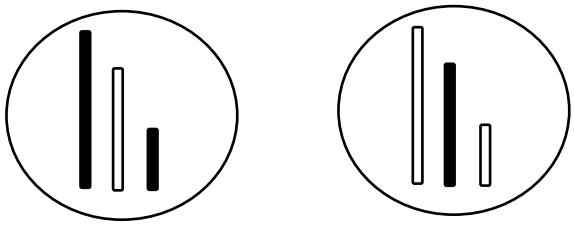
6093 Biology Yearly TYS 2012

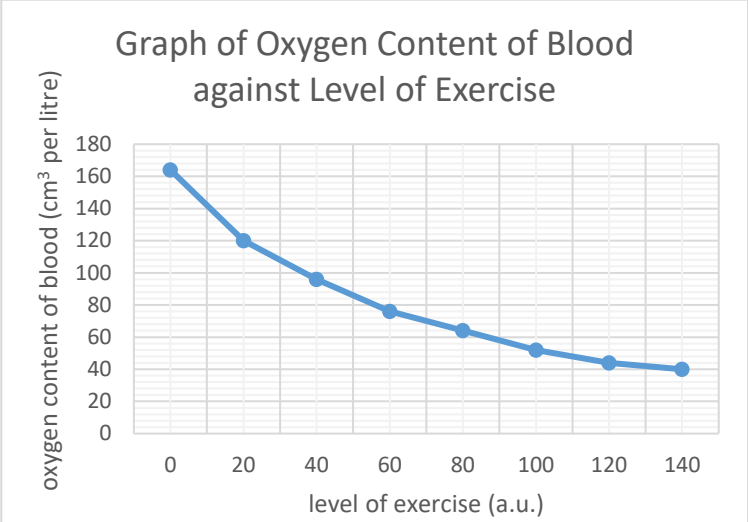
No	Paper 1	Marks	Remarks
1	B	1	
2	C	1	
3	D	1	
4	D	1	
5	A	1	
6	A	1	
7	C	1	
8	B	1	
9	C	1	
10	D	1	
11	C	1	
12	C	1	
13	B	1	
14	C	1	
15	D	1	
16	B	1	
17	C	1	
18	D	1	
19	D	1	
20	C	1	
21	C	1	
22	B	1	
23	A	1	
24	A	1	
25	D	1	
26	C	1	
27	C	1	
28	A	1	
29	B	1	
30	C	1	
31	A	1	
32	D	1	
33	A	1	
34	B	1	
35	A	1	
36	C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

	Paper 2		
	Section A		
1a	Gene is a unit of inheritance, born on a particular locus of a chromosome; gene is a small segment of DNA in a chromosome, made up of a sequence of nucleotides that codes for the production of polypeptides;	1 1	
1bi	Both parents are Aa.	1	
1bii	3:1	1	
1biii	AA, Aa	1	
	Total	5	
2a	Larger sample size to increase accuracy of results + offset any anomaly in readings	1	
2b	amount of urea increased almost 4 times when amount of protein increases from low protein level at 4.75g of urea per day to normal protein level at 19.2g of urea per day; amount of urea increased almost 6 times when amount of protein increases from low protein level at 4.75g of urea per day to high protein level at 31.5g of urea per day;	1 1	Compare low and normal Compare low and high
2ci	*Protein* 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; *Glucose* High hydrostatic blood pressure in glomerulus forces glucose out of glomerulus into Bowman's capsule by ultrafiltration; At PCT, most glucose are selectively reabsorbed through the walls of the tubule into the surrounding blood capillaries by diffusion and active transport + glucose are required by the body + reabsorbed readily;	1 1 1 1	
2cii	0.015 ÷ 0.01 = x1.5	1	
	Total	8	

3ai	A: hair B: blood capillary D: adipose tissue	1 1 1	
3aii	body temperature is higher than normal level detected by the thermoreceptors, stimulates hypothalamus which in turn stimulates sweat glands to become more active; Increased production of sweat + more water in sweat evaporates into water vapour from skin surface; More latent heat of vaporisation is lost from body + lose heat + temperature is restored to normal level;	1 1 1	Stimulus + gland + effect
3bi	37.1 – 36.72 = 0.38	1	
3bii	Decreased metabolic rate; reduce the amount of heat released; / Sweat glands are more active; results in more sweat produced, more water in sweat evaporates into water vapour, more latent heat of vaporisation lost; / Dilation of arterioles; allow more blood flow + more heat loss by radiation, convection, conduction;	1 1	
	Total	9	
4ai	Carbon dioxide + water $\xrightarrow[\text{light}]{\text{chlorophyll}}$ glucose + oxygen	1	R: no conditions, sunlight
4aii	chloroplasts	1	
4aiii	Palisade mesophyll cell	1	R: layer
4bi	stomata	1	R stoma
4bii	Open in presence of light to allow gaseous exchange where carbon dioxide diffuses in and excess oxygen to diffuse out when rate of p/s exceeds rate of r/p + water vapour to diffuse out of leaf to increase rate of transpiration; Close to reduce water loss + prevent wilting;	1 1	
4c	C	1	
	Total	7	

