6093 Biology Yearly TYS 2018

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

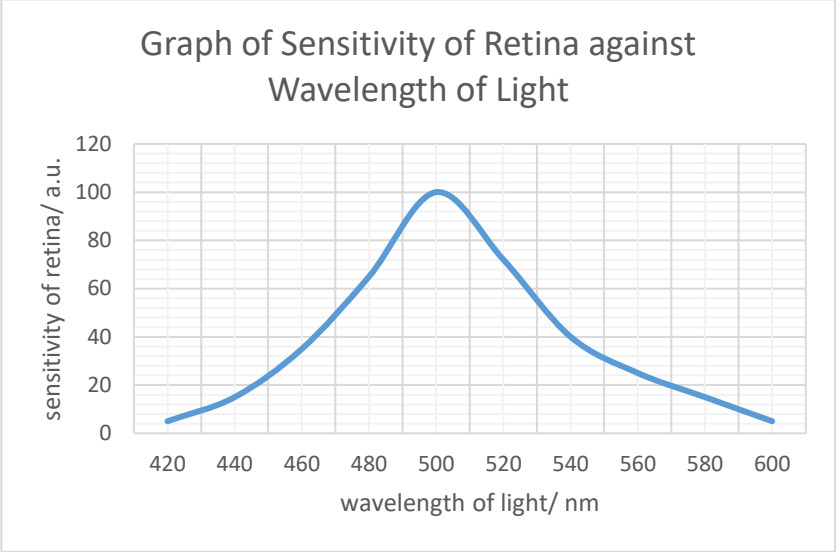
	Paper 2		
	Section A	**Marks**	**Remarks**
1ai	chromatid	1	
1aii	stage 3: metaphase stage 4: anaphase	1 1	
1bi	2	1	
1bii	plant 1: AA plant 3: aa	1	
	Total	5	
2ai	regulation of blood glucose concentration/ deamination of excess amino acids into ammonia and then urea/ breakdown of haemoglobin and stores iron released/ detoxification of alcohol by alcohol dehydrogenase into acetaldehyde/ production of bile used for emulsification of fats	3	
2aii	C	1	
2aiii	name: bile; function: emulsify fats into smaller fat droplets to increase surface area to volume ratio for faster digestion of fats by lipase;	1 1	
2bi	40 °C	1	
2bii	rennin has denatured at high temperatures of 60 °C beyond optimum temperature + active site is altered + substrate is unable to bind to enzyme to form enzyme-substrate complex;	1	
2c	solid lumps remains in the stomach longer compared to liquid milk; allows complete digestion and greater absorption of nutrients;	1 1	
	Total	10	

3ai	3 minute	1	
3aii	as temperature increases from 15 °C to 21 °C, clotting time decreases rapidly from 24 min (longest time taken) to 10 min; as temperature increases further to 35 °C, clotting time continue to decreases gradually to 2.5 min + lowest time taken for clotting/ as temperature increases from 15 °C to 35 °C, clotting time decreases from 24 min to 2.5 min; rate of clotting increases when temperature increases;	1 1 1	R: no quotation of data
3b	prevents foreign particles from entering the bloodstream; prevent excessive loss of blood;	1 1	
	Total	5	

4a	S: walls of alveoli are richly supplied with blood capillaries + F: continuous flow of blood maintains a steep concentration gradient for faster diffusion of gases; S: thin film of moisture covers the inner surface of the alveolus + F: dissolve gases for faster diffusion; S: walls of alveoli are one-cell thick + F: provides short diffusion distance for faster diffusion of gases; S: numerous alveoli in the lungs + F: provide large surface area to volume ratio to increase rate of diffusion of gases;	3	structure + function
4b	lower levels of carbonic anhydrase to catalyse the reaction between carbon dioxide and water in RBCs + forming lower amounts of carbonic acid; decrease amount of carbon dioxide converted to hydrogencarbonate ions for transport in the blood plasma; lower rate of carbon dioxide being transported to the lungs for excretion + leads to carbon dioxide poisoning/ excess carbon dioxide in the RBC/ slower gaseous exchange;	1 1 1	R: no relating to context
4ci	pressure decreases from 0 a.u. to -1 a.u. in the first second + reaches the lowest point at -1 a.u.; pressure increase from -1 a.u. to 0 a.u. in the next second;	1 1	1st second next second
4cii	muscles of diaphragm contract + diaphragm flattens + external intercostal muscles contract while internal intercostal muscles relax; moving the ribs upwards and outwards + sternum moves up and forward causing lungs to expand + increasing thoracic volume; lowering air pressure in the lungs/ atmospheric pressure is higher than pressure in the lungs + forces atmospheric air into lungs;	1 1 1	diaphragm + ICM ribs + sternum + volume pressure + air enters
	Total	11	

