

GCE



Edexcel GCE

Biology (6105/01)

Summer 2005

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Mark Scheme (Results)

General Principles

Symbols used in the mark scheme

Symbol	Meaning of symbol
; semi colon	Indicates the end of a marking point.
eq	Indicates that credit should be given for other correct alternatives to a word or statement, as discussed in the Standardisation meeting. It is used because it is not always possible to list every alternative answer that a candidate may write that is worthy of credit.
/ oblique	Words or phrases separated by an oblique are alternatives to each other.
{ } curly brackets	Indicate the beginning and end of a list of alternatives (separated by obliques) where necessary to avoid confusion.
() round brackets	Words inside round brackets are to aid understanding of the marking point but are not required to award the point.
[] square brackets	Words inside square brackets are instructions or guidance for examiners.

Crossed out work

If a candidate has crossed out an answer and written new text, the crossed out work can be ignored. If the candidate has crossed out work but written no new text, the crossed out work for that question or part question should be marked, as far as it is possible to do so.

Spelling and clarity

In general, an error made in an early part of a question is penalised when it occurs but not subsequently. The candidate is penalised once only and can gain credit in later parts of the question by correct reasoning from the earlier incorrect answer.

No marks are awarded specifically for quality of language in the written papers, except for the essays in the synoptic paper. Use of English is however taken into account as follows:

- the spelling of technical terms must be sufficiently correct for the answer to be unambiguous
e.g. for amylase, 'ammalase' is acceptable whereas 'amylose' is not
e.g. for glycogen, 'glicojen' is acceptable whereas 'glucagen' is not
e.g. for ileum, 'illeum' is acceptable whereas 'ilium' is not
e.g. for mitosis, 'mytosis' is acceptable whereas 'meitosis' is not
- candidates must make their meaning clear to the examiner to gain the mark.
- a correct statement that is contradicted by an incorrect statement in the same part of an answer gains no mark - irrelevant material should be ignored.

Question 1**Maximum mark**

- (a)
1. {Breaks / disrupts} hydrogen bonds between {bases / nucleotides} ;
 2. Strands separate / eq ;
 3. To expose base (sequences) ;

2 marks

- (b)
1. Short {sections / lengths} of nucleotides / 10-40 nucleotides ;
 2. Single stranded ;
 3. Reference to sequence of {bases / nucleotides} complementary to those on DNA ;
 4. {Select target / eq} section of DNA ;
 5. Reference to primer starting polymerase reaction ;

3 marks

- (c) Bacterial process {slower / takes longer / takes days} / {chance of error / difficult} ;

1 mark**Total 6 marks**

Question 2

Maximum mark

- (a)
1. Unable to {reproduce with each other / mate with each other / interbreed / eq} / cannot produce fertile offspring ;
 2. (Because of) {different mating behaviour / different mating seasons / different mating times of year / genetic incompatibility / eq} ;
 3. Reference to different species having different {features / appearance / characteristics} ;

2 marks

- (b)
- Idea of {DNA fingerprinting / genetic fingerprinting / hybridisation / base sequencing / amino acid sequencing / immunological comparison} ;
- {Close / eq} match between {DNA / protein / eq} (of two species) ;

2 marks

- (c)
1. Reference to allopatric speciation ;
 2. Populations {physically / geographically} separated / idea of {barrier / strip of land} separating populations ;
 3. Two populations {were unable to interbreed / prevented from breeding} ;
 4. {Environmental conditions / eq} differ (on either side of the isthmus) ;
 5. Reference to different selective pressures / different {features / alleles} selected in two populations / each population subjected to natural selection ;
 6. (Leads to) {formation / eq} of different {deme / gene pools} / eq ;
 7. Leads to {change / divergence} in {behavioural / physical} {characteristics / appearance} ;
 8. Reference to founder effect ;
 9. Reference to genetic drift ;

5 marks

Total 9 marks

Question 3**Maximum mark**

(a) Stroma of chloroplast / stroma ; 1 mark

(b) NADPH / reduced NADP / NADPH₂ / NADPH + H⁺ / NADPH + H ;
ATP ; 2 marks

(c) Idea of carbon dioxide fixation / carbon dioxide acceptor ;
To form 6C {compound / intermediate / molecule} / to form {2 x 3C molecules / GP} ; 2 marks

(d) (i) RuBP increases and GP decreases ;
Description of one curve (e.g. GP decreases and levels off, both quantities equal at 3.5 minutes, comparison of 2 gradients) ; 2 marks

- (ii) 1. [RuBP rises because] it is being regenerated / it accumulates / eq ;
2. [RuBP rises because] less CO₂ {to combine with it / for fixation / eq} ;
3. [GP falls because] less is being formed ;
4. [GP falls because] being used faster than its being formed ; 2 marks

Total 9 marks

Question 4

Maximum mark

- (a)
1. Both increased between 1970 and 1975 / both peak in 1975 ;
 2. (Overall) farmland birds decreased {more / faster} than woodland birds ;
 3. From 1995 to 2000 woodland birds increased and farmland birds decreased ;
 4. Comparative manipulated figures (e.g. 10.5 and 41.4, 30.9, 4 times greater fall in farmland birds) ;

2 marks

- (b)
1. {Insects / primary consumers} increase because fewer eaten ;
 2. {Producers / plants} decrease because more {herbivores / primary consumer / insects} ;
 3. {Predators / tertiary consumers / top carnivores} decrease because fewer birds ;
 4. {Predators / tertiary consumers / top carnivores} {eat / eq} other {secondary consumers / prey} ;
 5. (Therefore) other {secondary consumers / prey} decrease ;
 6. Other secondary consumers increase because {less competition / more food / more insects} ;

[Accept suitable named example(s) in any marking point]

