

GCE 2005

January Series



Mark Scheme

Biology Specification A

BYA2 Making use of Biology

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Dr Michael Cresswell Director General

BYA2

Question 1

- | | | | |
|-----|-------|--|---|
| (a) | (i) | Prophase; | 1 |
| | (ii) | Chromosomes/chromatids moved apart; | 1 |
| | (iii) | <p><i>A wide range of processes occurs during interphase. This list is by no means exhaustive, but we would expect to see answers such as:</i></p> <p>Increase in volume of cell/volume of cytoplasm / increase in mass / cell bigger;
 increase in number of organelles;
 synthesis of protein/named protein;
 DNA replication/increase / chromosomes copied;
 ATP synthesis / respiration;</p> | |
| | | max | 2 |
| (b) | | Divide real length of bar (in mm)/10 by 0.02; | 1 |
| (c) | | 12/200 x 24 / single error in otherwise correct method;
1.44 hours (1 hour 26 min); | 2 |

Total 7 marks

Question 2

- | | | | |
|-----|------|--|---|
| (a) | (i) | Reverse transcriptase; | 1 |
| | (ii) | Idea that mRNA is present in large amounts in cell making the protein / mRNA has been edited / does not contain introns / mRNA codes for single protein; | 1 |
| (b) | | (Ligase) splices / joins two pieces of DNA / “sticky ends”; | 1 |
| (c) | (i) | To remove microorganisms / make air sterile / produce aseptic conditions; which could compete for nutrients / make unwanted products / be pathogenic; | 2 |
| | (ii) | Maintains/controls temperature; | 1 |

Total 6 marks

Question 3

- | | | |
|-----|--|---|
| (a) | Endonuclease / restriction enzyme; | 1 |
| (b) | DNA made of base pairs;
Each base pair is same length / occupies same distance along backbone; | 2 |
| (c) | (i) Second blank box from left labelled 6; | 1 |
| | (ii) Distance moved depends on length / number of base pairs /
second longest fragment / second shortest distance identified; | 1 |
| (d) | 5; | 1 |

Total 6 marks

Question 4

- | | | | |
|-----|---|-----|---|
| (a) | Causes growth of follicle/oocyte;
Causes secretion of oestrogen;
With LH, stimulates ovulation; | max | 2 |
| (b) | (i) curve shown rising to day 21;
curve shown falling day 21 – 24; | | 2 |
| | (ii) (Concentration of) FSH remains low / returns to starting level; | | 1 |
| (c) | (i) Progesterone would inhibit FSH;
So no follicles/oocytes develop; | | 2 |
| | (ii) LH is released / no longer inhibited;
Triggers ovulation / release of ovum/egg; | | 2 |

Total 9 marks

Question 5

- (a) (i) Enzyme in solution becomes denatured / immobilised enzyme not;
enzyme in solution has active site distorted / unable to form E-S complexes /
immobilised enzyme retains shape of active site at higher temperatures / able to form
E-S complexes; 2
- (ii) Enzyme in solution more available to react / more exposed active sites /
enzyme more able/free to move / enzyme not bound;
Enzyme in solution has more collisions / more enzyme-substrate
complexes form; 2
- (b) Product easily separated from enzyme / product is not contaminated;
Can be reused;
Stable to pH;
Can be used in continuous process; max 2

Total 6 marks

Question 6

- (a) Red (blood) cells/rbc's/erythrocytes sticking together/clumping / correct reference to
antigen + antibody causing cells to stick together/clump;
Ignore clotting 1
- (b)

	Suspect 1	Suspect 2	Suspect 3
anti-A			
anti-B			
blood group	AB	B	A

Key	
	Agglutination
	No agglutination

- AB correct;
A + B correct; 2
- (c) (i) To increase the quantity of DNA; 1
- (ii) White blood cells/leucocytes/lymphocytes/phagocytes;
Because they have nucleus / rbc's have no nucleus; 2

Total 6 marks

Question 7

- (a) B
Air spaces / larger hollow stem; 1
- (b) Can tolerate ethanol;
Live in low oxygen supply/anaerobic conditions / can respire anaerobically;
OR
Have air spaces;
So oxygen can diffuse (in air spaces) to roots; 2
- (c) Few/sunken stomata / stomata closed during day;
Curled/rolled leaves / hinge cells;
Thick cuticle;
C4 photosynthesis; max 2

Total 5 marks

Question 8

- (a) Fertilisers / detergents / slurry/manure/sewage/faeces; 1
- (b) $(31 - 5) / 31 \times 100\%$ / single error in otherwise correct method;
83.87 / 83.9 / 84%; 2
- (c) Have continuous data for phosphate but not for biomass;
May not be cause and effect;
May be other factor involved;
Effect of named factor explained; max 2
- (d) 1. Increased phosphate causes increase in plant growth/algal bloom;
2. Plants (cover surface and) block out light;
3. Plants (under surface) die;
4. Increase in (aerobic) bacteria/decomposers (which break down plants);
5. Bacteria/decomposers use up oxygen / reduce oxygen conc. in water;
6. In respiration;
7. Plants unable to photosynthesise;
8. So less oxygen produced; max 6
- (e) (i) Pollution/non-biodegradable;
Non-specific / may kill other organisms;
Builds up in food chain / bioaccumulation idea;
Blanket weed may develop resistance;
Needs to be reapplied; max 2
- (ii) Not able to eat all blanket weed / grows faster than they can eat;
If most weed removed, shrimps may die;
Shrimps may be eaten by something / numbers reduced in some other way; max 2

Total 15 marks

Question 9

- (a) Protein made of (chain of) amino acids;
Each amino acid has its own base code/code;
Triplet codes; max 2
- (b) UCA = 2 marks
TCA – 1 mark; 2
- (c) CCG;
GGG GGG; 2
- (d) (i) Changes base sequence;
Of later triplets/amino acid codes; 2
- (ii) S-phase/interphase; 1
- (e) 1. mRNA leaves (nucleus) through nuclear pore;
2. To ribosome;
3. tRNA molecules bring amino acids (to ribosome);
4. Specific tRNA molecule for specific amino acid;
5. Anticodon of tRNA corresponds / complementary to codon on mRNA;
6. Peptide bonds form between amino acids;
7. tRNA detaches and collects another amino acid;
8. Ribosome moves along mRNA; max 6

Total 15 marks