



ASSESSMENT and
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General Certificate of Education

Biology 5416/6416 *Specification B*

Applied Ecology BYB6/A

Mark Scheme

2005 examination – June series

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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.

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; 2 max
(reject references to sea birds)
- (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; biological gives longer term control of pests; 2
(accept biological controls pests resistant to chemical);

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

OR

$$\frac{64}{40} = 1.6 \text{ times more effective}$$

- 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