6093 Biology Yearly TYS 2013

No	**Paper 1**	Marks	Remarks
1	B	1	
2	C	1	
3	C	1	
4	D	1	
5	D	1	
6	A	1	
7	D	1	
8	C	1	
9	D	1	
10	C	1	
11	C	1	
12	D	1	
13	A	1	
14	A	1	
15	D	1	
16	B	1	
17	C	1	
18	C	1	
19	B	1	
20	D	1	
21	D	1	
22	B	1	
23	A	1	
24	C	1	
25	B	1	
26	B	1	
27	B	1	
28	A	1	
29	B	1	
30	B	1	
31	B	1	
32	B	1	
33	D	1	
34	C	1	
35	C	1	
36	B	1	
37	B	1	
38	A	1	change option A to 23 + 1X for chromosomes in ovum
39	B	1	
40	A	1	
	Total	40	

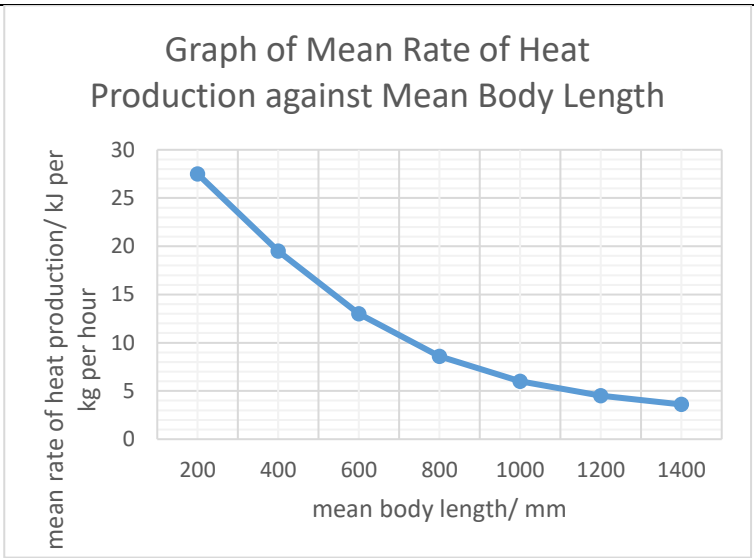
	Paper 2		
	Section A		
1ai	P: right atrium Q: bicuspid valve/ chordae tendineae	1 1	
1aii	Line drawn pointing to aorta with label X	1	
1b	Oxygenated blood from lungs flows into LA through pulmonary veins; muscles of LA contract increasing P(LA)+ When P(LA) is higher than P(LV), bicuspid valves open allowing blood to flow from LA to LV; muscles of LV contract increasing P(LV)+ when P(LV) is higher that P(LA) bicuspid valves closes to prevent backflow of blood into LA; When P(LV) is higher than P(aorta), semilunar valves open to force out of LV into aorta at high pressure, transported to all parts of the body; When P(aorta) is higher in P(LV), semilunar valves closes to prevent backflow of blood into LV;	1 1 1 1	Entry of blood into heart Atrial contraction Ventricular systole Closure of valves R: atrium contract A: muscles of the atrium contracts
1ci	P(LV) = Line 2 P(LA) = Line 3 P(aorta) = Line 1 P(LV) > P(LA) = 0.1 P(LV) < P(aorta) = 0.4 0.4 – 0.1 = 0.3s	1	
1cii	Line 2	1	
	Total	9	

2a	Translocation is the transport of manufactured food substances such as sucrose and amino acids by active transport; Occurs through the phloem from the leaves to the other parts of the plants vice versa/ bi-directional;	1 1	substances process location direction
2bi	Left side beside the cambium nearer to pith	1	
2bii	Right side, darker region nearer to epidermis	1	
2c	Weed killers are soluble in water / dissolves in water in soil; weed killer diffuse into the root hair cells down concentration gradient + diffuse from RHC into the adjacent root cells down concentration gradient until the xylem; weed killers move up the xylem vessel in the stem by transpiration pull; Weed killer reaches the xylem vessel in the leaf veins + reaching the chloroplasts in the mesophyll cells in the leaf;	1 1 1 1	solubility soil to RHC to RC to xylem process xylem to leaf to MC
	Total	8	

