ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme January 2002

GCE

Biology A / Human Biology

Unit BYA1

Question 1

(a)		C_{12}; $H_{22}O_{11}$;	2
(b)	(i)	Would turn lilac / purple / mauve; *Do not credit either pink or blue*	1
	(ii)	Sucrase / enzymes are proteins / have peptide bonds;	1
(c)		Benedict's and heat; Green / yellow / orange / red / brown *Do not credit unqualified references to water baths*	2
		Total	6

Question 2

(a)	**A**	Carries the (genetic) code / genetic instructions / DNA / makes mRNA / transcription / makes ribosomes;	
	B	Links amino acids / synthesises / makes protein;	
	C	Involved in modifying / packaging protein / forms glycoproteins / forms vesicles;	3
(b)	(i)	Mitochondrion; 0.01% as opposed to 0.003%; *Accept any valid approach but must be clear as to what the calculations relate*	2
	(ii)	With electron microscopes sections must be cut; Cisternae are joined to each other; Outside plane of section;	2 max
	(iii)	Protein synthesis requires energy / ATP; Mitochondria release energy / make ATP; From respiration; *Do not award credit for second point if candidate refers to mitochondria making / producing energy*	3
		Total	10

Question 3

(a) Lumen high
Cell low
Blood high; 1

(b) Surface area high
Difference in concentration high
Thickness low; 1

(c) (i) Microvilli / description give large surface area; 1
Only accept description if it refers to the membrane

(ii) Increase / maintain diffusion gradient / difference in concentration; 1

(d) Rate of diffusion increases as temperature rises;
(Molecules) have more (kinetic) energy;
Molecules move faster; 2 max
Award credit only to answers which relate to diffusion

Total 6

Question 4

(a) **A** because it has a capsule / slime layer; 1

(b)

Cell A	Cell B	Cell C
✗	✓	✗
✓	✓	✓

2

Treat blank as cross if in the absence of other crosses in table.
Hybrids between ticks and crosses should be treated as incorrect.

(c) (i) Water potential is lower / more negative;
Water enters the cell by osmosis / diffusion; 2

(ii) Plant cell wall and bacterial cell wall made of different substances; 1
Ignore incorrect references to substances in the bacterial wall

(d) Plasma membrane is thin / small;
Electron microscope has greater resolution / wavelength of electrons short; 2

Total 8

Question 5

(a)	(i)	Tidal volume;	1
	(ii)	Multiply **A** / tidal volume / volume of breath by number of breaths per minute / breathing rate; *Penalise error in (a) (i) once only*	1
(b)	(i)	Sends more impulses to… ; Diaphragm / intercostal muscles; Increases rate of inspiration / causes more frequent contraction;	
	(ii)	Sends impulses to … ; Sinoatrial node / SAN / pacemaker; Increases rate of discharge / heart rate; *Mark parts (b) (i) and (ii) out of a total of 4*	4 max
(c)	(i)	Diffusion;	1
	(ii)	Not normally present / needed; Any detected must have come from this test;	2
(d)		Longer diffusion pathway / takes longer to diffuse / slower rate of diffusion;	1
		Total	10

Question 6

(a)		One mark for line from right ventricle to lungs, arrow away from heart; One mark for line from lungs to left atrium, arrow towards heart;	2
(b)	(i)	Increased respiration; Carbon dioxide from muscles;	2
	(ii)	**B**;	1
		Total	5

Question 7

(a)	(i)	The receptor / glucagon will have a particular shape / tertiary structure; The other will fit / bind because of its shape;	2
	(ii)	Cells in other parts of the body do not have these receptors / Liver cells have these receptors;	1
(b)		Side chains / R-groups are different;	1

(c)		Tertiary structure changes / enzyme denatured / bonds broken; Will affect active site (of enzyme); Starch cannot bind / fit / form enzyme-substrate complex;	3
(d)		Keeps pH constant; So proteins / enzymes in mitochondria not denatured / affected;	2
(e)	1	Some proteins pass right through membrane;	
	2	Some proteins associated with one layer;	
	3	Involved in facilitated diffusion;	
	4	Involved in active transport;	
	5	Proteins act as carriers;	
	6	Carrier changes shape / position;	
	7	Proteins form channels / pores;	
	8	Protein allows passage of water soluble molecules / charged particles / correct named example;	6 max
		Total	15

Question 8

(a)		Pressure reaches highest value / greatest range of pressure in ventricle / description of sequence of changes;	1
(b)	(i)	Pressure in ventricle / **B** is higher than pressure in atrium / **A**;	2
	(ii)	0.2s; Time when pressure in ventricle / **B** is higher than pressure in aorta / **C**;	2
(c)	(i)	Higher;	1
	(ii)	Thicker muscle in (wall of) left ventricle;	1
(d)		1 μm;	1
(e)		1 mark – made of different tissues 2 marks – made of specified tissues illustrated with at least two examples from the table	2
(f)	1	Thick elastic layer in artery;	
	2	Evening out flow / associated with recoil;	
	3	Link between pressure in artery and ventricle contraction / systole;	
	4	Arteriole with muscular layer;	
	5	Muscle contraction results in smaller diameter / vasoconstriction;	
	6	Alters blood supply to different organs;	
	7	Endothelium provides smooth surface / limits friction;	
	8	Capillary wall thin / only endothelium;	
	9	For exchange;	6 max
		Total	15