AQA

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme
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GCE

Biology A/ Human Biology

Unit BYA1

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Question 1

(a) (i) Heat with (Benedict's) reagent;
Stays blue / does not go green/yellow/red etc. / no colour change; 2
Reject unqualified references to water baths.

(ii) Hydrolyse/heat with acid;
Neutralise/add hydrogencarbonate/named alkali;
Goes green/yellow/red etc; 3

(b) (i) Ink will dissolve in solvent/will obscure spots (as it rises)/ink will run;
(*Look for principle of interfering with chromatogram*) 1

(ii) Repeated placing of drops;
Allowing to dry between applications; 2

(c) $\frac{C}{B + C}$; 1

Total 9 marks

Question 2

(a)

	glucose	sodium ions	haemoglobin
Tissue fluid	✓	✓	x;
Blood plasma	✓	✓	x;

Mark for each correct row 2

(b) Hydrostatic pressure higher than osmotic "effect";
Forces/squeezes/pushes out;
Water/small molecules/ions/examples; max 2

(c) (i) Diffusion; 1

(ii) Equation given correctly;
Link established between respiration and use of oxygen;
Greater concentration gradient/difference in concentration (of oxygen);
Greater rate of diffusion (into cell); max 3

Total 8 marks

Question 3

(a)		Caused by blood leaving the heart/entering artery; As a result of ventricles contracting/systole;	2
(b)		Stretch as pressure increases; Recoil/spring back as pressure drops; *Do not accept contract and relax in this context.* *Allow 1 mark for 'stretch and recoil' without reference to pressure.*	2
(c)		Both have an endothelium/epithelium/squamous cells;	1

Total 5 marks

Question 4

(a)		Contain different/more than one tissue/type of cell;	1
(b)		0.8 (s)	1
(c)		0.4 (s) as events in right ventricle same as in left;	1
(d)	(i)	0 - 0.1/0.4 - 0.9 because the volume increasing/ventricle filling/blood entering;	1
	(ii)	from 0.9/0.1 – 0.4 because volume decreasing/ventricle emptying/blood leaving; *In part (d) accept any two figures from within the range.*	1
(e)		Correct answer of 15.75/15.8/16 = 2 marks Incorrect answer but clear understanding that 45cm^3 is 100% = 1 mark	2

Total 7 marks

Question 5

(a) Epithelium of alveolus, capillary wall/epithelium/endothelium, plasma; 1

(b) Cell wall;
Capsule;
Flagellum;
Mesosomes;
Plasmid;
Genetic material/DNA/nucleoid;
Ribosomes;
Accept references to size only if some idea of range is given
max 2

(c) Large (surface) area;
For diffusion;
or
Short distance to centre of cell/to all haemoglobin;
For diffusion; 2

(d) (i) Correct answer of approximately 7800/8000 = 2 marks
Incorrect answer but clearly derived by dividing diameter of cell A by 7 = 1 mark 2

(ii) Idea of cut through maximum diameter/middle; 1

Total 8 marks

Question 6

(a) Immediate/rapid increase, steady rise and plateau clearly identified; 1
Ignore references to rest period if clearly identified as such

(b) Find value of pulmonary ventilation from graph / 26-28;
Divide by breathing rate/20; 2

(c) More impulses along phrenic nerve to;
intercostal muscles/diaphragm;
Greater rate of contraction / more contractions / more inspirations / faster contraction; 3

(d) Air is from nose/trachea/bronchi/not been in alveoli/dead space;
Gas exchange/diffusion only in alveoli / not in these structures; 2

Total 8 marks

Question 7

(a) (i) 31/31.2; 1

(ii) Ratio would be less/smaller;
Cell is thin / has large surface area / (adapted) for diffusion; 2
Accept converse. Must relate to concept of ratio.

(b) (i) 6; 1

(ii) 11; 1

(c) Water potential inside vesicle more negative/lower;
Water moves into vesicle by osmosis/diffusion; 2

(d) Mitochondria supply energy/ATP;
For active transport / absorption against concentration gradient / synthesis / anabolism / exocytosis / pinocytosis; 2
Do not credit references to making, creating or producing energy.

(e)
1 Phospholipids forming bilayer/two layers;
2 Details of arrangement with "heads" on the outside;
3 Two types of protein specified;
e.g. passing right through or confined to one layer /
extrinsic or intrinsic /
channel proteins and carrier proteins /
two functional types
4 Reference to other molecule e.g. cholesterol or glycoprotein;
5 Substances move down concentration gradient/from high to low concentration;
Reject references to across or along a gradient
6 Water/ions through channel proteins/pores;
7 Small/lipid soluble molecules/examples pass between phospholipids/ through phospholipid layer;
8 Carrier proteins involved with facilitated diffusion;
Ignore references to active transport.
Credit information in diagrams. max 6

Total 15 Marks

Question 8

(a) (i) Curve rising and levelling out; 1

(ii) Substrate becomes limiting/falls/gets less;
Fewer collisions/complexes formed; 2

(b) To keep pH the same / optimum pH / so change in pH does not affect reaction; 1

(c) (i) For temperature up to 40 – 50°C has no effect;
Over temperature (of 40 – 50° C) reduces rate of reaction; 2
Note. Award one mark for general statement about the longer the incubation time, the slower the rate of reaction.

(ii) Bonds (holding tertiary structure) broken;
More enzyme denatured / tertiary structure destroyed;
Active sites lose shape/no longer fit;
Fewer enzyme-substrate complexes formed; max 3
Note. Award marks if clearly in the context of more denaturation.
Allow credit here for converse relating to exposure for 5 minutes.

(d) 1 Statement about two types, competitive and non-competitive;
Note. Award points 2 –5 only in context of competitive and non-competitive inhibition
<u>Competitive</u>
2 Similarity of shape of inhibitor and substrate;
3 Inhibitor can enter/bind with active site (of enzyme);

<u>Non-competitive</u>
4 Affect/bind to enzyme other than at active site;
5 Distorts shape of active site;

<u>Inhibitors</u>
6 Prevent entry of/binding of substrate to active site;
7 Therefore fewer/no enzyme-substrate complexes formed; max 6

Total 15 marks