ASSUMPTION ENGLISH SCHOOL
Sec 4 Biology 6093 Marking Scheme
Preliminary Examination 2019

Paper 1 (40 m)

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

Paper 2 Section A (50 m)

	a	P – protein/polypeptide Q- glycerol R – fat/lipid S – glucose/monosaccharide every 2 correct – 1 m	2
	b i	Benedict's test	1
	b ii	Add an **equal volume** of Benedict's solution into the sample; Shake the mixture and place the test tube into a **boiling water bath** for 3 minutes; If glucose is present, a **brick-red precipitate** will be formed; 3 points – 2 marks, 2 points – 1 mark, 0 to 1 point – no marks	2
2	a	phloem	1
	b	J and K; K is a leaf which takes in radioactive carbon dioxide for photosynthesis; The radioactive sugars formed in leaf K (through photosynthesis) can be translocated / transported up to J; Radioactive sugars cannot move down to the roots M or leaf L as the phloem at X is removed;	4
	c	All parts/ J, K, L and M; The phosphorus will be present in the roots M as water is absorbed by the root / plant roots absorbed radioactive phosphate ions; The radioactive phosphate ions can be transport up the xylem to the J, K and L as it remains intact;	3
3	a	O: phagocyte/white blood cell P: capillary	1 1

	b	M: the lymphocyte produces **antibodies** that causes the bacteria to **clump** together; N: The bacteria is being engulfed and ingested by phagocytes /phagocytosis of bacteria;	1 1
	c	The **platelets** are activated; Causing soluble **fibrinogen** to be converted into insoluble **fibrin**; The fibrin forms a **mesh**; to **trap red blood cells**; to form a **clot**; 5 points – 2 marks, 3 to 4 points – 1 mark;	2
	d i	lower for both	1
	d ii	Glucose and oxygen **diffused** through the capillary into the skin cells; for the cells to perform **aerobic respiration**;	1 1
4	a i	pancreatic trypsin/amylase/lipase	1
	a ii	small intestines / duodenum	1
	b i	insulin	1
	b ii	Insulin helps to decrease blood glucose concentration when it increases after absorption of glucose after a meal; Insulin helps to decrease blood glucose concentration by • increasing permeability of cell membrane to glucose, increasing rate of glucose uptake; • stimulating the liver to convert glucose into glycogen for storage; • increasing oxidation of glucose during tissue respiration; (any 2 of 3 points)	1 2
5	a	Continuous Variation: height, weight Discontinuous variation: blood type	1
	b	Amy and Christie. They are the only ones with identical blood groups;	1
	c	Couple 1.; They are the only ones with possibility of having allele I^O. I^O is a recessive allele and must be present in both the paternal and maternal genes in order for Amy and Christie to have blood group O.	1 1 1
	d	100%	1
6	a	insect: P, S, T wind: Q, R 5 correct – 2 marks, 3 or 4 correct – 1 mark	2
	b	The stigma is **feathery**; to provide a **larger surface area**; to capture **more;** **pollen grains**; every 2 correct – 1 mark	2
	c i	line + label L on stigma of **P** or **R**	1
	c ii	After **pollination**; the pollen grain **germinates**; The pollen tube grows as it secretes enzymes to digest; the tissue of the stigma/style; Every 2 points – 1 mark	2

	d	The nucleus in the pollen grain is **haploid** while the nucleus in a cell in structure S is **diploid**; The nucleus in the pollen grain is formed by **meiosis** while that of structure S is formed by **mitosis**.	1 1
7	a	carbon compounds in animals	1
	b	C & E	1
	c i	Draw from air to plants	1
	c ii	Photosynthesis	1
	d	Oceans can absorb carbon dioxide when the carbon dioxide **dissolves** in the water; The dissolved carbon dioxide is used by phytoplankton and algae during **photosynthesis**; Carbon compounds found in oceans can also be buried in the seabed and be converted into **fossil fuels**;	1 1 1

Paper 2 Section B (30 marks)

