



Jurongville Secondary School
Science Department 2019
Marking Scheme & Marker's Report

Assessment: Prelim Examination 4E Biology (6093)

Level: 4 Express

Qn	Marking Scheme	Remarks	Marks	Marker's Report
1	B		[1]	
2	A		[1]	
3	D		[1]	
4	D		[1]	
5	D		[1]	
6	B		[1]	
7	B		[1]	
8	C		[1]	
9	A		[1]	
10	D		[1]	
11	C		[1]	
12	D		[1]	
13	C		[1]	
14	D		[1]	
15	B		[1]	
16	C		[1]	
17	A		[1]	
18	B		[1]	
19	C		[1]	
20	A		[1]	
21	B		[1]	
22	A		[1]	
23	C		[1]	
24	B		[1]	
25	D		[1]	
26	B		[1]	

[Turn over

Qn	Marking Scheme	Remarks	Marks	Marker's Report
27	C		[1]	
28	A		[1]	
29	D		[1]	
30	C		[1]	
31	C		[1]	
32	A		[1]	
33	A		[1]	
34	C		[1]	
35	D		[1]	
36	B		[1]	
37	C		[1]	
38	A		[1]	
39	D		[1]	
40	D		[1]	

A: 9
 B: 9
 C: 11
 D: 11

[Turn over

Jurongville Secondary School
Science Department 2019
Marking Scheme & Marker's Report

Assessment: Biology (Pure) Prelim Paper 2 2019

Level: Sec 4E

Qn	Marking Scheme	Remarks	Marks	Marker's Report
1a	i) Mesophyll layer (accept both spongy/ palisade) ii) Cuticle iii) Stomata		[1] [1] [1]	
1b	i) Transpiration pull/ diffusion ii) Transpiration/ evaporation of water		[1] [1]	
1c	The mass lost in experiment II is higher than in experiment I by 0.8 g as the rate of transpiration (accept evaporation) is higher; The wind from the fan blows away the water vapour from around the stomata , maintaining a <u>steep concentration gradient</u> of water vapour; The mass lost in experiment III is lower than in experiment I as the rate of transpiration (accept evaporation) is lower; Water vapour is trapped within the plastic bag and this <u>increases the humidity</u> around the stomata, decreasing the water vapour concentration gradient;		[1] [1] [1] [1]	
			Total: 9	
2ai	X: Blood type O Y: Blood type A Z: Blood type B		[1] [1] [1]	
2aii	X had <u>no antigens</u> on the red blood cell as no agglutination occurred; Y had <u>antigen A</u> on it as antibody a will bind to it, causing agglutination, it has no antigen B on it as no agglutination occurred in the presence of antibody b. Z had <u>antigen B</u> on it as antibody b will bind to it, causing agglutination, it has no antigen A on it as no agglutination occurred in the presence of antibody a.		[1] [1] [1]	
2bi	C: coronary artery; It carries <u>oxygenated blood</u> from the aorta to the heart/ cardiac cells/ muscles;		[1] [1]	
2bii	Ensure that the vein is fitted in the right way so the valves will allow blood to flow through/ Use a piece of vein that does not have any valves;		[1]	
2biii	Reduce smoking/ quit smoking/ consume less cholesterol and saturated fats/ exercise regularly/ manage stress well		[1]	

Qn	Marking Scheme	Remarks	Marks	Marker's Report
			Total: 10	
3a	Presence of glucose in urine;		[1]	
3b	Avoiding sugary drinks - Reduces the rapid increase in blood glucose; - Sugars in drinks are easily absorbed into the bloodstream to increase blood glucose concentration; Spaced out meals - Allows gradual absorption of sugars from digested carbohydrates; - Less rapid increases in blood glucose; - Gives more time for glucose to be absorbed by cells for use or storage;	Any 3 points, max 2 points from each header	[3]	
3c	Regular exercise: - More glucose is used by muscle <u>cells</u> during exercise; - For respiration to release more energy;		[1] [1]	
3d	Alcohol use can cause liver cirrhosis/ damage; Excess glucose cannot be converted to glycogen easily for storage as the liver is the site of insulin action/ The liver is damaged and cannot convert excess glucose to glycogen;		[1] [1]	
3e	Insulin might be digested by enzymes when consumed/ Acid in the stomach might react with the insulin/ insulin is too big to pass through the small intestine for absorption;		[1]	
			Total: 9	
4a	Excretion is the process by which metabolic waste products and toxic substances are removed from the <u>body of an organism/ human</u> ;		[1]	
4b	Protein level in the <u>filtrate</u> and the urine is 0.0 g/ dm³/ No protein in filtrate or in urine; Protein is too big to pass through the basement membrane of the glomerulus into the nephron/ into the Bowman's capsule; Glucose undergoes ultrafiltration as it is small enough to pass through the basement membrane so the filtrate contains 1.0 g/dm³ of glucose; However glucose would be reabsorbed back into the <u>bloodstream</u> at the <u>proximal convoluted tubule</u>, hence the urine would have no glucose; Urea is small enough to be filtered out in the filtrate 0.3 g/dm³ in the filtrate; It is not absorbed back into the bloodstream and is concentrated in urine to 20 g/dm³/ is removed in urine;		[1] [1] [1] [1] [1] [1]	
			Total: 7	
5ai	Label space between cells as W		[1]	

