6093 Biology Yearly TYS 2017

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

	Paper 2		
	Section A	Marks	Remarks
1a	Homeostasis is the <u>maintenance</u> of a <u>constant internal</u> <u>environment</u> and conditions within the body of an organism + consisting of blood and tissue fluid;	1	Definition
	<u>Receptors</u> detect <u>stimuli</u> + negative feedback system + reacts to give a <u>reverse effect</u> of a stimulus + <u>restoring the</u> <u>normal condition</u> of the internal environment;	1	Describe negative feedback
1b	<u>Ductless</u> glands that <u>secrete hormones directly</u> into the <u>blood + transported in the bloodstream to a target organ;</u>	1	Definition
	e.g. pituitary gland secretes ADH to regulate reabsorption of water at the walls of collecting duct/ adrenal gland secretes adrenaline to increase metabolic rate/ pancreas secretes insulin and glucagon to regulate the BGC	1	Example
1ci	A: glycogen	1	
	B: glucagon	1	
1cii	Muscular contractions + increase rate of aerobic respiration + increase demand of glucose; increase glucose uptake into muscle cells + lowering BGC;	1	
	Total	8	
2a	Keeps the leaf afloat/floating/buoyant on the surface of the water	1	R: did not specify location on water
2b	Directly under/nearest to the upper epidermis + to absorb/capture as much sunlight as possible for p/s	1	R: did not take reference to upper epidermis
2c	In light-dependent stage, chlorophyll absorbs/traps <u>light</u> <u>energy</u> + convert into <u>chemical energy</u> ;	1	Absorbs light
	Light energy is used to <u>split water molecules into oxygen</u> and hydrogen atoms + photolysis of water;	1	Photolysis
	In light-independent stage, hydrogen <u>reduce</u> carbon dioxide to glucose / carbon dioxide gains hydrogen to form glucose	1	

	+ using the chemical energy from the light dependent		Reduction of
	stage;		CO ₂
2d	Rate of photosynthesis	1	R: no plateau at the end of graph R: no bisbost
	Percentage of carbon dioxide	1	nignest point to indicate optimum temperature; rate must start and end on zero
	Total	7	
3а	<u>photosynthesis</u> + leavs contain chlorophyll that traps and converts light energy into chemical energy + provide energy for other organisms in the food web/ does not get energy from other organisms;	1	
3b	74 10 2	1 1 1	
3c	trophic level 4	3	R: incorrect and inconsistent scale
	trophic level 3 trophic level 2 trophic level 1	7	

4a	Measure the <u>initial</u> mass of each plant at the start of experiment (M0) + measure the mass of each plant at the end of each day for 10 days (M1, M2, M3, etc.);	1	
	Calculate the loss of mass each day by finding the difference in mass of each plant and the mass of the plant the previous day (M1-M0, M2-M1, M3-M2, etc.);	1	
4b	Transpiration	1	
4c	D will lose most mass + D has more leaves than F + more stomata + rate of transpiration is higher in D than F;	1	Reason 1 compares with F
	D will lose most mass + air around D is less humid than		
	air around E which is enclosed in a plastic bag + rate of transpiration is higher in D than E;	1	Reason 2 compares with E
4d	To ensure the loss of mass is due to transpiration and not due to evaporation of water from the soil	1	
	Total	6	

5a	Asexual reproduction is the <u>process</u> resulting in the production of <u>genetically identical offspring</u> (clones) from <u>one parent;</u> Does not involve the fusion of <u>nuclei of</u> gametes <u>but</u> <u>involves mitosis;</u>	1	
5b	Fertilised egg becomes a <u>zygote</u> + <u>cilia</u> lining the inner surface of the oviduct <u>sweep</u> zygote along oviduct + <u>peristaltic movements</u> in the wall of oviduct also help move the zygote to uterus; zygote divides by mitosis to form embryo + embryo embeds/implants itself in the uterine lining;	1	Zygote to uterus Embryo formation &
	Amniotic sac encloses the embryo in the amniotic cavity containing amniotic fluid + Support and cushions the foetus before birth/ Shock absorber/ Protects the foetus against physical injury/ Allows foetus a certain degree of movement + promotes muscular development/ Lubricates and reduces friction in the vagina during birth;	1	Amniotic sac + 1 function
	villi containing blood capillaries of embryo grow from embryo into the uterine wall making up a placenta + separating the fetal and maternal blood systems;	2	Placenta formation
	placenta allows oxygen and dissolved food substances eg. glucose, amino acids and mineral salts, to <u>diffuse</u> from the maternal blood system to the fetal blood system/ allows metabolic waste/ excretory products eg. urea, carbon dioxide, to <u>diffuse</u> from fetal blood into the mother's blood/ allows antibodies to <u>diffuse</u> 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;		2 functions of placenta
	Total	7	

6ai	1400 cm ³	1	
6aii	Volume of each breath <u>increases</u> when exercise intensity increases;	1	Relationship
6aiii	1700×26 = 44 200 cm ³	1 1	
6b	Aerobic respiration	1	
	Total	5	
7a	<i>name</i> Cardiac/heart muscle tissue; <i>function</i> Contracts and relaxes to allow heart to pump the blood in the pulmonary and systemic circulation;	1 1	
7bi	5.6 dm ³ /min	1	
7bii	19 – 7 = 12 minutes	1	
7biii	% increase in heart rate = $\frac{168 - 66}{66} \times 100\%$ =155%	2 1	
7biv	Heart rate <u>increases rapidly</u> at the start of exercise from 66bpm to 160bpm in the first 2 minutes of exercise;	1	R: no quotation of
	Heart rate increases gradually from 160bpm to 170bpm in the next 2 minutes;	1	uala
	Heart rate reaches a <u>plateau</u> at 170 bpm in the last 1 minute of exercise;	1	
	Total	10	