1	a	It is the **optimum pH** for lipase action;	1
	b i	correct axis with units; appropriate scale; correct plots; best-fit curve; 4 points – 3 marks, 3 points – 2 marks, 2 points – 1 mark, 0 to 1 point – no marks	3
	b ii	mark based on student's graph	1
	c	The milk molecule is complementary to the active site of the lipase; The lipase catalyses the breakdown of the fat molecule into fatty acids and glycerol; The fatty acids lowers the pH of the mixture;	1 1 1
	d	The **pH** will **decrease less rapidly**; The bile salts causes the **emulsification** of the fats; The **surface area to volume ratio** is increased when the fats are emulsified; Thus, allowing the **lipase** to **digest** the fats **more rapidly**; every 2 points – 1 mark	2
2	a	Mutation is a spontaneous / sudden and random change; in the structure of the gene; or in chromosome number; 3 points – 2 marks, 2 points – 1 mark, 0 to 1 point – no marks	2
	b	Method; How results are interpreted; correct genetic diagrams;; Perform a **test cross** with a **homozygous recessive** salmon to determine if the orange-pink salmon is homozygous dominant or heterozygous; If the orange-pink salmon is homozygous, all the offspring will be orange-pink. If the salmon is heterozygous, only half the offspring will be orange-pink; Let P the the allele for orange-pink and p be the allele for white	1 1

		If the orange salmon is homozygous, Parental phenotype orange pink x white Parental genotype PP x pp Gametes formed P P p p F1 genotype Pp Pp Pp Pp F1 phenotype All orange pink If the orange salmon is heterozygous, Parental phenotype orange pink x white Parental genotype Pp x pp Gametes formed P p p p F1 genotype Pp pp Pp Pp F1 phenotype pink white pink white	1 1
	c	The ocean pout gene is isolated using a suitable **restriction enzyme**; The bacteria plasmid is cut using the **same restriction enzyme**; The ocean pout gene is mixed with plasmid and they form a recombinant plasmid in the presence of **DNA ligase**; Recombinant DNA is inserted into the bacterial cell after **heat/electric shock**;	1 1 1 1
E3	a	Homeostasis is the **maintenance** of a **constant internal environment**.	1
	b	Negative feedback is a corrective mechanism which **reverses** the **effects** of a **stimulus**; It **restores** the **normal** condition of the body;	1 1
	c	Detection of stimulus The **thermoreceptors** of the skin **detects** the **rise** in **temperature**; Nerve impulses are generated and sent to the **hypothalamus** which initiates the corrective mechanism; Corrective mechanism **Arterioles** in the skin **dilate** (and shunt vessels constrict); **More blood** flows to skin **capillaries**; increasing heat loss by conduction, convection and radiation; **Sweat glands** become **more active**, **more sweat** is produced; More **water evaporates;** causing **more latent heat of vapourisation** to be lost from the body; 7 points – 5 marks, 6 points – 4 marks, 4 to 5 points – 3 marks, 3 points – 2 marks, 2 point – 1 mark, 0 to 1 point – no marks.	2 5
O3	a	**Ultrafiltration** occurs between the glomerulus and Bowman's capsule; due to • wider afferent arteriole as compared to efferent arteriole; • partially permeable membrane of the Glomerulus; This allows water and small molecules to enter the Bowman's capsule; Every 2 points – 1 mark **Selective reabsorption** starts at the proximal convoluted tubule; **All**; the **glucose** and **amino acids** ;	2 3

		are reabsorbed through the tubule into the bloodstream by **diffusion** and **active transport**; Most of the **mineral salts** are reabsorbed as well (by diffusion and active transport) **Water** is also reabsorbed by **osmosis** along the nephron; Every 2 points – 1 mark (Composition) Excess water, excess salts and metabolic waste such as urea are passed on to the renal pelvis/bladder as urine;	1
	b	The **water potential** of blood increases; The **hypothalamus** is **stimulated** ; and the **pituitary gland releases less anti-diuretic hormone** (ADH) into bloodstream; Cells in **walls** of **collecting duct** become **less permeable** to water; **Less water** is **reabsorbed** from collecting ducts into blood capillaries; The body will **release more water** as urine, maintaining water potential of blood; 6 points – 4 marks, 4 to 5 points – 3 marks, 3 points – 2 marks, 1 to 2 points – 1 mark	4