Unit 1: Lifestyle, Transport, Genes & Health

Question Number	Question	
1.(a)(i)	The table below lists some features of four carbohydrates. Put a cross in the box to indicate that the feature is present in the carbohydrate. The first row has been done for you.	
	Correct Answer	Mark
	<table><tr><th>Feature</th><th>Glucose</th><th>Glycogen</th><th>Maltose</th><th>Starch</th></tr><tr><td>1-6 glycosidic bonds present</td><td></td><td>☒</td><td></td><td>☒</td></tr><tr><td>Made up of many monomers</td><td></td><td>☒</td><td></td><td>☒</td></tr></table> One mark per correct column.	4

Question Number	Question			
1.(a)(ii)	Name the disaccharide made up of α-glucose and galactose.			
	Correct Answer	Acceptable Answers	Reject	Mark
	lactose;			1

Question Number	Question	
1.(a)(iii)	Draw the molecules resulting when this disaccharide molecule is split into its two component monosaccharides.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of two. 1. one unit of glucose correctly drawn; 2. second identical unit;	 1 1 Max 2

Question Number	Question			
1.(a)(iv)	Name this type of reaction.			
	Correct Answer	Acceptable Answers	Reject	Mark
	hydrolysis;			1

Question Number	Question	
1.(b)	Explain the advantages of glycogen as an energy storage molecule in the human body.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of three. 1. large molecule/ made up of many monomers allows storage of large amounts of energy; 2. compact therefore large amounts can be stored in a cell; 3. insoluble therefore does not have an osmotic effect/ eq; 4. inert so not affected by other reactions in cells; 5. large molecule therefore cannot pass out of cells; 6. can be hydrolysed to release large amounts of energy / glucose when required;	1 1 1 1 1 1 Max 3

Question Number	Question	
2.(a)	Describe the changes in death rates shown on the graph.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of three 1. {during first 5 years / initially} there is little change in death rates; 2. from late 70's/ early 80's in most countries there is a lowering of death rates; 3. Poland is an exception when death rates have increased; 4. any quantitative manipulation of data e.g. death rate in Finland has halved over period;	 1 1 1 1 Max 3

Question Number	Question	
2.(b)(i)	Using both graphs, give **two** pieces of evidence to support this hypothesis.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of two. 1. Finland has high rates of CHD and high B.P.; 2. UK has high rates of CHD and high B.P.;	 1 1 Max 2

Question Number	Question	
2.(b)(ii)	Suggest how the data shown in the graphs do not fully support this hypothesis.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of two. 1. there is conflicting evidence; 2. Italy has high b.p. but low death rates;	 1 1 Max 2

Question Number	Question	
2.(c)	Suggest how high blood pressure can result in less oxygen reaching heart muscle.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of three. 1. damage to artery walls; 2. ref. to blood clot; 3. blood clot can block arteries; 4. ref. to coronary arteries; 5. lack of (oxygenated) blood flow to heart muscle;	 1 1 1 1 1 Max 3

Question Number	Question	
3.(a)	Name the blood vessels labelled **W**, **X**, **Y** and **Z**.	
	Answer	Mark
	W = coronary arteries **X** = aorta **Y** = (left) pulmonary artery **Z** = pulmonary vein 4 correct = 2 marks 2 or 3 correct = 1 mark 0 or 1 correct = 0 marks	2

Question Number	Question	
3.(b)	Describe and explain the events that occur during ventricular systole in the cardiac cycle.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of four. 1. ventricle (muscle) contracts; 2. higher pressure in ventricles relative to atria; 3. (pressure) closes atrioventricular valve; 4. higher pressure in ventricles relative to the {aorta / pulmonary artery / arteries}; 5. (pressure) opens the semilunar valve; 6. blood forced into the {aorta / pulmonary artery / arteries};	 1 1 1 1 1 1 Max 4

Question Number	Question	
3.(c)	Describe a reliable procedure that could be used to test this hypothesis.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of three. 1. place *Daphnia* on {cavity slide / eq} with caffeine; 2. (focus on heart) using microscope; 3. ref. to range of caffeine concentrations; 4. ref. to repeats; 5. ref. to {water as control / zero caffeine concentration}; Award one mark for each of the following points in context to a maximum of three. 1. control temperature; 2. reference to similar organisms used; 3. accurate measurement of DV; 4. reference to pretreatment;	 1 1 1 1 1 Max 3 1 1 1 1 Max 3

