

# Mark Scheme (Results)

## June 2010

GCE

GCE Biology (6BI08/01)

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## 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)	<p><b><u>Factor</u></b></p> <p>suitable factor stated e.g. temperature /age / storage / duration / prior treatment with solvent / pH / bile salts /eq ;</p> <p><b><u>Hypothesis</u></b></p> <p>hypothesis must be testable ;</p>	(2)

Question Number	Answer	Mark
1(a)(ii)	<ol style="list-style-type: none"> <li>1. reference to effect on the permeability of the membrane (of cell or vacuole) ;</li> <li>2. reference to which part of the membrane affected e.g. {phospholipids / proteins} ;</li> <li>3. explanation of how membrane component affected e.g. { movement or solubility of phospholipids / denaturation of protein} / eq ;</li> <li>4. reference to {betalain / pigment / red colour} leaking from the {cells / vacuoles} ;</li> <li>5. suitable trend suggested for stated factor e.g. increasing temperature has {no / little effect} at low temperature but a greater effect at high temperature / increasing alcohol concentration increases permeability ;</li> </ol>	max (3)

Question Number	Answer	Mark
1(b)(i)	<ol style="list-style-type: none"> <li>1. {volume / mass / surface area} of beetroot (cylinders) used / eq ;</li> <li>2. {type / source / variety / eq} of beetroot used;</li> <li>3. age of beetroot / eq;</li> <li>4. volume of water used / eq ;</li> <li>5. time spent in {solution / water / tube / eq} ;</li> <li>6. pH ;</li> <li>7. any other suitable variable ;</li> </ol>	max (2)

Question Number	Answer	Mark
1(b)(ii)	<p><b><u>Factor controlled</u></b></p> <ol style="list-style-type: none"> <li>1. suitable control method described e.g. temperature by using a water bath / eq ;</li> </ol> <p><b><u>Description of effect</u></b></p> <ol style="list-style-type: none"> <li>2. description of likely effect on the dependent variable provided e.g increased temperature increases leakage of pigment / eq ;</li> </ol>	(2)

Question Number	Answer	Mark
1(c)	<ol style="list-style-type: none"> <li>1. reference to measuring colour of solution ;</li> <li>2. appropriate method of reducing error described e.g. use of suitable reference {cuvette / solution} / reference to calibration / reference to suitable filter used / eq ;</li> </ol>	(2)

Question Number	Answer	Mark
2(a)	there will be no significant difference in the number of red blood cells in the blood of the athletes before and after the mountain training / eq ;	(1)

Question Number	Answer	Mark																																												
2(b)	<ol style="list-style-type: none"> <li>suitable table format ;</li> <li>correct column headings with units ;</li> <li>all differences calculated correctly ;</li> <li>differences include suitable - sign for A and I ;</li> </ol> <table border="1" data-bbox="395 907 1161 1433"> <thead> <tr> <th></th> <th colspan="3">Number of red blood cells (<math>\times 10^{12}</math>) per <math>\text{dm}^3</math></th> </tr> <tr> <th>Athlete</th> <th>before mountain training</th> <th>after mountain training</th> <th>Difference</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>5.0</td> <td>4.9</td> <td>-0.1</td> </tr> <tr> <td>B</td> <td>5.1</td> <td>5.3</td> <td>0.2</td> </tr> <tr> <td>C</td> <td>4.9</td> <td>5.7</td> <td>0.8</td> </tr> <tr> <td>D</td> <td>5.3</td> <td>5.5</td> <td>0.2</td> </tr> <tr> <td>E</td> <td>5.4</td> <td>5.6</td> <td>0.2</td> </tr> <tr> <td>F</td> <td>5.0</td> <td>5.4</td> <td>0.4</td> </tr> <tr> <td>G</td> <td>4.8</td> <td>5.3</td> <td>0.5</td> </tr> <tr> <td>H</td> <td>5.1</td> <td>5.6</td> <td>0.5</td> </tr> <tr> <td>I</td> <td>5.5</td> <td>5.1</td> <td>-0.4</td> </tr> </tbody> </table>		Number of red blood cells ( $\times 10^{12}$ ) per $\text{dm}^3$			Athlete	before mountain training	after mountain training	Difference	A	5.0	4.9	-0.1	B	5.1	5.3	0.2	C	4.9	5.7	0.8	D	5.3	5.5	0.2	E	5.4	5.6	0.2	F	5.0	5.4	0.4	G	4.8	5.3	0.5	H	5.1	5.6	0.5	I	5.5	5.1	-0.4	(4)
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Question Number	Answer	Mark
2(c)	<ol style="list-style-type: none"> <li>athlete A / C / I ;</li> <li>for {A / I} red blood cell count decreased (after mountain training) / for C increase greater than others / eq ;</li> </ol>	(2)

