



General Certificate of Education

Biology 5411

Specification A

BYA2 Making Use of Biology

Mark Scheme

2006 examination – January 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.

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.

BYA2

Question 1

(a)	Interphase/S-phase;	1
(b)	A D C E B ;	1
(c)	Attachment of centromeres/chromosomes/chromatids; Separation of centromeres/chromatids/chromosomes;	2
(d)	Halves chromosome number/haploid; Diploid/full number restored at fertilisation; <i>Allow correct reference to variation</i>	max 2
		Total 6

Question 2

(a)	Filled with air; Allows aerobic respiration/delays onset of anaerobic respiration;	2
(b)	Use of vector/plasmid/virus/tungsten bullet;	1
(c) (i)	Marker (gene); Allows identification of cells with new gene;	2
(ii)	May pass to bacteria; Pathogens may become resistant/unable to treat disease;	2
		Total 7

Question 3

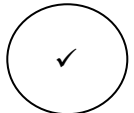
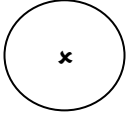
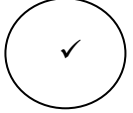
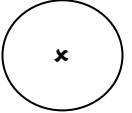
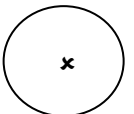
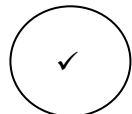
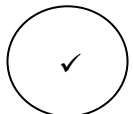
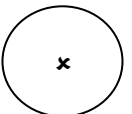
(a)	More cells in udders/larger udders; Cells are milk producing;	2
(b) (i)	65% \pm 2; ; Correct answer = 2 marks Incorrect answer based on correct method = 1	2
(ii)	Yield falls (over time period); BST increases yield by constant amount/BST yield falls at same rate; So increased yield becomes higher proportion of yield;	max 2
(c)	May not be cost-effective/ <i>not just cost</i> Concerns over animal welfare/ Hormone may be present in milk/ Not acceptable for organic farmers/ May affect reproduction;	1
		Total 7

Question 4

- (a) (i) Stops other microorganisms entering/only grow desired bacteria; 1
- (ii) Break up (intact) cells;
Separate (intact) cells/cell debris from solution/flocculate/filter/centrifuge;
Concentrate solution of enzyme/evaporate/crystallise; 3
- (b) Specificity;
Does not produce unwanted products/acts only on phytic acid;
- OR
- Works at lower temperatures/pressures;
Energy savings;
- OR
- Less needed;
Enzyme not used up;
Do not credit reference to immobilised enzymes 2
- (c) (Less) run off/contamination of water/penetration of soil;
Link to eutrophication; 2
- Total 8
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Question 5

- (a) Protein/glycoprotein/molecule;
 On surface of cell/in membrane;
 Stimulates immune response; max 2

	A	B	AB	O
Anti-A				
Anti-B				

1 mark for each correct column 3

Total 5

Question 6

- (a) GCAAUG; ;
 Allow one mark if T instead of U, i.e. GCAATG 2

- (b) (i) DNA is edited/introns present in DNA;
 Allow reference to 'junk' or non-coding DNA 1

- (ii) 220; allow 218 or 219-allow 2
 Three bases/nucleotides code for one amino acid;
 Correct explanation for 218 or 219; 2

- (c) mRNA has no base-pairing, tRNA has base-pairing/ mRNA linear, tRNA cloverleaf shape;
 mRNA has no binding site for amino acids, tRNA has;
 mRNA different for each gene/many kinds, only few/20/64 kinds of tRNA;
 accept mRNA longer/larger/more nucleotides than tRNA max 2

Total 7

Question 7

- (a) Temperature affects photosynthesis;
Affects enzyme activity;
So that any change in photosynthesis rate is result of carbon dioxide/light intensity;
max 2
- (b) Carbon dioxide increases rate of photosynthesis;
Up to max;
Something else/correct suggestion is a limiting factor; 3
- Total 5

Question 8

- (a) No competition/weaker competitor in US;
No organisms to eat it/pathogens to infect it in US;
Environment/abiotic factors more favourable/specific example e.g. temperature/water availability;
More reproduction; max 2
- (b) (Yes because) reduces;
Stays low;
- OR
- (No because) reduces;
But does not get rid of plants completely; 2
- (c) (i) Number of fire-ants falls rapidly/most killed;
Population remains low; 2
- (ii) Most fire-ants killed;
(Some survive because) some resistant;
Insecticide does not affect all stages of life cycle/named stage;
Insecticide does not reach all individuals/example e.g. underneath leaf;
Survivors reproduce;
Because of reduced competition/greater availability of food; max 3
- (d) 1. Specific (to one pest);
2. Only needs one application/reproduces; *allow long lasting effect*
3. Keeps population low;
4. (Pests) do not develop resistance;
5. Does not leave chemical residues in environment; *not just environmentally friendly*
6. Does not get rid of pest completely;
7. May become a pest itself;
8. Slow acting/takes time to reduce pest population;
9. Can be used in organic farming; max 6

Total 15

Question 9

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|-----|---|-------|
| (a) | 1. DNA is cut;
2. Using restriction enzyme;
3. Use electrophoresis;
4. Separates according to length/mass;
5. Southern blotting/transfer to (nylon) membrane;
6. Make single-stranded;
7. Apply probe;
8. Radioactive/fluorescent;
9. Reference to tandem repeats/VNTRs/minisatellites;
10. Autoradiography/eq; <i>8 and 10 should be consistent</i> | max 6 |
| (b) | (i) All bands in cub which don't come from mother;
Must be in father's DNA fingerprint;
<i>Principle that all bands in cub must come from mother and father = 1</i> | 2 |
| | (ii) Select pairs with dissimilar DNA fingerprints; | 1 |
| (c) | (i) Cells (from panda) in faeces/gut cells/blood cells; | 1 |
| | (ii) To increase amount of DNA/only small amount present; | 1 |
| | (iii) DNA/primer has specific base-sequence;
Reference to specific/complementary base-pairing; | 2 |
| (d) | Taking samples from animals causes stress/injury to animal;
Difficult to find animals;
Pandas are dangerous/threat to human; | max 2 |
| | Total | 15 |
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