edexcel
advancing learning, changing lives

Mark Scheme (Results)
January 2011

GCE

GCE Biology (6BI05/01)

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our website at www.edexcel.com.

If you have any subject specific questions about the content of this Mark Scheme that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:

http://www.edexcel.com/Aboutus/contact-us/

Alternatively, you can speak directly to a subject specialist at Edexcel on our dedicated Science telephone line: 0844 576 0037

January 2011

Publications Code UA026143

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

GENERAL INFORMATION

The following symbols are used in the mark schemes for all questions:

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
/ 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
[CE] or [TE]	Consecutive error / transferred error

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 Number	Answer	Mark
1(a)(i)	D ;	**(1)**

Question Number	Answer	Mark
1(a)(ii)	B ;	**(1)**

Question Number	Answer	Mark
1(b)	1. {hold / attaches / eq} bones together / eq ; 2. idea that still allows movement (at the joint) / eq ;	**(2)**

Question Number	Answer	Mark
1(c)	1. comment on time needed for repair / eq ; 2. reference to difference in composition of {P and Q} e.g. ligament has more elastic fibres , P is inelastic, P is less flexible ; 3. idea of need to (gradually) stretch repaired tissue ;	**max (2)**

Question Number	Answer	Mark
1(d)	1. less damage (to tissue) / eq ; 2. short time for recovery / eq ; 3. social benefit e.g. more patients can be treated ; 4. idea of economic benefit e.g. cheaper than invasive surgery ; 5. idea of less anaesthetic needed ;	**max (3)**

Question Number	Answer	Mark
2(a)(i)	between 7 and 8 <u>hours</u> / 8 <u>hours</u> ;	**(1)**

Question Number	Answer	Mark
2(a)(ii)	1. idea of not enough time (in the dark) ; 2. idea that {Pfr /active phytochrome} levels remain too high ; 3. reference to threshold e.g. once Pfr below a certain level (flowering happens) ; 4. flowering {stimulated / eq} (by fall in Pfr) ;	**max (2)**

Question Number	Answer	Mark
2(b)	1. reference to control ; 2. idea of comparison e.g. to show that flowering would not happen (without the cover) / eq ;	**(2)**

Question Number	Answer	Mark
2(c)	1. six hours too short (to cause flowering in plant E) / eq ; 2. eight hours {is long enough / causes flowering / eq} ; 3. idea of enough stimulus if part of the plant is in the dark for {8 hours / long time / enough time / eq} ; 4. leaf is (photo) receptor / eq ; 5. {phytochrome / Pfr / Pr} in leaves ; 6. signal must be passed to {growing points/site of flower production} from leaves / eq ;	**max (4)**

Question Number	Answer	Mark
2(d)	1. idea of {flowering / development /eq} happens at the right time ; 2. therefore flowers when insects available / leaf fall in autumn / same species flower at the same time / seeds germinate at the right time / eq ; 3. idea that day length changes to a set pattern e.g. always {short days in winter / long days in summer} ; 4. comparison with other less regular stimuli e.g. temperature ;	**max (3)**

Question Number	Answer	Mark
3(a)	1. (L-Dopa) can reach brain / unlike dopamine treatment / eq; 2. converted to dopamine (in brain) / eq ; 3. increases dopamine levels in the brain / eq ; 4. Parkinson's disease has low dopamine levels / reduces symptoms of Parkinson's disease / eq ;	**max (2)**

Question Number	Answer	Mark
3(b)	1. reference to {higher levels of / more} serotonin / eq ; 2. reference to synapse / eq ; 3. {inhibits / eq} reabsorption (into neurone) / eq ; 4. may reverse pumps to release more serotonin / eq ;	**max (3)**

Question Number	Answer	Mark
3(c)(i)	to mimic Parkinson's disease / Parkinson's disease has low dopamine levels / eq ;	**(1)**