4 marks

Question 4 continued**Maximum mark**

- (c)
1. Idea of birds eating insects sprayed with pesticide ;
 2. {Reference to / description of} bioaccumulation ;
 3. Fertiliser leads to {nitrate runoff / eutrophication} ;
 4. Fertiliser encourages the growth of fast growing plants / eq ;
 5. Prey birds seen more easily by predators / not easy for prey birds to hide from predators ;
 6. {Disruption / loss of} habitat ;
 7. Loss of {nesting / roosting} sites ;
 8. Loss of food / changes in food / disruption of {food chains / webs} ;
 9. Decrease in variety of foods ;

6 marks**Total 12 marks**

Question 5

Maximum mark

- (a) Made from { β -glucose / cellulobiose} ;
Linked by (1-4-)glycosidic bonds ;
Unbranched / straight / linear ;

3 marks

- (b) (i) 1. Acid peaks at 5, neutral peaks at 6 / {acid peaks at lower pH / neutral peaks at higher pH} ;
2. Activity of both is the same at 5.5 ;
3. Comment on the shape of the curve i.e. acid bell-shaped, neutral flatter ;
4. Neutral active over a wider range / converse ;

2 marks

- (ii) {Raising / eq} temperature / change the pH beyond the range shown on the graph / add inhibitor / wash enzyme away / add strong {acid / alkali} ;

1 mark

Question 5 continued**Maximum mark**

- (c)
1. {Restriction enzyme / endonuclease} to cut out (cellulose) {gene / section of DNA} (from fungus) ;
 2. Obtain plasmids from bacteria ;
 3. Open plasmid using {same restriction enzyme / endonuclease} ;
 4. Insert (cellulose) gene into plasmid ;
 5. Reference to sticky ends ;
 6. (Ends joined by) ligase ;
 7. Insert plasmid into bacteria ;
 8. Reference to method such as {electroporation / treatment with calcium chloride / electrical shocking / salt shocking} ;

5 marks

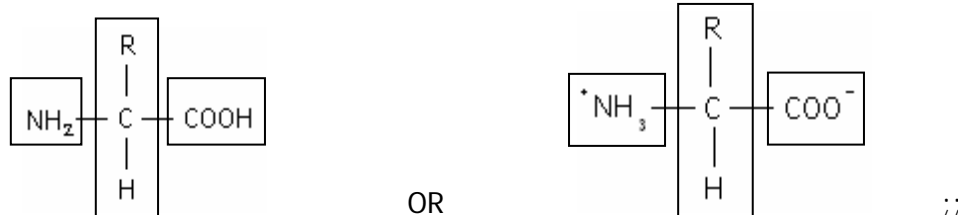
- (d)
1. To digest {cellulose / cellulobiose} in {grass / equivalent food} ;
 2. (Since) ruminant unable to produce enzyme ;
 3. Found in the rumen ;
 4. Cellulase breaks down cellulose into {sugars / monosaccharides / disaccharides / glucose / hexose} ;
 5. Which then produce organic acids ;

2 marks**Total 13 marks**

Question 6

Maximum mark

(a)



[3 areas correct = 2 marks]

[2 areas correct = 1 mark]

2 marks

- (b)
1. One of the bases in the DNA is changed ;
 2. By {addition / deletion / substitution} ;
 3. (Addition / deletion) results in a {frame / eq} shift ;
 4. Changes the sequence of amino acids / substitution changes the amino acid ;
 5. Changes the enzyme {shape / 3D structure / tertiary structure} / changes active site (of enzyme) ;
 6. Substrate unable to fit active site ;

4 marks

- (c)
1. To enable the impulse to pass from one {nerve cell / neurone} to another ;
 2. Arrival of {action potential / impulse} cause release of transmitter ;
 3. Reference to diffusion of transmitter across {cleft / gap} ;
 4. Binds to {receptor / protein} on post-synaptic membrane ;
 5. Role in {opening / closing} ion channels on post synaptic membrane ;
 6. Cause {depolarisation / polarisation (in inhibitory) / hyperpolarisation (in inhibitory)} on the post-synaptic membrane ;

3 marks

Total 9 marks

Question 7

Maximum mark

(a) {Loss of water vapour / evaporation of water} from {leaves / stems / aerial parts} ;

Through {stomata / lenticels} / by diffusion / down a water potential gradient ;

2 marks

(b) (i) 1. At night stomata closed / in daylight stomata open ;

2. (Because) at night no photosynthesis takes place / during the day photosynthesis takes place ;

3. {Temperature / heat} increases during the day / converse ;

4. Reference to wind speed increased during the day / converse ;

5. Reference to humidity decreased during the day / converse ;

6. Causing more evaporation of water / faster diffusion of water (vapour) ;

3 marks

(ii) 1. Transpiration decreases ;

2. Less uptake by roots ;

3. Because less steep water potential gradient / eq ;

4. Stomata close / fewer stomata open ;

5. Reference to wilting / eq ;

6. Reducing leaf surface exposed to air ;

7. Reference to abscisic acid promotes stomatal closure ;

3 marks

(c) In xylem (vessels) / {phloem / sieve tubes} / {apoplastic / symplastic} pathway ;

Transpiration stream / translocation ;

2 marks

Question 7 continued

Maximum mark

- (d) Thicker cuticle / description of cuticle e.g. has a waxy covering over leaf ;
- {Small(er) / reduced} leaf area / {spike / spine} / no leaves / appropriate change in leaf shape described ;
- {Inrolled / curled / curling / folded / rolled / C-shaped (in cross section) ;
- Stomata {less / fewer / in pits / in grooves / sunken} / stomata open only at night / reference to crassulacean acid metabolism (CAM) ;
- Hairs / hairy / presence of trichomes ;

2 marks

Total 12 marks