



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Biology 5416

Specification B

BYB1 Core Principles

Mark Scheme

2006 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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

General Guidance for the Mark Scheme

The following conventions are used in the mark scheme:

- A semicolon (;) separates each mark point
- An oblique stroke (/) separates alternatives within a mark point
- Underlining of a word or phrase means that the term must be used by candidates
- Brackets are used to indicate contexts for which a mark point is valid, but which may just be implied by a candidate's answer
- '*Accept*' and '*reject*' show answers which should be allowed or not allowed.
- Additional instructions may be shown in *italics*

The scheme shows the minimum acceptable answer(s) for each mark point - better, more detailed, or more advanced answers are always accepted, provided that they cover the same key ideas. Occasionally, a candidate will give a biologically correct answer that has not come up at standardising. If it is equivalent in standard to the mark scheme answers, it may be credited.

In some cases a mark may be awarded for understanding of a general principle, even though the detailed mark points on the scheme have not been made. This will be indicated on the mark scheme.

All mark points are awarded independently, unless a link between points is specified in the scheme.

Converse answers are normally acceptable, unless the wording of the question rules this out.

Disqualifiers

A correct point is disqualified when the candidate contradicts it in the same answer.

The list rule

When a question asks for a specific number of points, and the candidate gives more, any wrong answer cancels a correct answer. For example, if a question asks for two points and three answers are given, two correct and one clearly wrong, the mark awarded is one, whatever the order of the answers.

Valid points from **diagrams** are credited, if they are not duplicated in the text.

Where a question asks for **differences** between X and Y, the mark may be awarded for a feature of X without the converse for Y, if it is absolutely clear which is being referred to.

BYB1**Question 1**

- (a) glucose; 1
(*reject alpha glucose*)
- (b) hydrolysis; 1
(*accept catabolic*)
- (c) (long) straight/unbranched chains; 3
(*idea of more than 1) chains lie side by side / form (micro)fibrils;*
idea of H bonds holding chains together;
- Total 5**

Question 2

- (a) 16 gains 2 marks; 2
(*accept 15.5 – 16.5*)
(*principal of calculation i.e. measured distance (31-33mm/3.1-3.3cm) gains 1 mark*)
Mag
- (b) relevant adaptation; and explanation for second mark; e.g.

idea of many chloroplasts / lots of chlorophyll;
to trap or absorb light (energy);

elongated cells;
idea of maximum light absorption / light penetration;

chloroplasts move;
to trap or absorb light (energy);

range of pigments;
can absorb a range of wavelengths / colours / for max light absorption;

large S.A. or cell wall feature e.g. thin / permeable;
for (rapid) CO₂ absorption; 2
- (c) water would move from **B** to **A** and **B** to **C** (ignore C to A);
movement is from high / less negative water potential (Ψ) to a low /
more negative water potential (Ψ); 2
- Total 6**

Question 3

- (a) (i) **D** plasmid / ribosome(s) / cytoplasm / storage granules;
(accept any sensible structure)
- E** (slime / mucous) capsule
- OR*
- slime / mucous layer; 2
- (ii) protection / maintain shape / prevent lysis / strength / support; 1
- (b) two of the following:
nucleus;
- OR*
- nuclear envelope / mitochondria / chloroplasts / sER / rER /
golgi apparatus / 80s ribosomes
linear DNA / chromosomes / lysosomes / vacuole / vesicles / cellulose cell wall; 2 max
- (c) (i) starch digested / broken down;
by amylase / carbohydrase; 2
- (ii) any sensible suggestion e.g. no secretion of amylase / functional amylase /
piece of fungus might have died; 1
(accept carbohydrase / enzyme for amylase)
(reject "no digestion" without qualification)

Total 8

Question 4

- (a) ONE correct function;
and explanation; e.g.
- emulsifies fats / described;
increases surface area for lipase / faster rate of digestion by lipase;
- OR*
- bile (is alkaline) neutralises acidic material / chyme from the stomach;
provides optimum pH for (digestive) enzymes; 2
- (b) (i) cold - no / reduced enzyme action / e.g. stops autolysis;
(reject "cell activity reduced")
isotonic – stops osmotic effects / description of effect on cells or organelles;
buffer – prevents damage to enzymes / proteins; 3

-
- | | | |
|-------|--|----------------|
| (ii) | break open <u>the cells</u> / release <u>the cell contents</u> ; | 1 |
| (iii) | supernatant / liquid above the pellet;
spun at a high(er) speed;
<i>(mark as independent points)</i> | 2 |
| | | Total 8 |

Question 5

- | | | |
|-----|---|----------------|
| (a) | pancreas / small intestine labelled; | 1 |
| (b) | name of technique e.g. chromatography / electrophoresis;
method e.g. solvent and medium (chromatography)

<i>OR</i>

medium and charge (electrophoresis)

<i>OR</i>

amino acids separated according to property e.g. size / charge / solubility / adsorption;

identification e.g. Compare against known amino acids or Rf values calculated; | 3 |
| (c) | (i) active sites <u>contain substrate</u> / <u>ethylene glycol</u> ;
all active sites occupied / enzyme is limiting;
<i>(reject idea of active sites used up)</i> | 2 |
| | (ii) Ethanol is a similar <u>shape</u> to the substrate (ethylene glycol) /
complementary to active site;
<i>(reject "same shape")</i>
ethanol is a <u>competitive</u> inhibitor / reduces enzyme-substrate complexes /
prevents <u>substrate</u> (ethylene glycol) entering the active site;
<i>(reject "decreases rate of reaction")</i> | 2 |
| | | Total 8 |

Question 6

- | | | |
|-----|---|---|
| (a) | (i) <u>one</u> feature;
<u>then linked</u> Explanation;

(many) filaments / lamellae / secondary lamellae;
so large surface area;

large number of capillaries; (NOT "good blood supply")
maintains a diffusion gradient / removes oxygen;

thin epithelium / lamellae wall;
short diffusion pathway; | 2 |
|-----|---|---|
-

- (ii) maintains diffusion / concentration gradient / equilibrium not reached;
diffusion occurs across whole length (of lamellae / gill); 2
- (b) fish closes mouth and raises the floor of the mouth;
this decreases the volume / increases the pressure (of mouth);
Increased volume / decreased pressure of opercular cavity;
water forced over the gills;
operculum / opercular valve opens; 3 max
- (c) less energy needed / continuous flow of water or O₂; 1

Total 8

Question 7

- (a) feature and adaption; for example
1. phospholipid bilayer (as a barrier);
 2. forms a barrier to water soluble / charged substances / allows non-polar substances to pass
- OR*
3. maintains a different environment on each side / compartmentalisation;
bilayer is fluid;
 4. can bend to take up different shapes for phagocytosis / form vesicles / self repair;
 5. channel proteins (through the bilayer)/intrinsic protein;
 6. let water soluble/charged substances through / facilitated diffusion;
 7. carrier proteins (through the bilayer);
 8. allow facilitated diffusion / active transport;
 9. surface proteins / extrinsic proteins, glycoproteins / glycolipids;
 10. cell recognition / act as antigens / receptors;
 11. cholesterol;
 12. regulates fluidity / increases stability; 6 max

principle mark (only for 5, 6, 7, 8)

proteins transport material across the membrane 1 max

3 features max

- (b) curve description:
- 1 Curve goes down when the poison is added and rises when ATP added; 1
- explanation:
- 2 Ion movement is by active transport;
 - 3 ATP / energy needed for active transport;
 - 4 respiration provides ATP / energy;
 - 5 poison inhibits/stops respiration / ATP production; 3 max

Total 11
QWC 1