

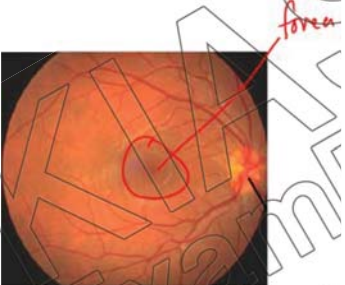
**Dunearn Secondary School
Preliminary Examination 2020
Secondary 4 Express Biology 6093
MARK SCHEME**

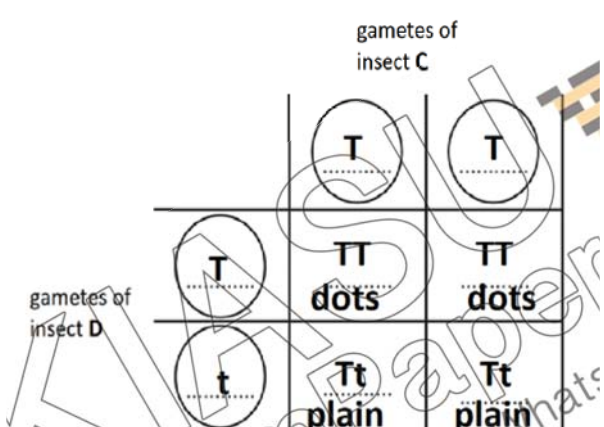
Paper 1: Multiple Choice Questions (40 marks)

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

Paper 2 Section A: Structured Questions (50 marks)

No	Answer Key	Mark												
1(a)	cytoplasm + site of chemical activities nucleus + contain genetic information/ control chemical activities cell membrane + partially permeable/control substances into and out of cell ribosomes + synthesis of proteins/polypeptides endoplasmic reticulum (accept smooth or rough) – transport of substances mitochondria + aerobic respiration to produce energy vacuole + storage of substances golgi apparatus + modified and export substances out Any three structure with correct function	1 1 1 1 1 1 1 1 1 Max 3												
(b)	cellulose cell wall + protection/mechanical support chloroplast + photosynthesis to produce glucose large vacuole / cell sap + store water, minerals and sugars Any two structures with correct function	1 1 1 Max 2												
(c)	Centriole + formation of spindle fibers during cell division	1												
	Total	6												
	Marker's comments:													
2 (a)	Enzymes	1												
(i)														
(ii)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">component of supplement</th> <th style="width: 25%;">substrate</th> <th style="width: 25%;">end product or products</th> </tr> </thead> <tbody> <tr> <td>amylase</td> <td>starch</td> <td>maltose</td> </tr> <tr> <td>protease</td> <td>protein</td> <td>polypeptides/ peptides/amino acids</td> </tr> <tr> <td>lipase</td> <td>fats/lipids</td> <td>fatty acids and glycerol</td> </tr> </tbody> </table>	component of supplement	substrate	end product or products	amylase	starch	maltose	protease	protein	polypeptides/ peptides/amino acids	lipase	fats/lipids	fatty acids and glycerol	1 1 1
component of supplement	substrate	end product or products												
amylase	starch	maltose												
protease	protein	polypeptides/ peptides/amino acids												
lipase	fats/lipids	fatty acids and glycerol												

