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Mark Scheme (Results)
January 2011

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)	1. prepare suitable (nutrient) agar / pour molten agar into a Petri dish / eq ; 2. inoculation of plate with bacteria e.g. transfer a (measured volume of) a bacteria culture to the agar and mix / eq ; 3. place antibiotic discs onto agar (containing the bacteria) / eq ; 4. ref to aseptic technique e.g. use sterile forceps to transfer discs to plate / eq ; 5. incubate plates ; 6. reference to detail of incubation e.g. suitable time / temperature / inversion of plates during incubation / fixing lid with tape eq ; 7. measure diameter of clear zone around disc / eq; 8. compare sizes of clear zone / eq; 9. reference to a suitable control e.g. paper disc soaked in water / eq ;	**max (6)**

Question Number	Answer	Mark
1(b)(i)	1. temperature ; 2. time incubated ; 3. concentration of antibiotic used ; 4. concentration / volume of bacteria solution used ; 5. nutrients in the agar / eq ; 6. type of bacteria used / eq ; 7. aerobic or anaerobic conditions / eq ; 8. {size / spacing / eq} of antibiotic discs /eq ;	**max (2)**

Question Number	Answer	Mark
1(b)(ii)	description of a suitable method to control one of the variables named in (b)(i) ;	**(1)**

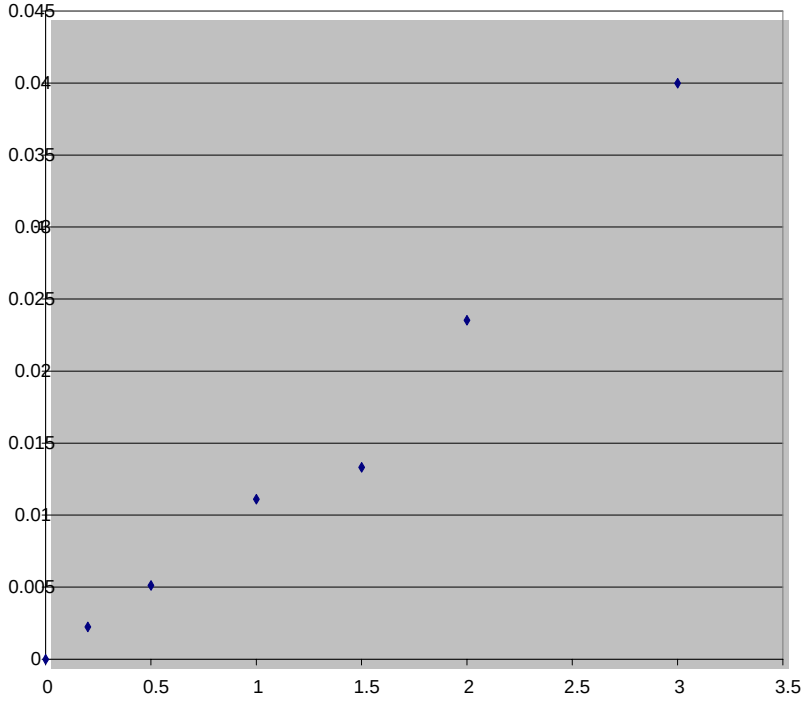
Question Number	Answer	Mark
1(c)	1. aseptic technique described e.g. flame necks of bottles / eq ; 2. do not seal plates when incubating them / tape lids down but allow air in / eq ; 3. use of {disinfectants / ethanol / eq} to clean {bench / apparatus used / eq} ; 4. safe disposal of {culture / plates / eq} / eq ; 5. wash hands after handling equipment /eq ; 6. keep ethanol away from naked flames / eq ; 7. suitable method for handling molten agar described e.g wear heat resistant gloves ;	**max (2)**

Question Number	Answer	Mark
1(d)	cost of antibiotic / effective {concentration / dose / duration /eq} risk of {side effects / allergic reactions} / is the antibiotic on a restricted list / {age / other medication / pregnancy /mass /eq} of patient / bacteriocidal or bacteriostatic / effect on advantageous bacteria in body / / eq ;	**(1)**

Question Number	Answer	Mark
2(a)	idea of equilibration / to make sure (rennin and milk) tubes reach the desired temperature before mixing / eq ;	**(1)**

