract Amt of sample taken out	1

Qn	Expected Answers	Marks
7 (b)	 <p>labelled axes &amp; graph correctly; correct points plotted; scale at least 2/3 of space; smooth curved line through all plotted points, not extrapolated at either end ;</p>	4
7 (c)	at 15 min: 40 at 45 min: 20      Change in rate= <u>20</u> %	1
7 (d)	Refer to graph @ 55 min for avocado: % activity remaining: <u>14%</u>	1
7 (e)	for both fruits the enzyme activity decreased as time went on ; the apricot enzyme shows the greatest reduction after 15 minutes ; avocado retains enzyme activity for longer after heating than the apricot ;	1
7 (f)	background: DNA is a biological molecule found in the nucleus of an animal cell. The <b>sequence of the bases in mRNA</b> determines the order of the amino acids that will be assembled into a protein . 1. When carrying out genetic engineering, sections of human DNA called <u>genes/alleles of the polyphenol oxidase</u> are <u>cut using restriction enzymes</u> . 2. Next <b>bacterial plasmids</b> are cut with the <u>same</u> restriction enzymes to form complementary sticky ends. 3. The <b>cut section of human DNA</b> is inserted into the cut plasmid and they are joined together to form a recombinant plasmid using <b>DNA Ligase</b> . 4. These plasmids are <b>inserted into bacteria/vector/yeast/bacteria</b> and protein synthesis occurs 5. Grow these transformed bacteria in incubator	4

Qn	Expected Answers	Marks
8 (a)	X: <b>menstruation</b> or <b>shedding of uterine</b> lining; <i>both level of oestrogen &amp; Progesterone is low /</i> → Pituitary gland secretes FSH into the bloodstream and stimulates development of follicles in ovaries which in turns secrete oestrogen. → Concentration of oestrogen increases.	1
	Y: <b>ovulation</b> or release of mature egg when Graafian follicle ruptures to release the egg (ovulation) to form corpus luteum. Corpus luteum produces progesterone → oestrogen remains high and level of progesterone increases	1
		1
8 (b)	<b>Maintain</b> and <b>further thickening</b> of uterine lining / so that placenta can be developed.	1 max 1
8 (c)	Fertilisation will take place: H	1
	Produce female sex hormones: I	1
8 (d)	Foetus in woman M will have a lower birth weight / be smaller in size / have a slower rate of development than foetus in woman N;	1
	Foetus receives less nutrients / slower rate of diffusion;	1
	as the vascular network in M has a lower surface area than the vascular network in N / more extensive vascular network ,	
Qn	Expected Answers	Marks
9 (a)	Impulses from <u>brain / hypothalamus</u> transmitted along relay neurone; (No mark if impulses is stated to have originated from sensory neurone/spinal cord)  Nerve impulses travel across synapse to motor neuron <u>to adrenal gland</u> (effector) <ul style="list-style-type: none"> <li>• Speeds up conversion of glycogen to glucose</li> <li>• Increase metabolic rate</li> <li>• Increase heart rate and blood pressure</li> <li>• Increase in rate and depth of breathing/ventilation</li> <li>• Increase in rate of blood clotting</li> <li>• Constricts arterioles in the gut and skin</li> <li>• Cause pupils to dilate</li> <li>• Contracts hair muscles to contract [ 4 pts- Max 3 m]</li> </ul> <p><b>Extra Info:</b></p> <ul style="list-style-type: none"> <li>• In a fight or flight situation such as being confronted by an armed robber/ just before the start of a race, level of adrenaline would increase.</li> <li>• Adrenaline stimulates the liver to convert glycogen to glucose to raise the blood glucose level so as to increase the supply of glucose for the muscles cells to carry out an increased rate of cellular respiration to release more energy to perform “fight” or “flight” actions.</li> </ul>	5

Qn	Expected Answers	Marks
9 (b)	<p><b><u>Distinguish; sexual vs asexual response</u></b></p> <ol style="list-style-type: none"> <li>1. Sexual reproduction involves the fusion of <b>two gametes to form a zygote</b> whereas there are <b>no gametes</b> formed in asexual reproduction [1]</li> <li>2. Sexual reproduction involves <b>two different parents</b> whereas asexual reproduction only involve <b>one parent</b> [1]</li> <li>3. The offspring in sexual reproduction are <b>genetically varied</b> while the offspring in asexual reproduction are <b>genetically identical to their parents</b> [1]</li> <li>4. Both sexual and asexual reproduction involve the process of <b>mitosis</b>, but the process of <b>meiosis</b> is only present in <b>sexual</b> reproduction [1]</li> <li>5. Asexual reproduction is generally faster as compared to sexual reproduction.</li> <li>6. Sexual reproduction will introduce variations in the population while asexual reproduction will not.</li> <li>7. Sexual reproduction has evolutionary significance while asexual reproduction will be limited.</li> <li>8. Asexual will produce more offsprings than sexual reproduction</li> </ol>	5

