



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# General Certificate of Education

## Biology 5416/6416 *Specification B*

*Environment BYB5/W*

## Mark Scheme

2005 examination – June 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.

Further copies of this Mark Scheme are available to download from the AQA website:  
[www.aqa.ork.uk](http://www.aqa.ork.uk)

Copyright © AQA 2005 and its licensors. All rights reserved.

#### COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334. Registered address AQA, Devas Street, Manchester. M15 6EX.  
*Dr Michael Cresswell Director General*

---

## 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.

---

## **Guidance on the award of the marks for Quality of Written Communication on Section B of Unit Tests**

Quality of Written Communication assessment requires candidates to:

- select and use a form and style of writing appropriate to purpose and complex subject matter;
- organise relevant information clearly and coherently, using specialist vocabulary when appropriate; and
- ensure text is legible, and spelling, grammar and punctuation are accurate, so that meaning is clear.

For a candidate to be awarded 1 mark for quality of written communication on Section B in a unit test, the minimum acceptable standard of performance should be:

- the longer parts (worth 4 marks or more) should be structured in a reasonably logical way, appropriate and relevant to the question asked;
- ideas and concepts should be explained sufficiently clearly to be readily understood. Continuous prose should be used and sentences should be generally be complete and constructed grammatically. However, minor errors of punctuation or style should not disqualify;
- appropriate AS/A level terminology should be used. Candidates should not use such phrases as ‘fighting disease’, ‘messages passing along nerves’, ‘enzymes being killed’ etc, but a single lapse would not necessarily disqualify. Technical terms should be spelled correctly, especially where confusion might occur, e.g. mitosis/meiosis, glycogen/glucagon.

The Quality of Written Communication mark is intended as a recognition of competence in written English. Award of the mark should be based on overall impression of performance on Section B. Perfection is not required, and typical slips resulting from exam pressure such as ‘of’ for ‘off’ should not be penalised. Good performance in one area may outweigh poorer performance in another. Care should be taken not to disqualify candidates whose lack of knowledge relating to certain parts of a question hampers their ability to write a clear and coherent answer; in such cases positive achievement on other questions might still be creditworthy. No allowance should be made in the award of this mark for candidates who appear to suffer from dyslexia or for whom English is a second language. Other procedures will be used by the Board for such candidates.

Examiners should record 1 or 0 at the end of Section B in the Quality of Written Communication lozenge. This mark should then be transferred to the designated box on the cover of the script.

**BYB5/W****Question 1**

- (a) (i) true indication of growth / water mass may vary; 1
- (ii) intraspecific; 1
- (iii) the denser the planting the greater the yield;  
above a planting density of approx 30 competition for named resource /  
named limiting factor/ population density not limiting; 2  
(*accept nutrients/space reject food*)
- (b) use genetically identical plants / clones/ asexual reproduction/ tissue culture;  
maintain identical environmental conditions/named condition;  
reference to density of planting; 2 max

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

- (a) transmission / reflected / misses chlorophyll/chloroplasts / wrong wavelength; 1
- (b) the energy is transferred to / absorbed by / incorporated into decomposers /  
named decomposer;  
stored in / used in growth of decomposers;  
respiration (of decomposers);  
released as heat;  
*or*  
energy stored in fossil fuels;  
combustion;  
released as heat; 3 max
- (c) (larger area) to absorb light;  
(larger surface area) to absorb carbon dioxide;  
short diffusion pathway for gases/ oxygen/CO<sub>2</sub>;  
light able to penetrate to all cells; 2 max
- (d) effect;  
detail;  
effect on photosynthesis; 3
- some effects are  
less light /light absorbed by water  
different wavelength of light  
temperature  
availability of carbon dioxide  
availability of water  
(*more than one effect award 1 mark only*)