5ai	173.5	1	R: unit written
5aii	$\frac{52.0 - 20.8}{52.0} \times 100\% = 60\%$ $\frac{180.0 - 175.5}{180.0} \times 100\% = 2.5\%$	 1	
5aiii	urea	1	
5b	structure A is the glomerulus + Stucture B is the venule; ultrafiltration + high hydrostatic blood pressure in A forces small molecules i.e. glucose, amino acids, mineral salts and nitrogenous waste products to pass through the partially permeable basement membrane into the Bowman's capsule + blood cells, platelets and large molecules i.e. proteins and fats are retained in the glomerular capillaries; blood capillaries surrounding the nephron unites to form B + join to form a branch of renal vein + carries deoxygenated blood with lower concentration of mineral salts and nitrogenous waste products and more carbon dioixide than blood entering the kidneys;	1 1 1	Identify both structures Function of A Function of B
	Total	6	
6a	A is main vein/ vein/ mid-rib + contains xylem and phloem situated close to mesophyll cells; xylem transports water and dissolved mineral salts from roots to mesophyll cells by transpiration pull + phloem transports sucrose from the leaves to other parts of the plant by active transport;	1 1	Identify structure and tissues Functions of tissues
6bi	sucrose	1	
6bii	phloem tissue	1	
6biii	$\frac{65cm}{2.5h}$ $= 26\ cm/h$	1 1	
	Total	6	

7a	aerobic respiration (P) in animal and plant cells + combustion (S) or burning of fossil fuels <u>produces carbon dioxide</u> + returning carbon dioxide to the environment; photosynthesis (Q) in plants <u>absorbs carbon dioxide</u> to be used to synthesise glucose + removing carbon dioxide from the environment; nutrient cycling + constant removal of carbon dioxide from environment and returning of carbon dioxide into the environment + ensures that concentration of carbon dioxide in the environment is <u>relatively constant</u>;	1 1 1	Return CO_2 Remove CO_2 Nutrient cycling
7b	bacteria and fungi are <u>decomposers</u> that <u>break down</u> dead organisms/ dead organic matter; <u>decomposition</u> and <u>respiration</u> of bacteria and fungi releases carbon dioxide into the environment; dead decomposed bodies of organism buried in the Earth for millions of years will <u>produce fossil fuels</u> such as coal, natural gas and oil + used in <u>combustion releasing carbon dioxide</u> to the environment;	1 1 1	
	Total	6	

	Section B		
8ai	 All points plotted correctly; Best fit line + smooth curve; Correct orientation; Correct axes + equal intervals;	4	
8aii	$100 - 15 = 85\ a.u.$	1	R: wrong units
8aiii	sensitivity <u>increases</u> from 5 a.u. to 100 a.u. as wavelength <u>increases</u> from 420 nm to 500 nm + <u>highest sensitivity</u> of 100 a.u. when wavelength is at 500 nm; as wavelength i<u>ncreases further</u> from 500 nm to 600 nm, sensitivity <u>decreases</u> from 100 a.u. to 5 a.u. + <u>lowest sensitivity</u> of 5 a.u. at 420 nm and 600 nm;	1 1	
8aiv	72 a.u.	1	
8b	<u>photoreceptor</u> in <u>retina</u> stimulated by bright light + nerve impulses produced; nerve impulses travel along <u>sensory neurone</u> in <u>optic nerve</u> to <u>relay neuron</u> in the brain + to the <u>motor neurone</u> and reaches effector (<u>muscles of the iris</u>); <u>circular</u> muscles of the iris <u>contract</u> + <u>radial</u> muscles of the iris <u>relax</u> + <u>pupil constricts</u> + reducing light entering the eye;	1 1 1	
	Total	11	