3a	P: branch of renal artery	1	
3bi	Protein content: 0.0 Glucose content: 0.1	1 1	
3bii	Proteins are present in P but not in R + at glomerulus, proteins are retained in the glomerular capillaries; they are too large to pass through the walls of the glomerular capillaries and the partially permeable basement membrane + no proteins in R;	1 1	
3biii	Absence of glucose in R + at PCT, most glucose are selectively reabsorbed through the walls of the tubule into the surrounding blood capillaries by diffusion and active transport;	1	
3c	Increase water potential above normal level in blood plasma stimulates hypothalamus in the brain to trigger pituitary gland to release less ADH into bloodstream; Less ADH stimulates cells in the walls of the collecting ducts to become less permeable to water + less water reabsorbed from the collecting duct into the blood capillaries; Larger volume of urine + urine produced is more diluted; / decrease water potential below normal level in blood plasma stimulates hypothalamus in the brain to trigger pituitary gland to release more ADH into bloodstream; more ADH stimulates cells in the walls of the collecting ducts become more permeable to water + more water reabsorbed from the collecting duct into the blood capillaries; smaller volume of urine + urine produced is more concentrated;	1 1 1	Stimulus
	Total	9	

4a	Energy needed to start a chemical reaction + lowered in the presence of enzymes	1	
4bi	*Boiling tube 1:* Protease digests proteins/gelatine into polypeptides + protease works best/most active/ rate of reaction of protease is the highest in acidic medium; Gelatine layer breaks down + silver particles are released into the water forming a suspension; *Boiling tubes 2 and 3:* In boiling tube 2, protease cannot digest proteins in neutral pH + in boiling tube 3, protease cannot digest proteins in akaline pH because enzymes are denatured + active site altered + e-s complex not formed + no enzyme reaction; Gelatine layer did not break down + silver particles are not released into the water;	1 1 1 1	Effect of pH on enzyme Effect of enzyme Effect of pH on enzyme Effect of enzyme
4bii	Temperature of each boiling tube/ Volume of water in each boiling tube/ Length of photographic film/ Amount of time taken to conduct experiment/ Volume of protease solution in each boiling tube	2	Any 2
	Total	7	
5a	microscopic green plants → zooplankton → small fish → carnivorous fish → large carnivorous birds	1 1	
5bi	microscopic green plants + water plants	1	
5bii	Producer such as water plants and microscopic green plants provide other organisms with energy and oxygen; Contain chlorophyll which traps and convert light energy into chemical energy; photosynthesise to synthesise glucose from carbon dioxide and water + produce oxygen as a by-product;	1 1 1	
	Total	6	

6a	1: Bb; Reason: both parents 1 and 2 have a genotype that is in a heterozygous condition because they are brown-eyed and has a daughter (individual 5) who inherits one recessive allele from each parent; 10: Bb Reason: Individual 4 is homozygous recessive (bb) blue-eyed, so individual 10 who is brown-eyed must be heterozygous Bb as he inherit a dominant allele from mother and recessive allele from father;	1 1 1 1	
6b	2, 6, 8, 10	1	
6c	Discontinuous variation	1	
	Total	6	
7ai	Hormones are chemical substances produced in minute/small amounts by an endocrine gland + transported by the blood to target organs; hormones influences growth, development and activity of an organism; after hormone performed its function + destroyed by the liver;	1 1 1	describe mode of transmission effect of hormones after
7aii	Transport milk from the glands to the nipple	1	
7b	Add sugar into the cow's milk	1	
	Total	5	

	Section B		
8a	 Axes labelled correctly + equal intervals + correct orientation; All points plotted correctly; Best fit line; Graph occupies at least 2/3 of grid;	4	
8bi	700mm	1	
8bii	15 kJ per kg per hour	1	
8biii	Mean rate of heat production <u>decreases</u> with increasing mean body length	1	
8c	Aerobic respiration	1	
8d	When blood and skin <u>temperature increases above normal level</u>, temperature <u>receptors</u> in the skin detects the change produce nerve impulses sent to hypothalamus in brain that stimulates <u>decrease in metabolic rate</u> so as to reduce the amount of heat released; <u>Arterioles</u> in skin dilate + <u>shunt vessels</u> constrict + increase blood flow to capillaries in the skin + <u>increasing heat lost</u> by radiation, convection, conduction; Sweat glands become <u>more active</u> causing an increase in production of sweat + <u>more water in sweat evaporates</u> into water vapour, increasing <u>heat loss by latent heat of vaporisation</u>;	1 1 1	
	Total	11	

