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GCE 2005
January Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Biology Specification A

BYA2 Making use of Biology

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BYA2

Question 1

(a)	(i)	Prophase;	1
	(ii)	Chromosomes/chromatids moved apart;	1
	(iii)	*A wide range of processes occurs during interphase. This list is by no means exhaustive, but we would expect to see answers such as:* 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; 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 x 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