

## General Certificate of Education

# Biology 6416

## *Specification B*

*BYB5/W The Environment*

# 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.

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

- (a) decomposers/detritus feeders/saprotrophs/saprotrophic bacteria or fungi; 1
- (b)  $\text{kJm}^{-2} \text{ year}^{-1}$ ; 2  
 (allow  $\text{m}^{-3}$ )  
 (two correct units gains 1 mark)  
 (all three correct gains 2 marks)
- (c) light reflected;  
 light misses chlorophyll/chloroplast/transmission through leaf;  
 wrong wavelength;  
 respiration (by primary producer);  
 inefficiency of photosynthesis; 3 max

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

- (a) accumulation of insecticide within individual/tissue;  
 peregrines eat large numbers of birds;  
 biomagnification/high concentration of insecticide kills peregrine;
- OR*
- seed-eating birds eat large numbers of seeds;  
 biomagnification/high concentration of insecticide in seed-eating birds  
 kills them;  
 no/less food for peregrine; 3 max
- (b) kills only those insects which eat seed/specific in action/named  
 environmental effect e.g. reduced leaching/spray drift/more efficient delivery; 1
- (c) acetylcholine not broken down;  
 specified effect e.g. continuous impulses/tetanus/muscle spasms;  
 how effect would cause death e.g. lack of breathing/specific effects on  
 nervous system (in correct context); 3

**Total 7**

**Question 3**

- (a) species present change the habitat/named change;  
other species able to colonise;  
new species better competitors; 3 max
- (b) D - as more species present;  
more complex food webs;  
change in one species will have little effect on others;  
as alternative food sources; 2 max
- (c) sand drains easily/low water retention;  
(sunken stomata) reduce transpiration;  
as pocket of saturated air trapped near stomatal pore;  
this reduces diffusion/water potential gradient; 3 max
- (d) series of changes over a distance;  
gradient of environmental factor/named environmental factor/cline present;  
ensures sampling of each community; 1 max

**Total 9**

**Question 4**

- (a) use of random numbers to place quadrats;  
number of individuals counted in large number of quadrats;  
little variation random, large variation - clustered; 3
- (b) new plants grow attached to parent; 1
- (c) less competition;  
for water/nutrients; 2

**Total 6**

**Question 5**

- (a) lower enzyme activity;  
decrease in rate of photosynthesis;  
less carbohydrate formed/named carbohydrate;  
lower respiration;  
lower rate of nutrient uptake;  
lower rate of protein synthesis;  
lower rate of cell division;  
damage by frost;  
lower translocation of sucrose/ to growing point; 4 max
- (b) (i) differ in height when plants from different altitudes grown in same environment; 1
- (ii) plants from 1500/3000m differ in height when grown at different altitudes; 1

**Total 6**

**Question 6**

- (a) zooplankton nearer surface at night;  
algae only found at surface;  
photosynthetic;  
no/little light below 30/40m; 3
- (b) (i) with increasing time predators have been present in the lake, the  
greater the depth at which the zooplankton occur during the day; 1
- (ii) variation in migration behaviour;  
vertical migration reduces chance of predation/prey can't be seen in  
low light intensity;  
those that migrated more likely to reproduce;  
genes/alleles (for behaviour) passed to next generation;  
increase in frequency of gene/allele in population; 3 max

**Total 7****Question 7**

- (a) more proteins/amino acids;  
more DNA/nucleotides/nucleotide derivative;  
increased cell division/number of cells formed; 2 max
- (b) reduced light/shading;  
less photosynthesis; 2
- (c) 1. bacteria/fungi feed on dead matter saprobially;  
2. bacteria/fungi/microorganisms multiply;  
3. respiration uses up oxygen;  
4. converts proteins to amino acids;  
5. then to ammonium compounds;  
6. nitrifying bacteria;  
7. convert ammonium compounds;  
8. via nitrates;  
9. (nitrification) uses oxygen; 6 max
- (d) lower species diversity/number of species;  
species tolerant to low oxygen thrive/species requiring high oxygen die out; 2

**Total 12**

**Question 8**

- (a) 1. shore crab rapidly colonises/rapid growth;  
2. ability to live different environments;  
3. no natural predators;  
4. will have similar/overlapping niche with native species/ valid example;  
5. shore crab better competitor/more aggressive;  
6. decreased population of prey species;  
7. other food implications/change in species diversity;  
8. ecosystem less stable;  
9. shore crab may be carrier of disease; 5 max
- (b) between A and B water potential of blood rises as water potential of blood rises as water potential of surrounding water rises, after B rise in water potential less rapid/at C no further change occurs; 1
- (c) No – as blood is isotonic with surrounding water/blood and surrounding water have same water potential; 1
- (d) (i) water potential of blood maintained;  
so (blood) cells not destroyed (by osmosis);  
  
*OR*  
  
replaces ions/salts lost diffusion;  
ions/salts required for named metabolic process; 2
- (ii) rate of respiration decreases;  
less ATP made;  
insufficient to maintain water potential of blood when in estuary;  
isotonic in sea so no need to transport salts;  
  
*OR*  
  
sea temperature higher than river;  
higher metabolic rate/higher enzyme activity;  
advantage of this crab e.g. still able to escape from predators; 3 max

**Total 12**

**QWC 1**