9a	Transgenic organism is any organism which acquires a foreign gene; Genetic engineering is used to transfer genes from one organism to another + transfer of genes involved inserting the genes of interest into a vector; eg. Genes can be transferred from human cells to bacterial cells using bacterial plasmid to produce insulin + elaborate;	1 1 1	Definition Describe function Example
9b	More efficient than selective breeding + uses individual cells which reproduce rapidly in the lab in a small container; Lower risk of genetic defects being passed down to offspring compared to selective breeding + as genes are selected carefully before the transfer; Low cost production of medicine/ important drugs + more affordable; Increase yield as it allows farmers to grow crops even when environmental conditions are not ideal for crops/ development of pest-resistant crops; Improve nutritional quality of foods + development of foods designed with specific nutritional content;	3	Efficiency Genetic defects Cost Yield Effect
9c	Temperature in the cooling jacket needs to be constant at optimum temperature for highest rate bacterial growth/ Amount of nutrients of in the nutrient broth for maximum bacterial growth/ Speed of the impeller to ensure oxygen and nutrients are evenly distributed/ pH must be kept constant at optimum pH for maximum bacterial growth/ amount of oxygen supplied through the sparger of maximum bacterial growth	3	
	Total	9	

E10a	Both asexual and sexual reproduction are processes for the production of new organisms to ensure the continuity of species; Asexual reproduction does not involve the fusion of nuclei of gametes but sexual reproduction involves the fusion of a nucleus of male gamete with the nucleus of female gamete to form a zygote; Asexual reproduction requires only one parent but sexual reproduction requires two parents (except for plants with bisexual flowers); Asexual reproduction produces genetically identical offspring but sexual reproduction produces genetically different/dissimilar offspring; Asexual reproduction is a relatively quicker method of reproduction than sexual reproduction;	4	1 similarity + 3 differences
E10b	Pollination is the transfer of pollen grains from the anther to the stigma so that nuclei of male and female gametes can fuse together; Self-pollination + definition Cross-pollination + definition	1 1	
E10c	IPF have petals that are large and brightly-coloured + but WPF small and dull-coloured and have no petals; IPF needs to attract insects; Nectar is present in IPF + but nectar is absent in WPF; IPF needs to attract insects which collect nectar; IPF are fragrant/ sweet-smelling + but WPF are odourless; IPF needs to attract insects; WPF have stigmas that are large, feathery and protrude out of the flower + IPF have stigmas that are usually small, compact and do not protrude out of flower; WPF needs to provide a large surface area to trap pollen grains; WPF have stamens with long pendulous filaments and protruding anthers + but IPF have stamens that are not pendulous and not protruding out of flower; pollen grains in WPF can be easily shaken out from the anthers; WPF produces more pollen than IPF + to increase the chances of landing on a stigma; WPF produces tiny and light pollen grains with smooth surfaces + but IPF produces larger pollen grains with rough surfaces + readily cling onto body of insects; Pollen grains from WPF can be easily blown by wind; IPF have nectar guide + but WPF do not have nectar guide; nectar guide in IPF is used to guide insects towards nectar;	4	Comparison statement; Reason; x 2
	Total	10	

O10a	Water continuously moves out of the mesophyll cells to form a thin film of moisture over their surfaces by osmosis + water evaporates from the thin film of moisture + water vapour moves into the intercellular air spaces; water vapour accumulates in the large air spaces near the stomata creating a higher concentration of water vapour in the leaf than outside the leaf + water vapour diffuses out of leaf through the stomata; Water potential of cell sap in mesophyll cells decreases + mesophyll cells absorbs water by osmosis from the cells deeper in the leaf; Results in a suction force that pulls water up the xylem vessel (transpiration pull);	1 1 1 1	Mesophyll to air spaces Concentration gradient Uptake of water into mesophyll Transpiration pull
O10bi	increase humidity + high concentration of water vapour in the air surrounding the plant; lower concentration of water vapour in the intercellular air spaces than that in the surrounding air water vapour concentration gradient is less steep between leaf and atmosphere; rate of diffusion of water vapour out of the leaf through the stomata decreases + rate of transpiration decreases;	1 1 1	explain high humidity compare concentration of water vapour effect on diffusion
O10bii	increase temperature of air + increase rate of evaporation of water from the thin film of moisture around mesophyll cells; higher concentration of water vapour in the intercellular air spaces than that in the surrounding air + steeper water vapour concentration gradient between leaf and atmosphere; rate of diffusion of water vapour out of stomata increases + rate of transpiration increases;	1 1 1	effect of high temperature compare concentration of water vapour effect on diffusion
	Total	10	