2019 TYS answer- Pure Biology

Paper 1

1	B	**11**	D	**21**	C	**31**	C
2	D	**12**	B	**22**	D	**32**	C
3	C	**13**	B	**23**	B	**33**	A
4	B	**14**	C	**24**	D	**34**	D
5	D	**15**	D	**25**	D	**35**	D
6	B	**16**	A	**26**	A	**36**	D
7	B	**17**	C	**27**	D	**37**	D
8	C	**18**	C	**28**	D	**38**	A
9	B	**19**	C	**29**	A	**39**	B
10	A	**20**	D	**30**	A	**40**	C

1	**(a)(i)**	**Identify** A is cell membrane. [1] **State function** A partially permeable membrane that controls the substances entering and leaving the cell. [1]	2
	(ii)	**Identify** B is ribosome. [1] **State function** Needed to synthesize proteins in the cell. [1]	2
	(b)	**Suggest why (include explanation)** Liver cells carry out many metabolic reactions that require energy. [1] The high number of mitochondria provides a higher amount of energy, released during aerobic respiration, to carry out these reactions. [1]	2
	(c)	**State** Plant cell has cell wall. [1] Plant cell has chloroplasts. [1] Plant cell has a large central vacuole. [1] (any 2)	2
	(d)	**Suggest purpose** Microvilli increases <u>surface area to volume ratio</u> [1] to increase rate of absorption of <u>digested food</u>. [1]	2

2	**(a)**	**Identify chambers** A and B are the atria. C is the right ventricle. D is the left ventricle. [1] **Explain why different thickness** D has the thickest wall, 12mm, to pump the blood at high pressure, out of aorta to the rest of body. [1] C has a thinner wall, 5mm, than D as C pumps blood to the lungs, which is nearer to the heart [1] A and B have thinnest walls of 3mm as they only needs to force blood into the ventricles. [1]	4
	(b)	**Suggest effects** The hole cause mixing of the oxygenated and deoxygenated blood.[1] This results in less oxygen in blood being transported around the body [1]	2
	(c)	**State** Diet high in saturated fats and cholesterol/ stress/ smoking (any 1)	1
3	**(a)**	**Explain** - As 1 has a higher water potential than 2, water leaves 1 (xylem vessel) and enters 2 (spongy mesophyll cell) by osmosis. - Water leaves 2 (spongy mesophyll cell) to form a thin film of moisture around the cell. - Water from the thin film of moisture evaporates forming water vapour. - Water vapour accumulates in 3 (intercellular air spaces). - As the concentration of water vapour in 3 is higher than at 5 (surrounding atmosphere), water vapour diffuses out of leaf through 4 (stomata)	5
	(b)	**Identify** J is the upper epidermal cell. [1] **Explain** Allows light to penetrate through into the photosynthesizing cells.[1] **Identify** K is the palisade mesophyll cell. [1] **Explain** Adaptation either one : - It has many chloroplasts containing chlorophyll to absorb light energy and convert it to chemical energy during photosynthesis. [1] - It is long and cylindrical to maximize sunlight absorption. [1]	4

	(c)	**Explain** When stomata are open, more carbon dioxide can diffuse into the leaf which is used for photosynthesis.[1] Oxygen produced at end of photosynthesis can also diffuse out of stomata. [1] Water vapour can diffuse out, increasing rate of transpiration.[1] This facilitates the water moving up the xylem by transpiration pull, providing water to cells for photosynthesis. [1]	4
4	**(a)**	Dd x Dd [1] D d D d [1] DD Dd Dd dd [1] No cystic fibrosis no cystic fibrosis no cystic fibrosis cystic fibrosis [1]	4
	(b)	**Explain** The actual ratio is different as the sample size is too small [1] Fusion of gametes (fertilization) is random process therefore it will not follow the probability. [1] (any 1)	1
	(c)	**Define** Mutation is a sudden random change in the structure of a gene [1] or in the chromosome number. [1]	1
	(d)	**State** Mutagenic agents such as formaldehyde / radiation	1
5	**(a)**	C C G A T A	1
	(b)	**State** Nucleotide	1
	(c)	**Discuss** Social implications More people are able to access to the medicine easily. [1] Cost of medicine is lowered thus more people can afford. [1] These medicines might cause allergies/ diseases in humans. [1] Ethical implications Morally wrong to exploit chickens to produced medicine for the benefit of humans. [1] Vegetarians may not consume the medicine as it is derived from chicken. [1]	4
6	**a**	**State** Energy is lost in: (any 2) 1. Uneaten parts/ dead body 2. Faeces	2

