

GCE



Edexcel GCE

Biology / Biology (Human) (6101/01)

January 2006

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Mark Scheme (Results)

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Biology / Biology (Human) (6101/01)

# 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 mark

Statement	Insulin	Collagen
Is a fibrous protein	x	✓
Molecule has repeating sequences	x	✓
Is an enzyme	x	x
Is insoluble in water	x	✓

[Any two correct = 1 mark]

[Ignore blank spaces]

[~~✓~~ (altered ticks) are wrong]

4 marks

**Question 2**

**Maximum mark**

Blue ;

Orange / red / brown / yellow / green ;

Acid / named acid ;

Iodine ;

Biuret (reagent) ; [allow Millon's reagent]

**Total 5 marks**

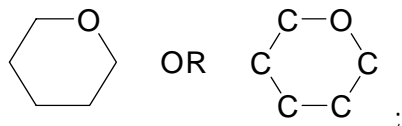
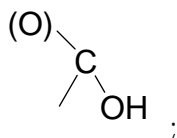
## Question 3

Maximum mark

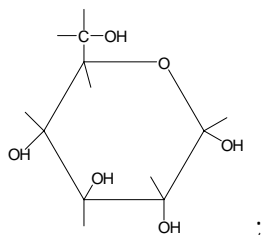
(a) Water ;

1 mark

(b) Correctly drawn 6-membered ring -

OH group on carbon 1 below the ring -

Rest of molecule drawn correctly -



[Accept correct vertical or horizontal transposition]

3 marks

(c) Energy source / eq ;

Idea that it is a source of glucose ;

In germinating seeds ;

2 marks

Total 6 marks

**Question 4**

**Maximum mark**

- (a)
- A Metaphase ;
  - B Prophase ;
  - C Telophase ;

**3 marks**

- (b)
1. Chromatids separate / centromere splits ;
  2. Moved to (opposite) {poles / ends / centrioles} ;
  3. By spindle fibres / microtubules ;
  4. Shortening / eq ;

**2 marks**

- (c) Daughter cells genetically identical to parent cell / maintains chromosome number / eq ;

**1 mark**

**Total 6 marks**

## Question 5

Maximum mark

- (a) ATP production / {aerobic respiration/eq} / oxidative phosphorylation ;
- 1 mark
- (b)
1. Mitochondrion drawn approximately 3x larger ;
  2. Non-stylised intermembrane space ;
  3. 5 or 6 non-stylised cristae ;
  4. Matrix **and** cristae correctly labelled ;
- 4 marks
- (c)
1. Reference to resolving power (of microscope) / membranes too close together to be seen separately ;
  2. Reference to dehydration / damage during preparation /eq ;
  3. Section cut through different planes (or mitochondria)/ eq ;
  4. Distortion of image during reprographics /eq ;
- 2 marks
- Total 7 marks**

**Question 6****Maximum mark**

(a) (i) 1. Cell B ;

2. It has the {lowest / most negative} water potential ;

3. Water moves from a higher to a lower water potential / eq ;

4. Reference to steepest water potential gradient/ eq ;

5. Reference to osmosis ;

**3 marks**

(ii) 1. Pure water has a water potential of zero ;

2. Cells always contain solutes/ eq. (in their cytoplasm) ;

3. Solutes make the water potential {lower / negative} ;

**2 marks**(b) (i) There is a greater concentration of ions in the cell sap  
(than in the culture solution) ;

Ions must therefore have moved against/eq. a concentration gradient ;

**2 marks**

(ii) Reference to cells have absorbed different quantities of each ion ;

**1 mark****Total 8 marks**



**Question 7****Maximum mark**

- (a) Phosphate and base joined to pentose sugar twice ;  
Base correctly joined to sugar ;  
Phosphate joined to two sugars ;

**3 marks**

- (b) 1. Held by hydrogen bonds(holding 2 strands together) ;  
2. {Between complementary base pairs / detail of base pairing } ;  
3. Reference to {5' to 3' and 3' to 5' strands / anti-parallel strands / DNA polymerase}  
4. Reference to double helix ;  
5. Reference to association of DNA with histones ;  
6. Called chromatin ;  
7. Reference to nucleosomes ;  
8. Further {folding / coiling} /ref to scaffold proteins ;

**5 marks**

- (c) (i) Cytosine : 36 ;  
Guanine : 36 ;  
Thymine : 14 ;

**3 marks**

- (ii) 50 (%) ;

**1 mark****Total 12 marks**

## Question 8

Maximum mark

- (a) (i) No contamination of product ;  
Enzyme can be re-used ;  
Allows process to be continuous ;

2 marks

- (ii) 1. Molecules {have relatively little kinetic energy / are moving slowly} ;  
2. Therefore fewer collisions (between substrate and enzyme) / eq ;  
3. Collisions take place with less energy /eq ;  
4. Slower rate of reaction / takes longer for lactose to be {hydrolysed /eq} ;  
5. Idea that not all of the substrate is broken down the first time /eq ;

3 marks

- (b) (i) Hydrolysis ;

1 mark

- (ii) Correct readings from graph i.e. 200 and 600 ( $\text{mg minute}^{-1}$ ) ;  
Increase in rate =  $600 - 200 (= 400)$   
% increase =  $400 \div 200 \times 100 (= 200\%)$  ;

3 marks

- (iii) 1. Enzyme is rate limiting ;  
2. Therefore all of the enzymes active sites are full /eq ;  
3. At any one time / eq ;  
4. This may be the maximum rate (of glucose production) / ref to  $V_{\text{max}}$  ;  
5. Substrate (concentration) is not rate limiting / eq ;

2 marks

- (c) Greater surface area of beads / increased contact between enzyme and substrate /  
eq. / more active sites available /eq ;

1 mark