Question Number	Answer	Mark
2(b)	1. suitable table format which includes all raw and calculated values; 2. correct column headings with units ; 3. all conversions to time in seconds correct ; 4. all means times correct ; 5. rates calculated correctly;	**max (5)**

Enzyme concentration (%)	Time for milk to clot/s			Mean rate of milk clotting /s^{-1}
	1	2	Mean	
0.0	Did not clot			0
0.2	420	450	435	0.002
0.5	210	180	195	0.005
1.0	90	90	90	0.011
1.5	60	90	75	0.013
2.0	45	40	{42.5/43}	0.024/0.023
3.0	30	20	25	0.040

Question Number	Answer	Mark
2(c)	**(Effect of changing the concentration of the enzyme rennin on the rate of clotting of milk)**  **A** axes correct orientation and scale with units and labels ; **F** data plotted as line / scatter graph ; **P** points plotted correctly ;	**(3)**

Question Number	Answer	Mark
2(d)	1. 1.5 / 3 (%); 2. appropriate comment on anomaly e.g. for 1.5 rate lower than general trend / does not fit line of best fit / eq ;	**(2)**

Question Number	Answer	Mark
2(e)	1. the value (of r) is greater than the critical value at 95% confidence / eq ; 2. there is a <u>significant</u> (positive) correlation between the increase in the concentration of {enzyme / rennin} and the rate of milk clotting / eq ;	**(2)**

Question Number	Answer	Mark
2(f)	1. increase in number of (enzyme) active sites available / eq ; 2. increased number of {collisions / enzyme substrate complexes / eq} ;	**(2)**

Question Number	Answer	Mark
3(a)	1. ref to an appropriate sampling technique e.g. need for some method of random sampling within the woodland; 2. & 3 . credit any two appropriate safety issues e.g. possible risk from indigenous animals / unidentified plants / insect bites / falling branches / slips and trips ;; 4. ref to an appropriate ethical issue e.g. reference to minimising disturbance to the habitat / no significant ethical issues ;	**max (3)**

Question Number	Answer	Mark
3(b)	1. practice method / see if method will work / eq ; 2. check most suitable size of quadrat to use / eq ; 3. select suitable {area / time }for sampling / decide on total size of area for sampling / eq ; 4. ref to standardising light measurements / check suitable time of day for sampling ; 5. {consider / state} what other variables need to be taken into {account / measured} eq ; 6. to determine appropriate dependent variable / eq ;	**max (3)**

Question Number	Answer	Mark
3 (c)	1. clear statement of dependent variable i.e. exactly what is to be measured stated e.g. percentage ground cover of primroses / eq ; 2. identification of one other variable that could affect growth of primroses e.g. gradient of slope, mineral content of soil, other surrounding vegetation, trampling, grazing ; 3. description of how this variable can be {controlled / minimized} e.g. through choice of site ; 4. identification of second variable that could affect growth of primroses ; 5. description of how this second variable can be {controlled / minimized} ; 6. justification of choice of size of quadrat ; 7. method described for placement of quadrat e.g. mark 100m x 100m grid and use random number tables / ref to transect method described ; 8. mark each plot for sampling and measure light intensity several times during the day / eq ; 9. light intensity sampling in all plots should be measured as close to the same time as possible ; 10. select suitable equipment to measure light intensity e.g. light meter, light probe and data logger, camera with light meter ; 11. stated number of measurements matched to statistical test chosen ; 12. clear reference to need for repeats ;	**(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)	1. clear table which matches method description with headings and units ; 2. means calculated from {repeat light intensity data / eq } ; 3. graph format appropriate to data, with correctly labelled axes e.g. scatter / line / bar ; 4. statistical test appropriate to data e.g. use of correlation test (Spearman's rank / eq) / suitable test to compare numbers (t- test/ Mann-Whitney U test/ eq) ; 5. statistical test justified /eq ;	**max (4)**

Question Number	Answer	Mark
3(e)	1. difficult to control all other factors affecting primrose abundance / eq ; 2. recognition that light intensity can change during sampling / eq ; 3. angle of sun changes during the day / eq ; 4. age / stage of primrose would affect % cover / eq ; 5. light levels measured on the day may not be representative of normal conditions /eq ; 6. suitable reference to difficulty of sampling technique / eq ; 7. any other appropriate limitation e.g competition from other plants ;	**max (3)**

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