Question Number	Answer	Mark
3(c)(ii)	1. (rationalist view) overall good should outweigh harm (to animals) ; 2. (absolutist view) all use (of animals) unacceptable ; 3. idea of as few animals as possible used in the trial ; 4. welfare of animals should be important / eq ;	**max (3)**

Question Number	Answer	Mark
3(d)	1. test {small sample / eq} {for safety / of healthy individuals} / eq ; 2. large sample of {patients / tested for effectiveness} / eq ; 3. reference to clinical trials on {1000s / larger sample} ; 4. reference to double blind {trials /tests} ; 5. reference to placebo ; 6. idea of representative sample e.g. take into account sex, age ;	**max (3)**

Question Number	Answer	Mark
4(a)	$3.5 \times 10^{-3} \div 1.7 \times 10^{-6}$ / $(3.5 \div 1.7) \times 10^{3}$; =2059 {million / $\times 10^{6}$}/ 2058.8 {million / $\times 10^{6}$} / 2 058 823 530 ; <u>Note:</u> 2 marks for correct answer 1 mark for incorrect answer but correct working	**(2)**

Question Number	Answer	Mark
4(b)(i)	fast twitch (fibre) / type II (fibre) ;	**(1)**

Question Number	Answer	Mark
4(b)(ii)	1. (ATP from) phosphorylation of ADP / eq ; 2. energy required (for phosphorylation) / eq ; 3. reference to glycolysis / glucose converted to pyruvate / eq ; 4. pyruvate {converted to lactate / reduced /eq} ; 5. idea that makes NAD available ; 6. reference anaerobic respiration ; 7. in (cell) cytoplasm / eq ; 8. ATP from oxidative phosphorylation in mitochondria / eq ; 9. idea that phosphocreatine is involved in production of ATP ;	**max (5)**

Question Number	Answer	Mark
4(b)(iii)	1. ATP supply limited / eq ; 2. reference to {anaerobic respiration / lots of lactate / eq} / eq ; 3. pH is lower / eq ; 4. affects enzymes / prevents muscle contraction / eq ;	**max (2)**

Question Number	Answer	Mark
5(a)	glycolysis ;	**(1)**

Question Number	Answer	Mark
5(b)(i)	B ;	**(1)**

Question Number	Answer	Mark
5(b)(ii)	C ;	**(1)**

Question Number	Answer	Mark
5(c)(i)	1. oxygen {to oxidise hydrogen / as hydrogen acceptor / as final acceptor of electron transport chain} / eq ; 2. reference to reduced {coenzyme / NAD / FAD / eq} ; 3. (reduced coenzyme) from {glycolysis / Krebs Cycle / eq} ; 4. comparison of two {oxygen uptake / respiration rates} from pyruvate, molecules B and C e.g. respiration rate faster in pyruvate than molecule B ; 5. reference to uptake of substrate compared e.g. uptake of molecule B faster than molecule C ; 6. comparison of diffusion rate / molecular size / eq ; 7. comment on oxidation level of substrate e.g. ratio H:O in molecule /eq ; 8. relative quantity of {reduced coenzyme / eq} produced / eq ; 9. pH effect of pyruvate more favourable for {enzyme / reaction} / eq ; 10. number of carbon atoms of {C lower than B} / eq ;	**max (4)**

Question Number	Answer	Mark
5(c)(ii)	1. lactate can be converted to {pyruvate / eq} ; 2. increases oxygen requirement / reference to oxygen debt / eq ; 3. idea of most potential for oxidation / e.g. can make the most {reduced coenzyme / eq} ;	**max (2)**

Question Number	Answer	Mark
6(a)	1. idea that stimulation generated from within (muscle) e.g. no external stimulation ; 2. idea of brings about depolarisation ;	**(2)**