Question Number	Question			
4.(a)	Identify the blood vessels **P**, **Q** and **R**.			
	Correct Answer	Acceptable Answers	Reject	Mark
	P aorta **Q** vena cava **R** capillary	pulmonary artery any named vein		1 1 1

Question Number	Question	
4.(b)	The blood pressure at point A is 10.5 kPa and the blood pressure at point B is 2.5 kPa. Calculate the percentage decrease in the pressure as blood flows from A to B.	
	Answer	Mark
	Correct answer (with or without working) = 2 marks Answer: 76(.2)% Correct working with incorrect answer = 1 mark 10.5 – 2.5 or 8 seen;	2

Question Number	Question	
4.(c)(i)	Explain the changes in blood pressure in the arteries.	
	Answer	Mark
	(pulses) due to {elastic recoil/ eq} / general drop due to {friction / dividing into more vessels};	1

Question Number	Question	
4.(c)(ii)	Explain the changes in blood pressure in the capillaries.	
	Answer	Mark
	(pressure drop) due to large volume of capillary network / friction between blood cells and walls of capillary;	1

Question Number	Question			
5.(a)	Give the sequence of amino acids found in the polypeptide chain that is coded for by this part of the DNA strand.			
	Correct Answer	Acceptable Answers	Reject	Mark
	Arginine alanine threonine glutamine glycine [All correct = 2 marks, one mistake = 1 mark, more mistakes = no marks]	arg ala thr glu gly		2

Question Number	Question			
5.(b)	Give the next triplet codon that you would expect to see on this DNA strand if codon 51 coded for the last amino acid in the polypeptide chain.			
	Correct Answer	Acceptable Answers	Reject	Mark
	ACT	adenine cytosine thymine	thiamine	1

Question Number	Question			
5.(c)	Complete the diagram below to show the sequence of bases on a molecule of messenger RNA synthesised from this part of the DNA strand.			
	Correct Answer	Acceptable Answers	Reject	Mark
	AGA GCC ACC CAG GGU [All correct = 2 marks, one mistake = 1 mark, more than one mistake = no marks]			2

Question Number	Question	
5.(d)(i)	Suggest what would happen to the structure of the protein coded for by this DNA molecule if thymine in **codon 49** was replaced by cytosine.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of **two** marks. 1. alanine would replace threonine; 2. {primary/ secondary} structure would be altered; 3. 3D shape would not be correct / eq;	 1 1 1 Max 2

Question Number	Question	
5.(d)(ii)	Suggest what would happen to the structure of the protein coded for by this DNA molecule if adenine replaced the first thymine in **codon 47**.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of **two** marks. 1. a stop signal would be inserted; 2. the protein would be shorter/ eq; 3. protein would be 46 amino acids long/ eq;	 1 1 1 Max 2

Question Number	Question	
6.(a)	The table below refers to three transport mechanisms. If the statement is true, put a cross in the appropriate box.	
	Correct Answer	Mark
	<table><tr><th>Statement</th><th>Osmosis</th><th>Facilitated diffusion</th><th>Active transport</th></tr><tr><td>Movement of water</td><td>☒</td><td></td><td></td></tr><tr><td>Requires ATP</td><td></td><td></td><td>☒</td></tr><tr><td>Molecules move down a concentration gradient</td><td>☒</td><td>☒</td><td></td></tr><tr><td>Carrier proteins are needed</td><td></td><td>☒</td><td>☒</td></tr></table> One mark for each two correct boxes.	6

Question Number	Question	
6.(b)(i)	Describe the changes in cytoplasm concentration of substance B shown in the graph and explain how these changes support the statement that substance B enters the cells by diffusion.	
	Answer	Mark
	Award up to **four** marks for any of the following in context. 1. Rapid rate of uptake {in first 4 hours / initially}; 2. Substance A passes down concentration gradient (into the cell) / eq; 3. {Between 4 and 8 hours / gradually} the rate of uptake decreases; 4. Due to smaller diffusion gradient / eq; 5. Rate of uptake is proportional to diffusion gradient / eq; 6. After 8 hours there is no further uptake; 7. Concentrations inside cell equal concentration outside cell/ eq;	1 1 1 1 1 1 1 Max 4

