GCE 2005
January Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Biology Specification B

BYB7 Microbes and Disease

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.

BYB7/A

Question 1

(a) One mark for each completely correct column

Characteristic	Bacterium	HIV
Capsid	X	✓
Cell wall	✓	X
Flagellum	✓	X
Plasmid	✓	X

2

(b) *similarity*
both have large SA / show folding / have phospholipid membrane / have proteins / enzymes associated with aerobic respiration; 1

difference
mitochondrion completely enclosed in membrane / mitochondrion has DNA / mitochondrion has ribosomes / mesosome infolding of surface membrane; 1

Total 4

Question 2

(a) ability to attach to cell (membranes);
ability to penetrate cells;
ability to spread throughout host;
nature of toxins produced;
(*allow lower number required to cause disease*)
(*allow have capsule for protection from substances produced by host*) 3 max

(b) (i) reference to translation;
no polypeptide/protein synthesis;
therefore no enzyme synthesis; 2 max

(ii) ribosomes different structure, so streptomycin cannot bind; 1

Total 6

Question 3

(a) bonding with cross-linking agent / entrapment in gel / binding onto surface of adsorbing agent; 1

(b) (i) higher optimum temperature when immobilised;
reduced activity at lower temperatures when immobilised; 2

(ii) rise to 65 ^{0}C due to increased kinetic energy of particles;
resulting in more collisions with active sites;
decrease after 65 ^{0}C due to denaturation of enzyme;
detail, e.g. breaking of S bonds / H bonds / ionic bonds;
active site changes shape / substrate no longer fits; 3 max

(iii) more stable at higher temperatures / higher optimum temperature
qualified; 1

Total 7

Question 4

(a) culture rubella virus in living cells;
less virulent / mutant strain;
attenuation method / purification 2 max

(b) (i) 1360 = 2 marks 2
(*general principle 0.68 ÷ 0.05 x 100 gains 1 mark*)

(ii) still have maternal antibodies; 1

Total 5

Question 5

(a) possible contamination from shell;
low temperature cooking does not kill bacteria / raw eggs contain bacteria; 2

(b) less water absorption by epithelial cells / water leaves cells;
since cells have less negative water potential; 2

(c) (i) specific primers added;
complementary base paring;
adds free nucleotides;
enzyme / RNA polymerase involved; 3 max

(ii) DNA not unzipped at lower temperature;
no replication of fragments / no exposed bases for base pairing;
no semi-conservative replication; 2 max

Total 9

Question 6

(a) sterilisation of equipment (*once*);
use of pipette/syringe to transfer culture suspension to plate;
use of spreader / shake ;
detail regarding lid, e.g. keeping over plate during transfer/spreading; 3 max

(b) 2.25 = 2 marks 2
(*general principle* ($1.5^2 \div 1^2$) *gains 1 mark*)

(c) increased temperature increases rate;
increased concentration increases rate;
increased molecule size decreases rate; 3 max
(*allow increased distance decreases rate*)

Total 8

Question 7

(a) prevent large gatherings, e.g. close cinemas;
isolate patients;
large scale vaccination;
use of face masks; 2 max

(b) (i) fall in deaths due to rise in number of people with immunity /
better care / targeting vaccination at vulnerable; 1

(ii) mutation of virus / new strain;
mutant form not recognised by memory cells (*allow antibodies*); 2 max

(c) (i) T lymphocyte receptors recognise shape of haemagglutinin /
neuraminidase / viral antigen;
clone (*once only*);
destroy virus; 2 max

(ii) clone (*once only*);
produce antibodies;
effect of antibody e.g. stimulation of phagocytosis /
precipitation of toxins; 2

(d) alter shape of active site of neuraminidase / block active site;
virus unable to leave host cells; 2

Total 11