



General Certificate of Education

Biology 5411
Specification A

BYA2 Making Use of Biology

Mark Scheme

2007 examination - June 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.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2007 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

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; <i>Accept each base used only once/once a triplet used, moves to next triplet/suitable diagram</i> 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; <i>Accept reference to 'early weeks' and 'late weeks'</i>	2 max
	(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;;
<i>Accept two different named nucleotides</i> | 2 |
| | (ii) No need for heating/cooling/temperature stays constant; | 1 |
| | | Total 4 |

Question 5

- | | | |
|-----|---|---------|
| (a) | Grow bacterium in fermenter; <i>reject vats</i>
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;
<i>Allow 1 mark for calculated answer using data from graph</i> | 2 max |
| | | Total 9 |

Question 6

(a)	Makes single-stranded DNA/cDNA from mRNA; <i>Reject turns RNA into DNA</i> 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; <i>Accept reverse for second point, i.e. replica plating idea</i>	2
	(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;
<i>Allow long lasting effect</i>
3 Keeps population low;
4 (Mosquitoes) do not develop resistance; <i>not immunity</i>
5 Does not leave chemical residues in environment/bioaccumulates;
<i>Ignore just environmentally friendly</i>
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;
<i>Accept 'pest' instead of mosquito</i> | 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 High 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 $185 \times 1.86 = 344.1$
 With progesterone $185 \times 1.95 = 360.75$
- OR 185×0.09 ;
- 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