



## **General Certificate of Education**

# **Biology 5416**

## *Specification B*

**BYB1      Core Principles**

# **Mark Scheme**

*2007 examination - January series*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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**Question 1**

(a)

	Sucrose	Maltose	Glycogen	Cellulose
made only from glucose molecules joined together	X	✓	✓	✓
branched molecule	X	X	✓	X
soluble in water	✓	✓	X	X

3

*(each correct line 1 mark)**(blank spaces = X);*

(b) Test for reducing sugar / Benedict's test is negative;

Boil/heat with acid and neutralise / use NaOH / use alkali;

*OR*

Use enzyme hydrolysis;

Yellow/orange/red/brown/green ppt with Benedict's solution;

*(award third point only if ref. to acid/enzyme/hydrolysis earlier)*

3

**Total 6****Question 2**

(a) Idea of uptake against a concentration gradient;

1

(b) Reference to carriers;

No further increase (in rate) when all proteins / carriers in use / carriers saturated / carriers limiting;

*(reject carriers used up)*

2

(c) Rate of respiration increases;

So more ATP produced / energy released (for active uptake);

More chance of collision with carriers (due to higher kinetic energy);

2 max

**Total 7**

**Question 3**

- (a) No net movement of water / no osmosis / no osmotic effects;  
Prevent organelles / named organelle changing shape / bursting;  
*(reject cells and cell components)* 2
- (b) (i) 1 Cell walls  
2 Nuclei  
4 Mitochondria  
5 Ribosomes;  
*(any 3 in correct order = 1 mark)*  
*(allow number if correctly corresponding to named part)* 2
- (ii) (Cell) walls; 1
- (iii) Ribosomes; 1
- (c) Reference to:  
Cristae/folded inner membrane/detail of structure;  
Starch grains;  
Grana/detail of structure;  
*(use list rules for marking)*  
*(shape neutral)*  
*(allow labelled diagrams)* 2 max

**Total 8****Question 4**

- (a) (i) Condensation; 1
- (ii) Box drawn around appropriate OH and H; 1
- (iii) Peptide; 1
- (b) (i) Hydrogen/ionic; 1
- (ii) Cysteine;  
Contains sulphur;  
Required to form disulphide bonds / sulphide bridges / (S-S bonds);  
Bonds are strong / bonds are covalent (not broken by heat treatment);  
*(if not cysteine, then max 1)* 2 max

**Total 7**

**Question 5**

- (a) As size increases the ratio (of surface area to volume) decreases; 1
- (b) (i) As body mass increases / gets heavier, oxygen uptake ( $\text{kg}^{-1}$ ) decreases  
OR  
As body mass increases / gets heavier, total oxygen uptake increases; 1 max
- Heat production related to body mass / number of cells / volume;  
Heat loss from skin / body surface;  
Smaller animals lose heat faster / more heat (per kg);  
Higher oxygen intake enables more / higher (rate of) respiration; 3 max
- (ii) Allows comparison (between different animals);  
(Rate of) respiration varies if animal is not at rest / animal moving; 2
- Total 7**

**Question 6**

- (a) Increase in rate of reaction:  
  
As more collisions between enzyme and substrate / more enzyme –substrate complexes form / substrate (concentration) limits rate of reaction;  
  
No further change in rate:  
  
As all active sites occupied / saturated / enzyme limiting rate of reaction; 2  
(*reject enzymes used up*)
- (b) (*ignore competitive / non-competitive inhibitor*)  
  
Inhibitor attaches to enzyme;  
Changes (shape of) enzyme / active site / 3D structure / tertiary structure or fewer active sites available;  
Substrate no longer able to bind / less chance of binding / less E-S complexes formed;  
  
Graph shows effect is not removed by excess substrate; 4
- (c) Urease (enzyme) / inhibitor concentration / volume / amount;  
If number of active sites / enzymes changes, rate of reaction / number of collisions / number of E-S complexes formed will change; 2
- Total 7**

**Question 7**

- (a) Double bonds / not all carbons carrying maximum number of hydrogen atoms;  
In hydrocarbon chain / between carbon atoms / in the R group; 2  
(C=C is 2 marks)
- (b) 1 Bipolar / hydrophobic and hydrophilic (nature of molecule);  
2 (Forms) bilayer;  
3 Reason for orientation e.g. hydrophobic tail repelled by water / hydrophilic head attracted by water;  
4 Allows movement of lipid soluble / non-polar molecules / water / gases / e.g. O<sub>2</sub> and CO<sub>2</sub>
- OR
- 5 Prevents movement of water soluble / (named) polar molecules;  
Allows membranes to fuse with other membranes / able to form vesicles / exocytosis and endocytosis;  
6 Unsaturated fatty acids increase fluidity / flexibility / permeability;  
7 Allows compartmentalisation / allows cells to maintain different concentrations of molecules on either side of the membrane; 4 max  
(accept marks from labelled diagram)
- (c) 1 Bile emulsifies (triglycerides) / large droplets to smaller droplets;  
2 (Smaller droplets) provide large surface area / faster digestion;  
3 Lipase (breaks down triglycerides);  
4 Into fatty acids and glycerol / monoglycerides;  
5 By hydrolysis;  
6 Diffusion (facilitated diffusion and active transport neutral);  
(reject "food" or wrong named molecule)  
7 Recombination (in epithelial cells);  
8 Chylomicrons formed / lipid coated by proteins;  
9 (Move into) lymph vessels / lacteals;  
10 Fatty acids / glycerol move into blood (capillaries); 6 max

**Total 12****QWC 1**