



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Biology 5416/6416 *Specification B*

Applied Ecology BYB6/A

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.

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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.

BYB6/A**Question 1**

- (a) two reasonable effects, explained, e.g.:
poisons organisms/named example;
covers animals/plants, which deprives them of oxygen;
sticks to gills, which deprives them of oxygen/
prevents filter feeding;
covers seaweeds/plants, so no photosynthesis;
(reject references to sea birds) 2 max
- (b) (i) petrol, because lowest concentration causing death; 1
- (ii) variation in response (of prawns);
(so,) idea of average sensitivity;
high enough concentration of any oil will kill 100%;
50% figure allows discrimination between oils; 2

Total 5**Question 2**

- (a) to maintain diversity;
to maintain organisms' habitats/ecosystem; 2
- (b) (i) exponential relationship/described;
smaller the area, greater the rate of extinction; 2
- (ii) one reason, explained, e.g. :
smaller areas are/have (many) fewer species/number of individuals and
thus smaller/less stable communities;
greater chance of competition;
human impacts more damaging;
diseases spread more easily;
greater impact of new diseases/predators;
smaller number of sites meeting niche of species; 1 max

Total 5**Question 3**

- (a) populations of different species;
living in the same environment/habitat;
(often) named after dominant plant/example; 2 max
(one mark for principle: all the species living in the same place)

- (b) more species/diversity (in the field);
more niches/habitats;
more feeding opportunities (range of types available); 3
- (c) one method named, e.g.:
mark, release, recapture;
sweep netting/kick sample;
pitfall traps;
light trap; 1 max
- Total 6**

Question 4

- (a) two ways, with explanation, e.g.:
mesh size, so only large fish caught;
quotas, so total catch limited/MSY/TAC;
close seasons, so breeding fish not caught;
exclusion zones, so breeding grounds protected;
net size, because of volume/area fished;
boat size/fishing effort, because of total catch/range; 2 max
- (b) one reason, e.g.:
reduced fishing efforts/explained;
high rates of growth/example of how achieved; 1 max
- (c) see if offspring are fertile;
if so, same species;
- or*
- DNA sequencing of hybrid and possible parent species/strains DNA;
if hybrid from two species, then two sets of very different DNA sequences/
from strains, then very similar DNA sequences; 2
- (d) (i) disease spread from farm to wild fish;
(because) very similar base sequences suggest virus from same source/
very closely related; 2
- (ii) mutation/described; 1

Total 8

Question 5

- (a) moves to 40°C side, then later to 20°C;
gets lighter in hot side and darker in cool side;
lighter as it absorbs heat/darker as it loses heat;
by conduction/convection/radiation; 3 max
- (b) lizard finds favourable environment;
(helps it to) maintain constant body temperature;
advantage of this, e.g. for enzyme activity; 2 max
- (c) receptors in blood vessels/skin;
nerve impulses produced;
go to coordinator/brain/hypothalamus;
motor neurones send nerve impulses;
to effectors/muscles; 3 max

Total 8**Question 6**

- (a) no leaves, so reduced area for water loss/evaporation/transpiration;
(shiny, indicates) waxy cuticle/covering, to reduce evaporation;
shiny surface to reflect light and reduce heating;
swollen stems, store water; 2 max
- (b) cell has lower water potential than external medium;
so, water enters by osmosis; 2
- (c) (i) active transport;
by specific carrier proteins/pumps; 2
- (ii) sodium ions transported more into vacuole (than to
outside);
because more sodium carrier proteins/pumps in
vacuole membrane;
- or*
- vacuole membrane less permeable to sodium ions/allows slower
sodium ion diffusion (back out);
membrane has fewer sodium channels; 2 max

Total 8

Question 7

- (a) chemical controls initial surges in pest numbers / less chemicals used; 2
 biological gives longer term control of pests;
(accept biological controls pests resistant to chemical);

- (b) (i) normal virus reduces area eaten by 40cm²
 genetically engineered reduces by 64 cm²
 $64 - 40 = 24$
 $\frac{24}{40} \times 100 = 60\%$ more effective
 40
 1 mark for principle of calculation;
 60% more effective = 2 marks;

OR

- $\frac{64}{40} = 1.6$ times more effective
 40
 1 mark for principle of calculation;
 1.6 times more effective = 2 marks; 2
(if only difference in area eaten given, 1 mark)

- (ii) toxin kills the caterpillars faster than just the virus;
 so less time for leaves to be eaten/energy for eating; 2

- (iii) isolate gene from scorpion DNA;
 using restriction enzyme/endonuclease/named example;
 cut viral DNA with same enzyme;
 ref. sticky ends (however produced);
 ligase;

or

- isolate mRNA from scorpion;
 for required toxin molecule/from required gene;
 reverse transcriptase to produce DNA;
 ref. sticky ends (however produced);
 ligase; 4 max

Total 10