9a	Diffusion is the net movement of molecules down concentration gradient but osmosis is the net movement of water molecules down water potential gradient; Diffusion and osmosis does not require energy but active transport requires energy; Diffusion and osmosis are movements down a concentration and water potential gradient respectively but active transport is a movement against a concentration gradient;	1 1 1	D & O DO & AT DO & AT R: mere definition
9bi	Water molecules enter cell B down water potential gradient through the partially permeable cell membrane + vacuole expands and pushes against the cell wall + cell B becomes turgid; Water molecules leave cell C down water potential gradient through the partially permeable cell membrane + vacuole shrinks + cytoplasm shrinks away from the cell wall + cell C becomes flaccid/ plasmolysed;	1 1	Describe + explain
9bii	Cell B	1	
9biii	Ions are absorbed into RHC by active transport against concentration gradient; RHC has a high ion concentration + creating a lower water potential than the water potential in the soil solution; Maintaining a steep water potential gradient + increase rate of water absorption into RHC by osmosis;	1 1 1	 Importance
	Total	9	

E10a	Photosynthesis is the process in which light energy absorbed by chlorophyll is transformed into chemical energy + chemical energy is used to synthesise carbohydrates from water and carbon dioxide; Carbon dioxide + water $\xrightarrow[\text{light}]{\text{chlorophyll}}$ glucose + oxygen / water and carbon dioxide are raw materials + oxygen released during the process in the presence of chlorophyll and light; in light-dependent stage, <u>chlorophyll</u> absorbs/traps <u>light energy</u> + convert into <u>chemical energy</u>; light energy is used to <u>split water molecules</u> into oxygen and hydrogen atoms + <u>photolysis</u> of water; In light-independent stage, hydrogen produced in photolysis is used to <u>reduce carbon dioxide</u>; <u>carbon dioxide</u> <u>gains hydrogen</u> to form glucose;	1 1 1 1 1 1	Definition Equation LDS LDS LIS LIS
E10b	Photosynthesis involved <u>enzyme-catalysed</u> reactions + affected by temperature; <u>Rate of enzyme reaction</u> is highest at optimum temperature + <u>rate of p/s</u> is the highest at optimum temperature; rate of p/s is higher on a warm day than a cold day + enzymes are <u>inactive at low temperatures</u> below optimum temperature; rate of p/s increases as temperature increases towards optimum temperature + enzymes <u>gain energy</u> + <u>increasing collisions</u> between enzymes and substrates/ increasing the rate of formation of <u>enzyme-substrate complex</u>;	1 1 1 1	Factor Relationship Explain – low temp Explain – optimum temp
	Total	10	

O10a	acrosome of the sperm releases an enzyme to disperse the follicle cells and break down part of the egg membrane; only one sperm nucleus enters the egg + fusion of the nucleus of a sperm with the nucleus of egg to form a zygote; cilia lining the inner surface of oviduct sweep zygote along oviduct + peristaltic movements in the wall of oviduct also help move the zygote to the uterus; zygote divides by mitosis to form embryo + implantation takes place about 7 days after fertilisation; Villi begin to grow from embryo into uterine lining + contain blood capillaries forming placenta + embryonic tissue and uterine lining + umbilical cord attached the embryo to placenta; Amniotic sac encloses the embryo in amniotic cavity containing amniotic fluid;	1 1 1 1 1 1	Breakdown of egg membrane Fertilisation Zygote moves to uterus implantation Formation of placenta Amniotic sac
O10b	allows oxygen and dissolved food substances eg. glucose, amino acids and mineral salts, to diffuse from the mother's blood to the fetal blood; allows metabolic waste/ excretory products eg. urea, carbon dioxide, to diffuse from fetal blood into the mother's blood; allows antibodies to diffuse from mother's blood to the fetal blood + protecting the foetus against certain diseases; produces progesterone which maintains the thickness and health of uterine lining during pregnancy;	1 1 1 1	
	Total	10	