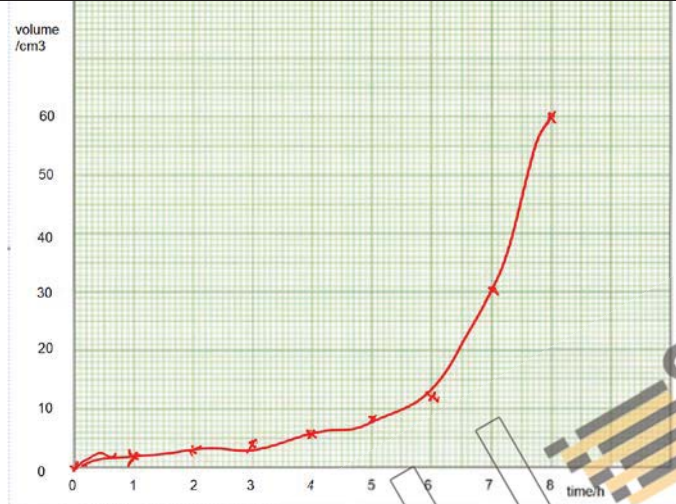
(iii)	Cellulase breaks down indigestible cellulose cell wall into glucose.	1
(b)	Stomach wall secretes gastric juice containing hydrochloric acid of pH 2 and protease like pepsin which can denature and break the protein enzymes.	1 1
(c)	Insulin and glucagon are hormones secreted directly into the blood in response to high and low blood glucose concentration respectively. Insulin stimulates the uptake of glucose by liver and muscle cells which convert it to glycogen for storage/increased glucose metabolism to reduce blood glucose level to norm. Glucagon stimulates the liver and muscle cells to convert glycogen to glucose to increase blood glucose level to norm	1 1 1
	Total	10
	Marker's comments:	
3 (a)	Constricted pupil focuses light rays sharply onto the fovea	1
(i)	Cones detect the primary colours (red, blue and green) of light to enable the person to see objects clearly in daylight while rods only sense the presence of light i.e. black and white image.	1
(ii)	Red blood cells in capillaries are opaque; Multiple layers of nerve cells detect multiple images/block light rays	1 1
(b)		1
(c)	Loss of night vision/blur vision Less blood flow to the retina/deprive of oxygen/nutrients; Malfunction receptors especially rods lost its sensitivity/unable to detect light Any two	1 1 1 Max 2
	Total	7
	Marker's comments:	
4 (a)	Glucose + oxygen → carbon dioxide + water (+ energy)	1
(b)(i)	20 min	1
(b)(ii)	2	1
(c)	Anaerobic respiration; Glucose → lactic acid (+ a little energy) Decrease in oxygen concentration from 20 to 2 leads to less energy derived from aerobic respiration for muscular contractions (increase in carbon dioxide – aerobic respiration is still ongoing) Increase in lactic acid from 1 to 5 means more energy is	1 1 1 1

	derived from anaerobic respiration to maintain muscular contractions							
(d)	Repayment of oxygen debt/continual breathing to increase oxygen concentration Oxygen is used to break down lactic acid in the liver to energy. Energy released converts lactic acid back to glucose.	1 1 1						
	Total	10						
	Marker's comments:							
5 (a)	DNA /chromosomes/chromatin/nucleus	1						
(i)								
(ii)	Gene is a segment of the DNA which codes for a specific protein/polypeptide/trait Dominant allele is an <u>alternative form</u> of the gene whose trait will always be expressed in its presence in homozygous or heterozygous genotype.	1 1						
(b)	 <p>Allele of gametes Genotypes of all 4 offspring Phenotypes of all 4 offspring</p>	1 1 1						
(c)	Heterozygous cross between insects C will produce 1 dot, 2 plain and 1 strip natural selection occurs due to camouflagage of plain	1 1 1						
	Total	10						
	Marker's comments:							
6								
(a)	<table border="1" data-bbox="316 1630 1142 1818"> <thead> <tr> <th>mitosis only</th> <th>meiosis only</th> <th>both mitosis and meiosis</th> </tr> </thead> <tbody> <tr> <td>E + F, J & L</td> <td>G & H</td> <td>K</td> </tr> </tbody> </table>	mitosis only	meiosis only	both mitosis and meiosis	E + F, J & L	G & H	K	2 rights – 1 mark 4 rights – 2 marks All rights – 3 marks
mitosis only	meiosis only	both mitosis and meiosis						
E + F, J & L	G & H	K						
(b)(i)	Cell B	1						
(ii)	Anaphase in mitosis	1						

	separates the sister chromatids to the poles forming two identical cells	1
(iii)	Mutation will occur/new allele formed	1
	Total	7
	Marker's comments:	

Paper 2 Section B: Free Response Questions (30 marks)