		3. Excretory products	
	b	**Calculate** 1600-90/1600 x 100% [1] = 94.3 % …94% [1]	2
	c	90% of energy is lost to the environment as food is transferred from one trophic level to the next. The predators of the tertiary consumer are on the last trophic level in the food chain hence they have the least amount of energy available to them. Hence, there will be very few predators of tertiary consumers.	1 1
Section B			
7	**ai**	Labelled axes -1 Scale- 1 Plots- 1 Line- 1	
	aii	9.75%	
	bi	**Describe relationship** As the years increase, the percentage of fish caught increases. For the first 10 years from 1993 to 2003, the percentage of fish caught increases slightly from 5.2% to 5.6%. For the following 10 years from 2003 to 2013, the percentage of fish caught increases exponentially/ drastically from 5.6% to 16.3%.	[2]
	bii	**Describe function** A larger proportion of fish in the sea that are 40cm and longer shows that there is **availability of food** for growth and this indicates a sustainable ecosystem. It also shows that the fish are adaptable to changes to the environment and live to reproductive age. Over fishing does not take place in the sea and this is also a positive indicator of fish stocks.	[1] [1] [1]
8	**(a)**	Nephron is involved in osmoregulation of blood/ removal of waste substances such as urea from the body [1]. This involves two main processes, ultrafiltration and selective reabsorption. In the glomerulus, **small substances like water, amino acids, glucose and urea** are filtered out at the basement membrane and **enters the Bowman's capsule** during ultrafiltration. [1] These forms the glomerular filtrate. Selective reabsorption takes place at the convoluted tubule of the nephron. All of glucose and amino acids will be reabsorbed into the bloodstream. [1]	4

		The remains of the filtrate, mainly urea, will flow along the tubules of nephron and excreted out of body in the form of urine. [1]	
	(b)	Blood is drawn from the vessel in the arm and travels into the dialysis machine. [1] In the machine, blood flows through the dialysis tubing which is bathed in a dialysis fluid. The dialysis tubing is partially permeable which allows small molecules like urea to diffuse out. [1] The dialysis fluid has the correct concentrations of glucose and amino acids as a normal healthy individual to prevent these substances to diffuse out of blood. [1] The dialysis fluid does not contain any urea to allow urea to diffuse out of blood. [1] The dialysis fluid travels in the opposite direction as the blood flow to maintain the concentration gradient thus allowing urea to diffuse out. [1] The tubing is long and highly coiled to increase surface area to volume ratio thus increasing the rate of diffusion of waste substances. [1] The blood, with urea removed, will then flow out of the machine back into another vessel. [1] Any 5	6
9	**(a)**	When blood glucose concentration is higher than normal, the islets of Langerhans in the pancreas releases insulin into the bloodstream [1] Insulin stimulates the liver cells to convert excess glucose to glycogen [1] Insulin also increases the uptake of glucose by cells by increasing the permeability of cells to glucose/ Insulin increases metabolism of glucose [1] Blood glucose concentration will then decrease back to normal. When blood glucose concentration is lower than normal, the islets of Langerhans in the pancreas release glucagon into the bloodstream [1] Glucagon stimulates the liver cells to convert stored glycogen to glucose [1] Thus increasing the concentration of glucose in blood.	5

	(b)	In a cold environment, the skin arterioles undergo <u>vasoconstriction</u> which prevents lesser blood flow nearer to skin surface [1] less heat is lost to the environment via convection, radiation and conduction.[1] The sweat glands become less active [1] Less water from sweat evaporates thus less latent heat of vaporization is removed [1] from the body Shivering helps to generate heat which warms the body [1]	5
9	**(a)**	Enzyme has a 3D shape with a depression known as active site.[1] The active site is complementary to the shape of the substrate. [1] Substrate binds to the enzyme forming an enzyme-substrate complex [1] The enzyme acts on the substrate/ chemical reactions take place and substrate changed into products [1] Products leave the enzyme and enzyme remains chemically unchanged at end of reaction [1]	5
	(b)	Enzymes are involved in the chemical digestion of food, breaking down large insoluble food into smaller soluble food substances [1] for absorption. **Starch** is broken down by enzyme amylase released from pancreas into maltose. [1] Maltose is further broken down by maltase released from intestinal walls to form glucose. [1] **Protein** is broken down by enzyme trypsin released by the pancreas into polypeptides [1] Polypeptides are then broken down in amino acids by peptidases released from walls of small intestine. [1] Note: must include source, product	5