ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 5411

Specification A

BYA2 Making Use of Biology

Mark Scheme

2007 examination - June series

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Question 1

(a) Thr-His-Thr-His-Thr; 1

(b) (i) TCA; 1

(ii) UCA; 1

(c) (i) A base from one triplet cannot be used in an adjacent triplet;
Accept each base used only once/once a triplet used, moves to next triplet/suitable diagram
Specified peptide contains only one amino acid/ overlapping code would produce other amino acids/Gln and/or Thr as well/peptide would have more than five amino acids; 2

(ii) Some amino acids coded for by more than one codon/triplet/sequence of 3 bases;
ACC and ACA both code for threonine; 2

Total 7

Question 2

(a) (i) Attaches (chromosome) to spindle/holds (sister) chromatids together; 1

(ii) Separate chromatids/centromeres/chromosomes/ aligns chromosomes at equator; 1

(b) (i) n,n,2n; 1

(ii) X on arrow going from 2n to n; 1

Total 4

Question 3

(a) Only one variable/ weeding is only variable; 1

(b) (i) The earlier weeding starts, the greater the yield;
First 4 weeks, weeding has same effect/yield constant;
After 4 weeks, yield goes down more; 2 max
Accept reference to 'early weeks' and 'late weeks'

(ii) Weeds compete (with the beans);
For light/nutrients/water/valid factor; 2

Total 5

Question 4

(a)		To make many copies of DNA/more DNA;	1
(b)	(i)	Nucleotides/ primers/ polymerase;; *Accept two different named nucleotides*	2
	(ii)	No need for heating/cooling/temperature stays constant;	1
		Total	4

Question 5

(a)		Grow bacterium in fermenter; *reject vats* Reference to aseptic conditions/named conditions for growth; Reference to use of starch in medium; Separate cells from contents of fermenter, e.g. filtration, centrifugation; Isolation of enzyme, e.g. evaporation;	3 max
(b)		Can be used over and over again; Enzyme does not contaminate product; Enzyme more stable if temperature/pH change; Can be used in a continuous process;	2 max
(c)	(i)	More (surface area of) enzyme exposed to substrate in smaller beads/ smaller beads have larger SA compared to volume; As beads get larger, takes more time /further for substrate to reach enzyme/enter bead;	2 max
	(ii)	Extrapolate graph; Line of best fit; Read rate off y axis; *Allow 1 mark for calculated answer using data from graph*	2 max
		Total	9

Question 6

(a) Makes single-stranded DNA/cDNA from mRNA;
Reject turns RNA into DNA
Joins DNA; 2

(b) (i) Gene transferred alongside target gene/gene used to identify cells containing target gene; 1

(ii) Grow cells on a specific medium;
Only cells with chymosin will grow/cells with chymosin look different; 2
Accept reverse for second point, i.e. replica plating idea

(iii) Can pass to pathogens;
Unable to use antibiotics to treat disease/ kill pathogen; 2

(iv) Lower probability of disease from animals/
acceptable to vegetarians/those with concerns for animal welfare/
purer enzyme obtained/can be produced on larger scale; 1

Total 8

Question 7

(a) Extensive/dense root system;
Obtains water from greater area;

Thick/very waxy cuticle;
Reduces water loss by evaporation/transpiration;

Reduced number of stomata;
Reduces water loss by evaporation/transpiration; *water loss must be qualified*

Rolled leaves/motor cells;
Traps moist air/reduces water loss by evaporation/transpiration;

C4 special kind of photosynthesis;
More efficient photosynthesis in hot conditions;

Sunken stomata;
Traps layer of moist air/reduces water loss by evaporation/transpiration;

Tolerant to high temperatures; *accept heat shock proteins*
Able to photosynthesise in tropical conditions; 4 max

(b) (i) Fields have different environmental factors/named factor e.g. light intensity;
Relate to growth of crop e.g. rate of photosynthesis;
OR
C has higher yield because has all 3 nutrients;
B lower than C because lacks potassium/A lowest because no added nutrients;
2 max

(ii) Disease/pest;
Because same crop grown every year/effect of disease eg reduced photosynthesis;
OR
Suitable environmental factor, eg drought, low temperature;
Effect on crop e.g. reduced photosynthesis;
OR
Lack of nutrients/suitable nutrient;
Not supplied by fertiliser; 2

Total 8

Question 8

(a)	(i)	Use of parasite/predator/pathogen; To control (numbers of) a pest organism;	2
	(ii)	1 Specific (to mosquito); 2 Only needs one application/reproduces; *Allow long lasting effect* 3 Keeps population low; 4 (Mosquitoes) do not develop resistance; *not immunity* 5 Does not leave chemical residues in environment/bioaccumulates; *Ignore just environmentally friendly* 6 Does not get rid of mosquito completely; 7 May become a pest itself; 8 Slow acting/ takes time to reduce mosquito population; 9 Can be used in organic farming; *Accept 'pest' instead of mosquito*	6 max
(b)		To see if the fungus would be effective in houses/environment; Make sure it would survive/reproduce/grow; Not harmful to use;	2 max
(c)		Not (bio)degradable/does not break down; Remains inside organism; Idea that one organism may consume many others; Organisms at top of food chain receive greatest/harmful amount of DDT/bioaccumulation;	3 max
(d)		Insecticide gives fast (initial reduction)/biological control slow; Takes time for fungus to grow;	2
		Total	15

Question 9

(a)		1 Pituitary releases FSH; 2 FSH stimulates growth of follicles; 3 Follicle produces oestrogen; 4 Hormone travels in blood; 5 Oestrogen inhibits FSH production; 6 <u>High</u> oestrogen stimulates FSH/LH; 7 LH brings about ovulation; 8 FSH also involved in ovulation;	6 max
(b)		Causes rise in FSH / inhibition of FSH removed; Stimulates follicle development;	2
(c)	(i)	Same as other group/two named variables the same; But no progesterone treatment;	2
	(ii)	More lambs/ more sheep give birth; At closer time interval;	2
(d)	(i)	Without progesterone 185 x 1.86 = 344.1 With progesterone 185 x 1.95 = 360.75	
OR		185 x 0.09;	
		16/17 lambs;; *Correct answer = 2* *Correct method but wrong answer = 1*	2
	(ii)	May not be cost-effective/ may wish to stagger lambing;	1
			Total 15