



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme January 2004

GCE

Biology B

Unit BYB2

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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.

Question 1

(a)	(i)	A anaphase;	1
	(ii)	(C) B,A,D;	1
	(iii)	(original) chromosome/DNA has been replicated; each chromosome consists of two chromatids/ chromatids attached at centromere; (accept reference to condensed state of chromosomes)	2
(b)	(i)	it has doubled/now 8;	1
	(ii)	chromosome/DNA replication but no separation/anaphase/cell division;	1
Total			6

Question 2

(a)	meiosis halves the chromosome number / from diploid to haploid/ produces haploid/n cells; when gametes fuse/at fertilisation, the diploid number is restored; this keeps the chromosome number constant/correct from one generation to the next/after sexual reproduction; introduces <u>genetic</u> variation/independent assortment/crossing over;	3 max
(b)	M between moss plant and spore;	1
(c)	(gamete B, no mark) gamete B has/A does not have: few reserves/nutrients; smaller size; flagella, so mobile;	2 max
Total		6

Question 3

- (a) name, such as addition/deletion/substitution;
corresponding description of change in the sequence of bases in DNA/
frameshift, such as addition of a base to DNA sequence; 2
- (b) (i) smoking and drinking increase risk;
risk increases for nonsmokers with more alcohol;
20-40 cigarettes increases risk;
at all levels of alcohol consumption;
4 or more drinks increase risk in all groups;
worst risk with combination of 40+ cigarettes and 4 or more
drinks;
smoking and drinking together have a greater effect than either
on its own;
over 40 cigarettes and no alcohol greater than 1 or 2 alcoholic
drinks/valid comment about anomaly; 3 max
- (ii) other environmental factor/e.g. passive smoking;
genetic predisposition / inherited from parents;
mutation; 1 max
- Total 6
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Question 4

- (a) use restriction enzyme/endonuclease/named, e.g. Bam/Eco;
to cut DNA in specific place/base sequence; 2
- (b) heat DNA to 90 - 95°C;
strands separate;
add primers;
and nucleotides;
cool so that primers bind to DNA;
(DNA) polymerase forms new strands/joins nucleotides; 4 max
- (c) (i) virus is inhaled/sprayed into the lungs;
gets into cells, inserting the healthy gene; 2
- (ii) makes DNA from RNA, (*rather than other way round*); 1
- Total 9
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Question 5

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|--------------|--|----------|
| (a) | mutation changes the amino acid sequence/primary structure of Factor VIII protein;
changes the tertiary structure/3D shape; | 2 |
| (b) | (mutant) Factor VIII protein is non-functional/does not work with Factor IX;
so no conversion of Factor X to active form and pathway blocked; | 2 |
| (c) | boy's blood contains (active) Factor VIII;
Factor VIII haemophiliac's blood contains (active) Factor IX;
the mixture has both Factors and so the pathway can complete/blood clots; | 2 max |
| Total | | 6 |
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Question 6

- | | | |
|--------------|---|----------|
| (a) | (i) plasmid; | 1 |
| | (ii) the bacteria divide/grow, producing many copies of desired gene/plasmid;
OR
the bacteria divide/grow to cover the agar; | 1 |
| | (iii) plant tissue that has antibiotic resistance survives;
identifies plant tissue which has desired gene/plasmid; | 2 |
| | (iv) to <u>clone</u> plants/produce <u>genetically</u> identical plants with gene/characteristic;
and produce large numbers/quickly; | 2 |
| (b) | (i) (<i>one reasonable suggestion</i>),
e.g. toxin present all the time;
save costs of buying/ application of spray;
no spray drift onto other fields/insects; | 1 max |
| | (ii) (<i>one reasonable suggestion</i>),
e.g. killing of harmless/useful insects that feed on wild plants;
damage to food chains starting with wild plants; | 1 max |
| Total | | 8 |
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Question 7

- (a) semi-conservative;
helix unwinds;
separation of two (polynucleotide) strands;
(free) nucleotides bind to exposed bases/strands;
hydrogen bonding;
specific/complementary base pairing;
A to T and C to G;
(DNA) polymerase joins nucleotides; 6 max
- (b) (i) mRNA attaches to ribosome;
codon on mRNA;
binds to an anti-codon on tRNA;
each tRNA brings a specific amino acid;
sequence of codons/bases on mRNA determines order of amino acids;
formation of peptide bonds/amino acids joined by condensation reactions; 4 max
- (iii) inserted gene/mRNA complementary to normal gene/mRNA;
binds to it to prevent protein synthesis/form double strand/prevents mRNA binding to ribosomes;
will not stop all translation, some mRNA reaches ribosomes/
because not all mRNA is bound by inserted gene mRNA; 2 max
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- Total 12
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- QWC (See Guidance) 1