	Section B		
8a	Graph of time taken to become colourless against temperature	4	
	Labelled axes + equal intervals + correct axes; Best fit line; Occupies 2/3 of the grid; All points plotted correctly;		
8b	<u>Lipase</u> digests <u>milk fats into fatty acids;</u> Increasing amounts of fatty acids causes <u>pH to decrease</u> below 8; Phenolohthalein becomes colourless in acidic pH below pH	1 1	Enzyme reaction Effect of fatty acids on pH
	8;	•	Effect on indicator
8c	At 55°C, beyond optimum temperature of 35°C, enzyme/lipase <u>denatures +</u> Lipase cannot bind to milk fats to form enzyme-substrate complex/ active site is altered, no enzyme reaction, no fatty acids formed, pH remains unchanged;	1	
8d	Optimum temperature from graph 35°C; Temperature at which the <u>time taken</u> for milk to become colourless in the <u>shortest</u> + the <u>rate</u> of enzyme <u>reaction</u> is the <u>highest</u> ;	1	Quote data
	Total	10	

9a	1600 + 700 + 200 - 1500 - 100 - 300 - 200 = 400 cm ³	1	
9b	Water produced by metabolic reactions + catabolic and anabolic reactions;	1	
	Examples: aerobic respiration + briefly describe;	1	
9c	evaporation of water in sweat will reduce greatly + sweat glands are less active reducing secretion of sweat;	1	
	water <u>excreted in urine</u> will increase due to <u>increase water</u> <u>potential</u> in blood plasma;	1	
	evaporation of water from thin layer of moisture in alveoli when breathing out increases due to <u>increase muscular</u> <u>contraction</u> and <u>increase aerobic respiration</u> to release excess heat;	1	
	Water lost through <u>egestion of faeces</u> increase or decrease depending on the <u>diet</u> + not affected by temperature;	1	
9d	<u>decrease</u> water potential <u>below normal level</u> in blood plasma stimulates <u>hypothalamus</u> in the brain to trigger <u>pituitary</u> <u>gland</u> to release <u>more ADH</u> into <u>bloodstream</u> ;	1	
	<u>ADH stimulates</u> cells in the <u>walls of the collecting ducts</u> become <u>more permeable</u> to water + <u>more water reabsorbed</u> from the collecting duct <u>into blood capillaries</u> ;	1	
	smaller <u>volume</u> of urine + urine produced is <u>more</u> <u>concentrated;</u>	1	
	Total	10	

E10a	Nucleotide is a <u>basic unit</u> of DNA + made up of a <u>deoxyribose</u> sugar, a <u>phosphate</u> group and a nitrogen-containing <u>base</u> ;	1	nucleotide
	bases of one chain are bonded to bases of opposite chain according to <u>rule of base pairing</u> + <u>complementary</u> <u>bases</u> are joined by <u>hydrogen bonds</u> ;	1	rule of base pairing
	adenine binds to thymine + cytosine binds to guanine;	1	comp. bases
	Nucleotides can be joined together to form polynucleotides + a sequence of nucleotides forms a gene;	1	polynuc. + gene
	DNA molecule is made up of two anti-parallel polynucleotide chains + two strands are twisted into a double helix;	1	double helix+ anti- parallel
	DNA molecules are wrapped around proteins to form chromatin threads which coil tightly to form chromosomes during cell division;	1	chromatin + chromosome
E10b	A fragment of DNA in human chromosome that contains the gene of interest is obtained + <u>restriction enzyme</u> cut restriction site of gene at the two ends of the gene to produce <u>sticky ends</u> ;	1	Cutting of insulin gene
	A <u>plasmid</u> from a bacterium is obtained + cut plasmid with same restriction enzyme + producing <u>sticky ends</u> <u>complementary</u> to the sticky ends of the desired gene;	1	Cutting of plasmid
	<u>Mix</u> the plasmid with the DNA fragment containing the gene of interest + bind to plasmid by the complementary base pairing between their sticky ends + DNA ligase to seal + forming a recombinant plasmid;	1	Formation of recombinant plasmid
	<u>Mix</u> recombinant plasmid with E.coli bacterium + apply temporary heat or electric shock to open up pores in the cell surface membrane of the bacterium for the plasmid to enter + forming a transgenic bacterium;	1	Formation of transgenic bacterium
	Total	10	

O10a	Co-dominance results when the <u>two alleles</u> controlling a <u>trait both express</u> themselves in an organisms;	1	Definition
	Blood groups A, B, AB and O are determined by <u>alleles I^A,</u> I^{B} and I ^O ;	1	Alleles
	I ^A and I ^B are dominant over I ^O / I ^O is recessive but I ^A and I ^B exhibit co-dominance:	1	Condition
	Individuals with I ^A I ^B will have AB blood group + Individuals with I ^A I ^O and I ^A I ^A will have A blood group + Individuals with I ^B I ^O and I ^B I ^B will have B blood group + Individuals with I ^O I ^O will have O blood group;	1	Two Examples
	Parents with $I^{A}I^{O}$ and $I^{B}I^{O}$ will have 25% chances of a child with genotype $I^{A}I^{B}$ + include punnet squares;	1	Probability
	Parents with $I^A I^B$ and $I^B I^O / I^A I^O$ will also have 25% chances of a child with genotype $I^A I^B$;	1	Probability
O10b	Mutation is a <u>sudden random change</u> in the <u>structure</u> or in the <u>chromosome number</u> of a gene;	1	Explain using 2 examples
	Error may occur <u>during replication</u> of gene or chromosome + Error is <u>not repaired</u> + gene is modified/ chromosome is altered;	1	
	Eg: albinism, sickle-cell anaemia, Down's syndrome + short description	2	
	Total	10	