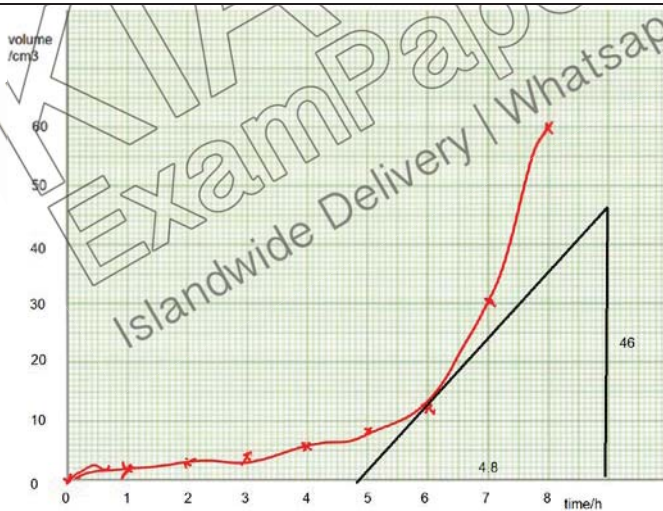
7 (a)



scale ;
 correct plot points ;
 best fit curve ;
 correct axes and labels

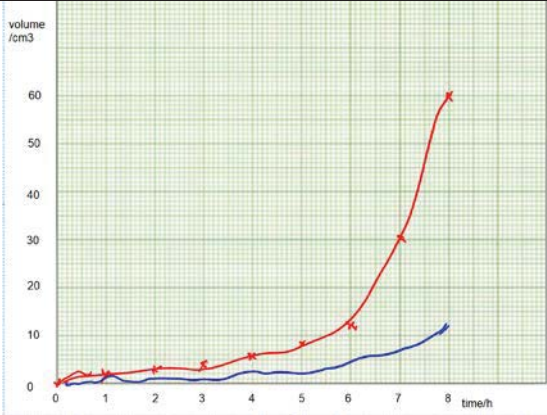
1
1
1
1

(b)



Triangle shown on the graph;
 $46.0/4.8$
 $= 9.6 \text{ cm}^3/\text{hr}$ (1/2 dp or 3 sf with correct unit)

1
1
1

(c)	 <p>Lower values</p>	1
(d)	<p>Thick waxy leaves; Less stomata; Leaves become thorns; fewer small leaves; inverted stomata; curled leaves any logical answer</p>	1 1 1 1 1 1 Max 2
	Total	10
	Marker's comments:	
8 (a)	<p>in <u>solution</u> / <u>dissolved</u> / absorbed / taken up (by plant) by root hair ; osmosis of water; active transport / diffusion of minerals ; correct description of concentration gradient ; (nitrate ion) carried in xylem ;</p>	1 1 1 1 1 1 Max 3
(b)(i)	<p>Green chlorophyll best absorbs red and blue light as energy; Optimal light intensity ; not a limiting factor/save energy Extended hours for photosynthesis to increase growth rate/yield</p>	1 1 1
(ii)	<p>Temperature at 25°C to 30°C for optimal enzymatic activities; Increased carbon dioxide concentration to eliminate limitation; Lower humidity to increase transpiration and uptake of minerals Optimal water condition/potential Any two factors</p>	1 1 1 1 Max 2
(c)	<p>Introduce pollinators (bees or man) to promote cross-pollination</p>	1 1
	Total	10
	Marker's comments:	
9 (a)	<p>gamete(s) / egg(s) / ovum / ova + sperm in the oviduct/fallopian tube ; fuse / join / combine AW ; zygote ; cell division/mitosis to form embryo / blastula / blastocyst /</p>	1 1 1 1

	morula ;	1 Max 4
(b)	oxygen + glucose → respiration ; amino acids + protein synthesis / growth / cell division ; ions / vitamins / minerals / salts / antibodies + for named use ; removal AW of + carbon dioxide / urea ; placenta + umbilical cord ; diffusion in capillaries ; mother's blood + fetus' AW blood ;	1 1 1 1 1 1 1 Max 6
	Total	10
	Marker's comments:	