**Total 9**

**Question 3**

- (a) (i) ammonia/ammonium ions/compound; 1
- (ii) glucose; 1
- (b) final acceptor for hydrogen:  
to form water; 2
- (c) glycolysis;  
can continue;  
NAD can accept more hydrogen; 2 max
- (d) secondary / tertiary structure;  
produces particular shape of active site;
- or*
- (shape of) active site;  
complementary to shape of substrate; 2
- (e) sodium ions/ non-competitive inhibitor binds to enzyme  
at a site other than active site;  
resulting in change of shape of active site/no longer complementary;  
substrate can no longer bind with the enzyme /  
enzyme-substrate complexes no longer formed; 3
- Total 11**

**Question 4**

- (a) source of pests/animals, and effect on crop;  
source of weeds/no longer taking nutrients, hence competition/reduced yield;  
creation of larger fields/leaving room, hence more efficient use of machinery/  
grow more crops;  
hedgerows have to be maintained, so removal saves time/money; 2 max
- (b) allows beetles to remain/survive/over winter in the middle of the field/strip of  
grass;  
effect on distribution,  
e.g. do not normally reach the centre of the field / can reach all parts; 2
- (c) increases biodiversity;  
source of food for animals;  
habitat/nest for animals;  
reduce need for insecticides/attracts insects away from crop;  
windbreaks/prevent erosion/run-off/leaching;  
migratory corridors; 2 max

- (d) insects with certain colours more visible;  
 beetles eat more black insects;  
 black insects breed less frequently;  
 do not pass on (black) alleles;  
 frequency of (black) alleles fall; 4 max

**Total 10**

**Question 5**

- (a) eggs / larvae / weeds left in soil;  
 lots of / plentiful supply of the same food source for pest;  
 rapid growth/reproduction of pest/more pests;  
 need to re-apply pesticides/use different pesticides / resistance to pesticides;  
 hence lower yield / more of crop affected; 3 max
- (b) (i) resistant allele is recessive;  
 parents must both be heterozygous/carriers;  
 produce an offspring which is homozygous recessive; 3  
*(accept these points if clearly shown in a genetic diagram)*  
*(accept mutation causes resistance to become dominant (in the gamete)*  
*for 1 mark)*
- (ii) bioaccumulation/biomagnification;  
 higher dose to have the same effect / develop tolerance;  
 kill natural enemies/predators of pest;  
 kill (beneficial) organisms (not a predator) / named;  
 hazard to user / enters water/food chain;  
 residue left on crop; 2 max

**Total 8**

**Question 6**

- (a) (i) transect line may not go through representative areas /may avoid certain areas; 1
- (ii) large sample;  
 how random coordinates are generated / how random places chosen; 2
- (b) (i) spread of values around the mean height of the plant; 1
- (ii) smaller plants at higher altitude;  
 greater the altitude the lower the standard deviation ;  
 reference to figures to make a comparison; 2 max
- (iii) the plants measured were grown under uniform conditions; 1

- (c)
1. shallow roots to collect water that is on the surface;
  2. deep roots to collect water lower down;
  3. number of leaves reduced / shape of leaf (needle/spine)/rolled leaf/fewer stomata reduces transpiration/evaporation/water loss;
  4. thicker cuticle reduces transpiration/water loss;
  5. sunken stomata reduce transpiration/water potential gradient/water loss;
  6. succulents have water storage tissue;
  7. hairy leaves reduce transpiration/water potential gradient/water loss;
- 4 max

**Total 11**

**Question 7**

- (a)
- (i) excessive use of fertilisers;  
run-off /leaching;
- 2 max
- (ii)
1. growth of algae/plants stimulated/increased;
  2. death of algae/plants;
  3. more bacteria/decomposers/decomposition;
  4. respiration;
  5. decomposers/bacteria remove oxygen;
  6. animals die (because of lack of oxygen);
- 5 max
- (b) no membrane-bound organelles/named example;  
circular DNA;  
plasmids;  
cell wall made of murein /peptidoglycan/ capsule;  
flagella;  
mesosomes;  
smaller /70S ribosomes;  
size – qualified;
- 3 max

**Total 10**

**QWC 1**