Question Number	Question	
6.(b)(ii)	Suggest how the shape of the graph would change if the temperature in the experiment was decreased to 10 °C. Give an explanation for your answer.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of **two** marks. 1. Substance B has less kinetic energy; 2. Movement through membrane is slower/ eq;	 1 1 Max 2

Question Number	Question	
7.(a)	Explain why the model used to describe the structure of this cell membrane is called the fluid mosaic model.	
	Answer	Mark
	Award one mark for each of the following points in context to a maximum of **two** marks. 1. Fluid because phospholipids moving (within membrane); 2. Causing proteins to move; 3. Mosaic due to presence of proteins/ eq;	 1 1 1 Max 2

Question Number	Question	
7.(b)(i)	Describe the effects of the presence of cholesterol and of an increase in temperature on the permeability of the three membranes to substance A.	
	Answer	Mark
	Award up to **three** marks for following in sequence or context. 1. (The presence of) cholesterol decreases the permeability of membranes (to substance A); 2. The higher the cholesterol content the lower the permeability; 3. An increase in temperature increases the permeability of all 3 membranes (to substance A); 4. A change in temperature affects the permeability of the membrane without cholesterol more than the membranes with cholesterol/ eq;	 1 1 1 1 Max 3

Question Number	Question	
7.(b)(ii)	Suggest an explanation for the effect cholesterol has on the permeability of the membranes to substance A.	
	Answer	Mark
	Award up to **two** marks for following in sequence or context 1. cholesterol binds the tails of phospholipids together; 2. phospholipid layer is more rigid; 3. phospholipids more closely packed; 4. idea that substance A cannot pass through gaps created when phospholipids moving; 5. ref to some effect on polarity of membrane;	 1 1 1 1 1 Max 2

Question Number	Question	
8.(a)	Describe how each of these factors is involved in efficient gas exchange in the alveoli of a mammalian lung.	
	Answer	Mark
	Award up to **three** marks for the following in context 1. (thin wall) of {squamous/ flattened} (epithelial cells); 2. small diffusion distance; 3. ref to blood flow in capillaries; 4. ref to ventilation; 5. maintains {concentration/ diffusion} gradient of {gases/ carbon dioxide/ oxygen};	 1 1 1 1 1 Max 3

Question Number	Question	
8.(b)	Describe and explain the effect of cystic fibrosis on gas exchange.	
	Answer	Mark
	Award up to **two** marks for the following in context 1. mucus builds up in airways; 2. cilia cannot move it because it is thick/ eq; 3. reducing ventilation (below blockage); 4. gas exchange occurs over {fewer alveoli / smaller surface area};	 1 1 1 1 Max 2

Question Number	Question			
8.(c)(i)	Give the name of a female who is homozygous for the CF gene.			
	Correct Answer	Acceptable Answers	Reject	Mark
	Priya			1

Question Number	Question			
8.(c)(ii)	Give the name of a male who is heterozygous for the CF gene.			
	Correct Answer	Acceptable Answers	Reject	Mark
	Zac / Samir			1

Question Number	Question			
8.(c)(iii)	If Fiona and Samir had a third child, state the probability that this child would have cystic fibrosis.			
	Correct Answer	Acceptable Answers	Reject	Mark
	0.25;	¼ 1 in 4 25%	1:3 1 to 3	1

Question Number	Question	
8.(d)	Genetic screening can be used to identify the cystic fibrosis allele. By considering contrasting ethical viewpoints, discuss **one** reason in favour and **one** reason against genetic screening for cystic fibrosis.	
	Answer	Mark
	Award one mark for identifying a potential benefit and a further mark for an explanation of the benefit. For example 1. to determine whether or not a parent is a carrier; 2. therefore can make informed decision about having children; **or** 3. determine whether or not embryo has disease; 4. informed decisions can be made about {future care for child / termination of pregnancy} / treatment could start immediately; Award one mark for identifying a potential disadvantage and a further mark for an explanation of the disadvantage. For example 5. ref to false positives / negatives; 6. decisions on whether to terminate a pregnancy or not are based on wrong information; **or** 7. other abnormalities may be found; 8. some social implication e.g. life insurance, finding {partner / job}, depression;	4