GCE

Edexcel GCE

Biology (Human) (6105/01)

Summer 2006

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Mark Scheme (Results)

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Biology (Human) (6105/01)

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 marks**

Plantae / Plants;

Prokaryota / Monera / bacteria ;

Fungi / Fungus ; [ref to moulds = 0]

Animalia / animals ; [ref. to mammals = 0]

Total 4 marks

Question 2 **Maximum marks**

(a) (gene) {length / eq} of DNA that codes for {polypeptide / protein /eq};
(allele) form of gene /eq ;

2 marks

(b) (i) dominant ;
if recessive not possible to produce child D or G, (as all offspring in second generation would have to be Dd)/eq explantion ;

2 marks

(b)(ii) B - Dd
F - dd
J - Dd

[2 correct = 1, 3 correct = 2]

2 marks

Must use D and d (allow CE for other letters used in (b)(ii))

(b)(iii) 50% / 1 in 2 / 0.5 / ½ ;
(parental genotypes) dd x Dd ;
Clearly indicated gametes ;
offspring genotypes /(at least Dd and dd) ;

3 marks

(c) 1. mutation ;
2. occurs during meiosis /suitable cause of mutation /ref to non-disjunction;
3. causes faulty {protein /polypeptide/eq} to be produced /might not be produced ;
4. recessive/ both parents could be carriers /eq;
5. offspring inherit recessive(allele) from both parents ;

2 marks

Total 11 marks

Question 3 **Maximum marks**

a) ref. to shape described gives {increased/eq} / surface area ;

1 mark

b) 1. active {uptake / transport} ;

2. {up / against / eq} {concentration gradient / eq} ;

3. {energy /ATP} used ;

4. idea of selective uptake ;

5. by cell membrane ;

6. ref. to ion pumps / carrier protein / channel protein ;

7. ref. to diffusion /facilitated diffusion ;

4 marks

c) reduced NADP / eq $_{+}$
+

ATP ;

1 mark

d) 1. suitable plant material ; [e.g. maize seedling, duckweed] ;

2. ref. to {culture solution / Sach's solution} with phosphate missing and ref. to complete / control with all minerals ;

3. control of specified variable / eq;

4. description of suitable apparatus set up / simple diagram ;

5. left to grow for appropriate time/eq ;

6. ref. to how measured result assessed ;

3 marks

Total 9 marks

Question 4 **Maximum marks**

a) 1. addition of phosphate to ADP / eq ;

2. idea of {redox / oxidation} reactions ;

2 marks

b) 1. ref. to phospholipids in membranes ;

2. ROS react with fatty acids in phospholipids ;

3. {damage / disrupt /eq} membrane of {mitochondria / cristae} ;

4. {etc / H^+ pumps /stalked particles} {in /across} inner membrane (of mitochondria;

5. {etc / H^+} not possible in damaged membrane / eq ;

3 marks

c) 1. {deletion / substitution / addition} of {a / single} {nucleotide/ base} in a DNA;

2. (triplet) codes for different amino acid / ref to frame shift ;

3. sequence of amino acids (in enzyme) altered ;

4. {shape / tertiary structure} of {enzyme / superoxide dismutase / active site} altered ;

5. {substrate / superoxide} {no longer fits / unable to bind with} {enzyme / superoxide dismutase / active site} / ref. enzyme-substrate complex cannot form ;

6. (therefore) superoxide {not removed / eq};

4 marks

Total 9 marks

Question 5 **Maximum marks**

(a) 1. {long / pointed} canines for {stabbing prey / holding prey / eq} ;

2. {premolars / molars/ carnassials} have {sharp edges / eq} for {shearing/eq} ;

3. incisors for nibbling meat off bones ;

2 marks

(b)(i) 1. correct comparison of rodents in the diet ;

2. correct comparison of {small pets / human food /berries} in the diet ;

3. general comparison of the diet

[Note: not essential to use figures, but if used must be correct]

2 marks

(b)(ii) diet would provide more energy ;

need to eat a smaller quantity of food ;

less time spend {hunting /eq} ;

2 marks

(c)(i) 1. more territories in a given area ;

2. greater carrying capacity ;

3. Population would be greater/population density greater ;

2 marks

(c)(ii) any ONE from the following list: disease, predation, climate / weather, water supply, stress, availability of dens / shelter, pest control, road kill ;

1 mark

Question 5 continued **Maximum marks**

(d) 1. Interruption of gene flow between rural and urban foxes / rural and urban populations become separated /no breeding between rural and urban foxes ;

2. by a barrier / behavioral differences ;

3. different environmental conditions either side of barrier ;

4. different selection pressures / different alleles selected for ;

5. formation of two different gene pools ;

6. difference in physical characteristics / dentition ;

7. correct ref to {allopatry /sympatry}

4 marks

Total 13 marks

Question 6 **Maximum marks**

a) 1. {malathion/inhibitor} similar shape to {substrate /acetylcholine} ;

2. blocks active site;

3. prevents {entry / eq} of {acetylcholine / substrate};

2 marks

b) 1. acetylcholine allows impulse to pass across gap/eq;

2. acetylcholine binds to receptor on post synaptic membrane ;

3. (causes) depolarisation/ action potential ;

4. malathion {inhibits / prevents action of} acetylcholinesterase;

5. (therefore) acetylcholine not {hydrolysed / broken down} ;

6. (results in) idea of {further / continued / over} stimulation of post-synaptic membrane /{more / too many} impulses transmitted;

7. idea of over-stimulation of {muscles / glands / eq} / idea of loss of coordination;

5 marks

Question 6 continued **Maximum marks**

c) 1. (chemicals) {rapid / quicker result} / easier to apply;

2. idea of storage only temporary / cannot establish long-term balance of organisms used in biological methods;

3. difficult to remove control organisms from fruit etc;

4. ref. to reliability /kills all the insects ;

2 marks

d) 1. (biodegrade organophosphates are not being used) so percentages fall ;

2. (non-biodegradable) {do not break down / persist / accumulate in environment};

3. (therefore) remain on {fruit / vegetables / grains};

4. so other {detectable/non biodegradable} residues/eq will increase;

3 marks

Total 12 marks

Question 7 **Maximum marks**

(a) {chemical energy / carbohydrates stored} / {energy fixed/ eq} ;
in {producers / green plants/ by {photosynthesis / autotrophic nutrition} ;

2 marks

(b)(i) 180 - 145 = 35;
(5 / 35) x 100 or other intermediate stage ;
= 14.3 (%) ;

3 marks

(b)(ii) 1. {decompose / breakdown / rot /eq} {dead bodies / remains/eq} ;
2. using external digestion ;
3. to release {nutrients / nitrates / eq} / recycling of nutrients ;

2 marks

(b)(iii) 1. temperature lower ;
2. lower enzyme activity ;
3. shorter growing season / less sunlight / less suitable wavelength of light ;
4. less photosynthesis ;
5. less water ;

2 marks

(c) 1. replanting after harvesting trees ;
2. selective felling of timber trees, leaving rest of forest intact ;
3. {pollarding/ coppicing} / harvesting/eq on rotation ;
4. (coppicing)trees cut at ground level and allowed to regrow /(pollarding) cut leaving short trunk idea and regrow;
5. for 4 -25 years and then harvested ;
6. plant fast growing species of trees ;

3 marks

Total 12 marks