GCE 2005
January Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Biology Specification B

BYB5/W Environment

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.org.uk

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Guidance on the award of the mark for Quality of Written Communication

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 the question identified as assessing QWC 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 the question identified on the paper as assessing QWC. 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 the paper 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) secondary consumer / trophic level 3;
second species to peak / in which phosphorus appears; 2

(b) energy is lost at each level (so not enough left); 1

(c) ATP;
DNA;
RNA / tRNA / mRNA;
nucleotides *(accept only if DNA/RNA not mentioned*);
phospholipids;
NADP;
RuBP; 2 max

Total 5

Question 2

(a) (i) respiration; 1

(ii) decomposers;
(*accept bacteria/fungi*) 1

(b) $\frac{87402}{1.7 \times 10^6} \times 100 = 5.14/ 5.1\%$; 2
(correct answer = 2 marks)
(principle: energy in producers ÷ energy of light absorbed = 1 mark)

(c) excites chlorophyll/electrons;
release electron(s); 2 max

(d) reduced NADP;
reduces GP / to change GP to TP;
ATP;
provides the energy to reduce GP / convert GP to TP / TP to RuBP/
provides phosphate to convert TP to RuBP; 4

Total 10

Question 3

(a) (i) mites killed by pesticide;
springtails not affected / only affected slightly; 2

(ii) few mites at first so number of springtails increases;
pesticide concentration reduced so mite numbers increase;
as mite numbers increase more springtails eaten
(and number decreases); 3

(b) numbers go up and down;
one goes up before the other;
variation in numbers reduced / becomes less;
expect number of prey always to be higher than numbers of predators; 2 max

(c) (i) phloem; 1

(ii) mass flow;
solutes will lower water potential;
water moves into phloem;
by osmosis;
creates high hydrostatic pressure; 3 max

Total 11

Question 4

(a) there is no difference between the number of lichens growing on the walls
(facing different directions); 1

(b) 36, 36, 36; 1

(c) 2; 1

(d) p less than 0.05;
reject the null hypothesis;
the difference is not due to chance/significant difference;
the direction the wall faces does have an effect on the population of lichens; 3 max

(e) algae photosynthesise/ produce organic molecules /named;
fungus anchors the lichen / absorbs water which is available to the algae/
prevents dehydration of alga /absorbs mineral ions/ phosphates/nitrates; 2

Total 8

Question 5

(a) hydrolysis/breakdown/digestion of carbon compounds;
respiration (by bacteria);
releasing carbon dioxide;
taken up by the plant during photosynthesis; 3 max

(b) active transport;
energy/ATP is used ;
carrier molecules/protein needed; 3

(c) crossing over;
independent assortment/segregation;
meiosis (*only if crossing over / independent assortment not given*);
mutation;
random fertilisation; 2 max

Total 8

Question 6

(a) (i) dogwhelks move more; 1

(ii) their food contains more material that cannot be digested / no enzymes to digest;
such as cell walls/cellulose; 2

(b) TBT is accumulated;
dogwhelks eat many mussels; 2

(a) (i) competitive has similar shape to substrate / non-competitive is different;
competitive fits into the active site / non-competitive fits into another site on the enzyme;
competitive inhibition is reduced as substrate concentration is increased /substrate concentration has no effect on non-competitive inhibitor;
competitive inhibitor competes with substrate for active site; 3 max

(ii) tetanus / muscle contracts all the time/ any reference to parasympathetic response;
acetylcholine remains (in receptors on postsynaptic membrane) / not able to be removed (from receptors on postsynaptic membrane); 2

Total 10

Question 7

(a) 1. colonisation/pioneering;
2. microscopic plants at start;
3. death / decomposition;
4. named change in environment e.g. increase in organic matter/ stabilisation;
5. new species colonise once there is a change;
6. increase in number of species/diversity;
7. increase in total amount of living material/biomass/ more niches;
8. increase in nutrient availability;
9. change from more extreme conditions / more stability; 6 max

(b) *marking principles*:
one mark – direct result of removing forest cover;
e.g. soil erosion/leaching
one mark – specific effect on organisms in lake;
e.g. more sediment/nutrients (for plants to grow) 2

(c) 1. named nutrient availability;
2. numbers of producers providing energy (for a food chain);
3. light intensity affecting the rate of photosynthesis;
4. disease killing (weaker) members of species;
5. space for nest building / niches;
6. reproductive rate balancing death rate;
7. competition for a named limited resource;
8. (intra and interspecific) competition explained;
9. predation described; 5 max

Total 13

QWC (See guidance) 1