GCE 2004
June Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Biology/Human Biology A
BYA1

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BYA 1

Question 1

(a) (i) Biuret / alkali + copper sulphate;
Lilac/purple/mauve/violet; 2

Do not give credit for blue or pink. Ignore references to heating.

(b) R group of phenylalanine copied accurately; 1

(c) (i) Bond shown linking carbon and nitrogen;
OH and H removed, =O and –H remaining; 2

(ii) Peptide bond; 1

(d) Addition of hydroxyl/OH group; 1

Candidate must distinguish clearly between hydroxylation and hydrolysis

Total 7 marks

Question 2

(a) Diaphragm (muscle) contracts;
Flattens / Increases volume of chest;
Reduced pressure allows air to enter; 3

(b) Allows comparison;
As organs differ in size;
Larger organs will need more blood; max 2

(c) 2 marks for 40.91 / 40.9 / 41
1 mark for 59.09 / 59.1 / 59 2

(d) (i) Some oxygen still in lungs (which will enter the blood) /
removal of carbon dioxide (from blood); 1

(ii) More blood available for other organs;
Supplying oxygen/glucose / removing carbon dioxide;
OR
Diaphragm muscles not contracting (as not breathing);
Will not require (as much) oxygen/glucose; 2

Total 10 marks

Question 3

(a) (i) Golgi; 1

(ii) Exocytosis; 1

(b) (i) Joining together of amino acids / synthesis/production of thyroglobulin / makes protein; 1

Do not credit synthesis of amino acids

(ii) Electron microscope has high/greater resolution;
Because it uses electrons;
Which have smaller wave(length); max 2

(c) (i) (structure) made up of similar cells; 1

(ii) (structure) made up of (different) tissues; 1

In part (c) ignore references to function

Total 7 marks

Question 4

(a) Large surface area to volume ratio;
For diffusion;
OR
Flat/thin;
So oxygen can reach all haemoglobin/centre rapidly / short pathway; max 2

(b) (i) Partially permeable / allows water through but not sucrose; 1

Accept semi-permeable / selectively permeable.

(ii) Phospholipid (in membrane)/bilayer dissolved/broken down;
Allows haemoglobin/contents to leak out; 2

(c) (i) Monocyte has a nucleus / red blood cell does not; 1

(ii) Granulocyte has lobed nucleus; 1

Reject C - Shaped

Total 7 marks

Question 5

(a)

Plant cell	Prokaryotic cell
Cellulose cell wall; mitochondria; nucleus; chloroplast; Golgi or other organelle;	Absence of cellulose cell wall; mitochondria; nucleus; chloroplast; Golgi or other organelle;
Absence of flagellum; capsule; mesosome;	Flagellum; capsule; mesosome;
Membrane-bound organelles;	No membrane-bound organelles;

Allow any pair of entries relating to structural feature. Must compare like with like. 2

(b) (i) Buckwheat; 1

(ii) Brazil nut; 1

(c) Add ethanol; *Accept meths / alcohol*
Then mix with water;
Emulsion / white colour / precipitate etc 3

Give credit for second marking point only if in correct order.

Total 7 marks

Question 6

(a) More (kinetic) energy;
Molecules are moving faster; 2

Ignore references to collisions

(b)

Feature	Efficient absorption of digested food from the small intestine	Reducing water loss from a leaf
Surface area	maximum	minimum
Difference in concentration	maximum	minimum
Thickness of exchange surface	minimum	maximum

Mark for each correct column, one mark each. 2

(c) (i) Greater the concentration difference/gradient, faster rate of entry/diffusion; 1

(ii) Curve flattens out;
Channel/carrier proteins / carriers;
Become limiting; max 2

Total 7 marks

Question 7

(a) (i) Hydrolysis; 1

(ii) Water enters fungus (by osmosis);
Increases pressure inside fungus;
Cell wall no longer strong enough/present so cannot withstand this; max 2

(iii) Cell wall (of plant) not made of chitin/made of cellulose;
Enzyme is specific to chitin / will not break down cellulose; 1

(b) Way in which the whole protein/polypeptide is folded / shape adopted by whole protein molecule / further folding of 2° structure; 1

Do not credit unqualified reference to three-dimensional shape.
Reject third level /third sort.

(c) (i) More (kinetic) energy;
Bonds/specified bonds (holding tertiary structure) break; 2

(ii) Change amino acids;
Allowing formation of more hydrogen bonds/disulphide bridges; 2

(d) 1 Sequence of amino acids gives shape;
2 This is tertiary structure;
3 Has similar shape to substrate;
4 Fits / competes for active site;
5 Fits at site other than active site;
6 Distorting active site;
7 Therefore substrate will not fit (active site); max 6

Total 15 Marks

Question 8

(a)	(i)	Pattern described as constant / decrease to 04.00 / 06.00 then rising;	1
	(ii)	Corresponds to ventricles contracting / systole;	1
	(iii)	Less / little difference between maximum and minimum / less variation / constant / not pulsed / smoother; pressure in vein lower	2
(b)	(i)	The larger the molecule, the less permeable; Over 68 000 walls not permeable;	2
	(ii)	Plasma proteins / albumin and globulin too large to leave capillary; Water lost / Increase in concentration of proteins in blood / plasma;	2
	(iii)	Haemoglobin in red blood cells/ Haemoglobin too large to pass through membrane of RBC/ Red blood cells (containing haemoglobin) too large to pass through wall;	1
(c)		1 myogenic / beats spontaneously / does not require nerve impulse; 2 SAN sends wave of electrical activity / impulse; 3 over atria; 4 rate of beating slowed by parasympathetic / vagus; 5 rate of beating increased by sympathetic / (cardiac) accelerator; 6 delay at / slow conduction through AVN; 7 wave of electrical activity passes down bundle of His / through Purkyne tissue; 8 allows blood to empty into ventricles / atria to empty; 9 before ventricles contract	6

Total 15 marks