5ai	A: red blood cell B: tissue fluid	1 1	
5aii	Arrow must be drawn <u>from RBC</u> through the walls of capillary, through tissue fluid, through the cell surface membrane into the cells	1	R: multiple arrows
5aiii	Phagocytes can destroy foreign particles that enter the blood by <u>engulfing and ingesting</u> + ingested foreign particle will be <u>digested</u>; Lymphocytes <u>produce antibodies</u> + - antibodies destroy bacteria by <u>attaching to them</u> and causing the <u>surface membrane to rupture</u>/ - causing <u>bacteria to clump together/agglutinate</u> so that they can be easily ingested by phagocytes/ - <u>neutralising the harmful toxins</u> produced by bacteria;	1 1	Phagocytosis Production of antibodies + 1 function of antibodies
5b	Group A ✓ ✘ Group AB ✘	2 1	
	Total	8	
6ai	<u>Amount of catalase</u> present in the increasing number of discs of potato tissue	1	
6aii	<u>Volume</u> of hydrogen peroxide used for each test tube; <u>Temperature</u> of mixture in each test tube;	1 1	
6aiii	A test tube with only hydrogen peroxide without any potato	1	
6b	The <u>higher</u> the <u>amount</u> of discs of <u>potato</u> tissue, the higher the <u>amount of catalase</u>, the <u>higher</u> the <u>rate of breakdown</u> of hydrogen peroxide into water and hydrogen, the <u>more froth</u> produced	1	
	Total	5	

7a	A: nucleus B: mitochondrion C: Golgi apparatus	1 1 1	
7bi	 *For each pair of homologous chromosome, only one member enters a single gamete.* Pg 311, 307	2	A: any other possibilities
7bii	Ovary/ Testis	1	
	Total	6	

	Section B		
8a	 correct orientation; All points plotted correctly; Best fit line; Graph occupies at least 2/3 of grid;	4	
8b	65 – 20 = 45 cm^3 per litre	1	
8c	194 – 40 =154 cm^3 per litre	1	
8d	level of exercise increases, muscles contract more vigorously + increase amount of oxygen used up; increase demand for oxygen due to increase rate of <u>aerobic respiration</u>; <u>breathing rate increases</u> to inhale more air at a faster rate; <u>heart beats faster</u> so that more oxygen can be transported by blood to muscles at a faster rate;	1 1 1 1	Relationship Explain Effect Effect
	Total	10	

9a	Water continuously moves out of the mesophyll cells to form a thin film of moisture over the surfaces of spongy mesophyll cells by osmosis; Water potential of cell sap in mesophyll cells decreases + mesophyll cells absorbs water by osmosis from the cells deeper in the leaf; Water evaporates from the thin film of moisture and moves into the intercellular air spaces in the spongy mesophyll layer; 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;	1 1 1 1 1	Thin film of moisture Compare WP intercellular air spaces compare conc. of water vapour Diffusion
9b	Moving air blows away water vapour that accumulates outside the stomata + creating a lower humidity/ lower conc. of water vapour; Maintains steep water vapour concentration gradient between the leaf and the atmosphere continuous diffusion of water vapour out of leaf + higher rate of transpiration than that of still air; still air makes water vapour accumulates/ higher humidity/ high concentration of water vapour outside leaf + lower rate of transpiration than that of moving air;	1 1 1 1	
9c	Aerobic respiration	1	
	Total	10	

E10a	Similarities 1. Both require receptor to detect a stimulus 2. Both involved the transmission of nerve impulses along the sensory neuron and motor neuron 3. Both involves an action carried out by effectors Differences 1. VA is a <u>deliberate</u> action with conscious control but RA is an <u>immediate</u> response to a specific stimulus <u>without conscious control</u>. 2. In VA, nerve impulses are transmitted to the relay neurons in the brain <u>for processing and decision-making</u> but in RA, nerve impulses are not transmitted to the brain for processing and decision-making until after the RA has been carried out by the effector. 3. In VA, the <u>pathway</u> travelled by the nerve impulse from receptor to effector is <u>longer</u> than that in RA.	4	
E10b	Knee-jerk reflex + Sudden tapping below the kneecap; Stretch receptor receives stimulus + produces nerve impulses; Nerve impulses transmitted along the <u>sensory neurone</u> to <u>relay neurone</u> in the <u>spinal cord</u>; Nerve impulses transmitted from the CNS in spinal cord to the <u>motor neurone</u>; Nerve impulses transmitted along the motor neurone to the effectors + upper thigh muscles; Upper thigh muscles contracts + moving the leg forward/ momentary kicking action;	1 1 1 1 1 1	Name of reflex Stimulus Receptor Sensory neurone Relay neurone Motor neurone Effector Action
	Total	10	

O10a	Chewing in the mouth cuts protein into smaller pieces + physical digestion continues along alimentary canal by peristalsis + churning in the stomach; Proteins are first chemically digested in the stomach by protease/pepsin into polypeptides + in the presence of hydrochloric acid in gastric juice that creates a pH 2 acidic medium for protease/pepsin to work best; Proteins are also digested by trypsin in the small intestines into polypeptides + polypeptides are further digested in the small intestines by peptidases into amino acids + alkaline pH;	1 1 1	Physical digestion Chemical digestion Chemical digestion
O10b	folds in the inner surface of the small intestines + folds bear numerous minute finger-like projections called villi + epithelial cells of villi have numerous microvilli + to increase surface area to volume ratio for increase rate of absorption of digested food substances; Thin walls/ membranes + epithelium is only one cell thick + shorten diffusion distance to increase rate of absorption of digested food substances; Lacteal/ lymphatic capillary transport fats + blood capillaries transport sugars and amino acids away from the small intestines + maintaining a steep concentration gradient for absorption of digested food substances to take place continuously;	1 1 1	Structure + function Structure + function Structure + function
O10c	Liver regulates the blood glucose concentration; when BGC is higher than normal level, eg. after a meal; islets of Langerhans in the pancreas is stimulated to secrete insulin into the bloodstream; insulin stimulates liver to convert excess glucose to glycogen for storage in liver cells + decreasing BGC to normal level; when BGC is lower than normal level, eg, after exercise; islets of Langerhans in the pancreas is stimulated to secrete glucagon into the bloodstream; glucagon stimulates liver to convert glycogen back into glucose + released into bloodstream + increasing BGC to normal level;	 1 1 1 1	 Example Process Example Process
	Total	10	