Question Number	Answer	Mark
***6(b) QWC**	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. reference to {*Sinoatrial node / SAN*} ; 2. initiates *depolarisation* / eq ; 3. passes through (wall of) *atria* / eq ; 4. causes *atrial* {*systole* / eq} ; 5. *AVN* conducts to *ventricles* / eq ; 6. reference to {*Purkyne* fibres / bundle of *His*} ; 7. ventricular {*systole* / eq} follows (from apex) / eq ; 8. atrioventricular valves closed (and prevent flow to atria) ; 9. *semilunar* valves opened by pressure / eq ; 10. blood forced into *arteries* / eq ; 11. changed pressure in {*diastole* / eq} closes *semilunar* valves ;	**max (6)**

Question Number	Answer	Mark
7(a)	1. rhodopsin / iodopsin ; Any one from: 2. broken down by light / / generates {action potentials / nerve impulses} / / appropriate reference to {black and white / monochromatic / colour / trichromatic} vision ;	**max (2)**

Question Number	Answer	Mark
7(b)	1. sequencing of human DNA / eq ; 2. {provides knowledge / eq} of human genetics / eq ;	**(2)**

Question Number	Answer	Mark
7(c)	1. lifestyle / environmental factors / eq ; 2. such as {carcinogens / eq} ; 3. such as {diet / obesity / inactivity} / eq ; 4. such as infections / eq ; 5. genes may make it more likely / eq ;	**max (3)**

Question Number	Answer	Mark
7(d)	1. gene {needs to be switched on / expressed / eq} ; 2. by transcription factors / eq ; 3. in order to produce {mRNA / protein / CFTR} ; 4. (transcription factors) might not be present / eq ;	**max (3)**

Question Number	Answer	Mark
***7(e) QWC**	(QWC – Spelling of technical terms *(shown in italics)* must be correct and the answer must be organised in a logical sequence) 1. triplet code / eq ; 2. represents amino acid (sequence) / eq ; 3. (mRNA) binds to ribosome / eq ; 4. reference to {anticodon / codon} ; 5. tRNA decodes mRNA / provides correct amino acid / eq ; 6. idea of two tRNA sites in the ribosome ; 7. two amino acids brought together / eq ; 8. joined with peptide bond / eq ; 9. reference to peptidyl transferase ; 10. idea that sections of DNA are {templates for / transcribed into} RNA ;	**max (6)**

Question Number	Answer	Mark
7(f)	1. bonds to DNA / eq ; 2. idea of sequence of bases recognised ; 3. (sequence of bases) has unique shape / eq ; 4. idea of bonding in DNA recognised ;	**max (2)**

Question Number	Answer	Mark
7(g)	1. accumulation of small mutations / eq ; 2. changes existing genes / eq ; 3. idea of gene duplication and one mutates ; 4. which allows mutation without losing function ; 5. (subfunctionalism) separates functions into separate genes / eq ; 6. (retroposition) produces DNA {without introns / from mRNA} / eq ; 7. idea of (frameshift) reads genetic code from new starting point ; 8. idea that junk DNA can become an active gene ;	**max (5)**

Question Number	Answer	Mark
7(h)	1. causes inflammation / eq ; 2. atheroma can lead to atherosclerosis / eq ;	**max (2)**

Question Number	Answer	Mark
7(i)	1. idea of non-overlapping code ; 2. reference to {start codon / there is a frame / RNA polymerase binding site} / eq ; 3. only one {template / eq} strand / eq ; 4. reference to direction of reading of strand e.g. 5'-3' ;	**max (2)**

Question Number	Answer	Mark
7(j)	1. selective advantage / eq ; 2. (characteristic) passed to more offspring / eq ; 3. increased frequency of allele in population / eq ; 4. reference to speciation ;	**max (3)**

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481

Email publications@linneydirect.com

Order Code UA026143 January 2011

For more information on Edexcel qualifications, please visit www.edexcel.com/quals

Edexcel Limited. Registered in England and Wales no.4496750
Registered Office: One90 High Holborn, London, WC1V 7BH