Qn	Marking Scheme	Remarks	Marks	Marker's Report
5aii	Urine production regulates <u>blood</u> water potential, sweat production regulates <u>body temperature</u> ; Urine production is controlled/affected by ADH concentrations, sweat production is affected by nervous impulses;		[1] [1]	
5bi	At 8 minutes		[1]	
5bii	When the person exercises, muscle cells release a lot of <u>heat</u> (through respiration), <u>sweat production increases</u> from <u>0.6</u> to <u>12 arbitrary units</u> ; Hypothalamus detects the increase in body temperature and sends nerve impulses to sweat glands which become more active/ produce more sweat; After t=23 minutes, heat production slows down/ sweat production <u>reduces</u> from 12 to 0.6 arbitrary units; Negative feedback to the sweat glands to reduce <u>sweat production</u> / Body temperature returns back to normal by around t=23;	Must use info from the graph to get full marks	[1] [1] [1] [1]	
			Total: 8	
6a	Correct pyramid shape with producers at the bottom , organisms labelled clearly;		[1]	
6b	10% of energy is transferred to the next trophic level, 90% of energy is lost <u>between</u> trophic levels through heat in respiration/ <u>uneaten</u> organism parts/ <u>waste products</u> / <u>undigested food (faeces)</u> ; Not enough energy in <u>fourth</u> trophic level to support another level/ 5 th trophic level will obtain very little energy;		[1] [1] [1]	
6c	Protein feed from animals is <u>expensive</u> , increasing the cost; More energy efficient to <u>feed humans</u> crops or producers or even the animals used to make the fish feed; Waste feed can cause eutrophication of the water; Diseases can pass between fish in fish farm <u>very</u> easily; Chemicals such as antibiotics, when used to control disease can also pollute the environment; Natural habitat of organisms is removed;	Any 3 valid points	[3]	
			Total: 7	

Qn	Marking Scheme	Remarks	Marks	Marker's Report
7ai	Correctly labelled axes Reasonable scale (graph is large enough to fill 50% of the space in both directions); Correct plotting of points;		[1] [1] [1]	
7aii	As the number of cigarettes smoked increases from 0 to 10 sticks a day, the average live birth weights of a baby decreases from 2.78 to 2.12 kg; Cigarette smoke contains nicotine to constrict blood vessels, including umbilical cord vessels; Carbon monoxide binds with haemoglobin to form carboxyhaemoglobin, so the oxygen carrying capacity of red blood cells is reduced; Less blood containing oxygen / nutrients is brought to the foetus for growth and respiration OR Less oxygenated blood is brought to the foetus for growth and respiration;;		[1] [1] [1]	
7b	Progesterone; It is released by the <u>ovaries</u> / and subsequently the <u>placenta</u> ; It helps to <u>maintain/ further thicken</u> the uterine lining to ensure the lining is maintained during pregnancy;		[1] [1] [1]	
			Total: 10	
8a	Let B be the dominant allele for night blindness Let b be the recessive allele for normal sight parent phenotype male night blindness X female normal parent genotype Bb X bb gametes B b b b F1 genotype Bb Bb bb Bb F1 phenotype night blindness night blindness normal Normal		[1] [1] [1] [1] [1]	

Qn	Marking Scheme		Remarks	Marks	Marker's Report
	F1 phenotypic ratio	2 night blindness : 2 normal	Accept 1:1		
8b	Continuous variation	Discontinuous variation	2 examples per category	[2] [1] [1] [1]	
	Any 2 e.g. (Height, mass, IQ, skin tone)	Any 2 e.g. (blood type, gender)			
	Range of phenotypes/ values/ characteristics/ traits	Clear cut phenotypes, distinct from one another with no intermediates			
	Controlled by many genes, has an additive effect	Controlled by one or few genes, no additive effects			
	Affected by environment (e.g. diet)	Not affected by environment			
				Total: 10	
9 E a	Similarity: Both are made up of basic units of amino acids (bonded together by peptide bonds); Contain the elements C,H, O, N; Differences: Polypeptides are shorter/ smaller/ less complex than proteins which are larger/ more complex; Polypeptides are straight chains of amino acids without a 3D folded structure that proteins have;		At least 1 similarity	[3]	
9 E b	Glycogen: - A storage form of carbohydrate/glucose; - Complex structure with branched chains of glucose molecules; - Found in animal/ human cells (in particular muscle and liver cells) Glucagon: - A hormone; - Carried/ transported by the bloodstream; - Secreted by the islets of Langerhans in pancreas; - Stimulates liver cells to convert more glycogen to glucose for use; Glycerol: - A product of chemical digestion of fats, along with fatty acids; - It is absorbed from the small intestine and is recombined with fatty acids in the epithelium of the villus;		At least 2 points for each substance, max 3 points for each substance	[7]	
				Total: 10	

Qn	Marking Scheme	Remarks	Marks	Marker's Report
9 OR a	Similarities: - Both meiosis and mitosis give rise to new cells through nuclear division; - DNA replication occurs before both meiosis and mitosis occurs; - Cytokinesis occurs at the end of each to give rise to new daughter cells; Differences: - Mitosis occurs in somatic (normal) cells, meiosis occurs in reproductive organs in gamete formation; - Mitosis consists of one nuclear division, meiosis consists of two; - Meiosis gives rise to 4 daughter cells, mitosis gives rise only to 2; - Crossing over takes place in cell meiosis but not in mitosis; - Meiosis gives rise to genetically dissimilar daughter cells, daughter cells in mitosis are genetically identical;	At least 2 similarities Any reasonably difference	[6]	
9 OR b	Example any named leaf cell (e.g. palisade mesophyll cell, etc); Many of the <u>same</u> cells come together to form a tissue; Which carries out a specific function, photosynthesis; <u>Different</u> types of tissues come together to form the organ, which in this case is the leaf; The leaf is to help the plant to photosynthesize and make food;	Any 4 points	[4]	
			Total: 10	