Question Number	Answer	Mark
2(d)	1. $\{5.1 / 5.12\} \times 10^{12} / \text{eq} ;$ 2. $\{5.4 / 5.38\} \times 10^{12} / \text{eq} ;$	(2)

Question Number	Answer	Mark
2(e)	<b>A</b> axes correct orientation and scale with units and labels ; <b>F</b> data plotted as bar chart ; <b>P</b> bars plotted correctly ; <b>B</b> range bar included ;	(3)

Question Number	Answer	Mark
2(f)	1. the value of t is greater than {critical value / 2.12} / eq ; 2. at the 95% confidence level /reference to probability 0.05 / significance {5% /0.05} / eq ; 3. therefore there is an increase in the number of red blood cells (per $\text{dm}^3$ of blood) in the athletes after (2 weeks of mountain) training / eq ;	max (3)



Question Number	Answer	Mark
3(a)	<ol style="list-style-type: none"> <li>1. reference to an appropriate sampling technique e.g. need some form of systematic sampling to provide a suitable range of distances seeds are placed apart from each other ;</li> <li>2. &amp; 3 . credit any two appropriate safety issue e.g. suitable reference to lack of danger, consideration as to whether parsnip seeds are poisonous, reference to dangerous animals, washing hands ; ;</li> <li>4. reference to an appropriate ethical issue e.g. lack of ethical considerations in growing parsnip seedlings ;</li> </ol>	max (3)

Question Number	Answer	Mark
3(b)	<ol style="list-style-type: none"> <li>1. practice method / see if method will work / eq ;</li> <li>2. check most suitable {conditions / seasons / eq} for {growth/ germination} (of parsnip seeds) ;</li> <li>3. select suitable timescale (for measuring germination / growth rates) / eq ;</li> <li>4. identify other variables that may need to be taken into account / eq ;</li> <li>5. reference to use same {source / variety} of parsnip seeds ;</li> <li>6. to determine appropriate dependent variable / eq ;</li> </ol>	max (4)

Question Number	Answer	Mark
3 (c)	<ol style="list-style-type: none"> <li>1. clear statement of dependent variable i.e. exactly what is to be measured stated (percentage / eq) of seeds germinated / mass of {parsnips / eq} ;</li> <li>2. measurement method described ;</li> <li>3. clear statement of a suitable independent variable e.g. sowing density ;</li> <li>4. {distances apart / densities} for parsnip seeds suggested ;</li> <li>5. reference to consideration of source of the parsnip seeds (to reduce variation) ;</li> <li>6. suitable medium for germination of seeds suggested (compost / moist cotton wool / plant tissue culture / eq) ;</li> <li>7. some clear consideration of time period over which the seeds will be {measured / allowed to germinate / eq} ;</li> <li>8. identification of one other variable that could affect growth / germination ;</li> <li>9. description of how this variable can be controlled ;</li> <li>10. identification of a second variable that could affect growth / germination ;</li> <li>11. description of how second variable can be controlled ;</li> <li>12. clear reference to need for repeats ;</li> </ol>	(8) + (2) QWC

**QWC award up to 2 marks**

level	Mark	Descriptor
Level 1	0	The account is very disorganised and is very difficult to follow. Scientific vocabulary is very limited with many spelling and grammatical errors.
Level 2	1	There is some disorganisation in the account which is not always in the correct sequence. Some relevant scientific vocabulary is used. The account is not always in continuous prose and there are grammatical errors and some important spelling mistakes.
Level 3	2	The account is well organised with no undue repetition and a correct sequence. There is good use of scientific vocabulary in the context of the investigation described. The account is written in continuous prose which is grammatically sound with no major spelling errors.

Question Number	Answer	Mark
3(d)	<ol style="list-style-type: none"> <li>1. clear table which matches method description with headings and units ;</li> <li>2. reference to means calculated from repeat data ;</li> <li>3. graph format appropriate to data ;</li> <li>4. statistical test appropriate to data e.g. use of {Spearman's Rank / eq} for correlation / suitable test to compare numbers germinated {t- test/ Mann-Whitney U test/ Chi - squared / eq} ;</li> <li>5. statistical test justified /eq ;</li> </ol>	max (4)

Question Number	Answer	Mark
3(e)	<ol style="list-style-type: none"> <li>1. difficult to control all factors (affecting yield) / eq ;</li> <li>2. impossible to control natural variation of seeds / genetic factors / eq ;</li> <li>3. timing of germination may be erratic / eq ;</li> <li>4. measuring {germination / eq} does not necessarily correspond to yield of crop / eq ;</li> <li>5. {controlled / experimental / eq} conditions may not represent natural growing conditions / eq ;</li> <li>6. any other appropriate limitation ;</li> </ol>	<p style="text-align: right;">max (3)</p>

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