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Mark Scheme (Results)

January 2012

GCE Biology (6BI02) Paper 01
Development, Plants & Environment

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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)	B ;	**(1)**

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

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

Question Number	Answer	Mark
1(a) (iv)	A ;	**(1)**

Question Number	Answer	Mark
1(a) (v)	C ;	**(1)**

Question Number	Answer	Mark
***1(b)QWC**	(QWC – **Spelling** of technical terms must be correct and the answer must be organised in a logical sequence) 1. *nucleolus* {disappears / breaks down} / eq ; 2. *nuclear {envelope/ membrane}* breaks down / eq ; 3. *centrioles* move to (opposite) poles / *centrioles* separate / eq ; 4. {*spindle* / *spindle* fibres / asters} form / are visible / are produced by *centrioles* / eq ; 5. *{chromosomes / chromatids}* become visible / eq ; 6. *{chromosome / chromatid / chromatin }* condenses / DNA coils / eq ; 7. (chromosomes can be seen as) {pairs of /sister } *chromatids* / eq ; 8. correct reference to *centromere* (holding chromatids in pairs);	**(5)**

Question Number	Answer	Mark
2 (a)	1. natural ; 2. evolution / speciation / reproduction; 3. behavioural ;	**(3)**

Question Number	Answer	Mark
2 (b)		**(3)**

Description	**Adaptation**
Hearing becoming temporarily less sensitive after listening to a loud music for a few hours	Physiological ;
Heart beats faster when the hormone adrenaline is released	Physiological ;
People in a cold climates having a shorter neck than people living in hot, dry conditions	Anatomical ;

Question Number	Answer	Mark
3 (a)	1. year 1 ; 2. {more / eq } species present (in year 1) / greater variety of species ; Ignore references to abundance.	**(2)**

Question Number	Answer	Mark
3 (b)(i)	mitosis ;	**(1)**

Question Number	Answer	Mark
3 (b)(ii)	1. low genetic diversity is {few / low number of / less / eq} different <u>alleles</u> in the {gene pool / population / species} / small gene pool / eq ; 2. (asexual reproduction leads to) all offspring being {<u>genetically</u> identical / clones / same genotype / same <u>alleles</u> } ; 3. no meiosis/ no recombination of genetic material / eq; 4. idea of variation only possible as a result of mutation ;	**(2)**

Question Number	Answer	Mark
*** 3 (c)**	(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence) 1. (description of how to vary the independent variable) Idea of at least 5 different nitrate (ion) concentrations ; 2. Reference to repeats at each concentration ; 3. (measuring of dependent variable) Increase in {length/mass/ height} ; 4. use plants that are genetically {similar / same} / same age / same original {height/ size / mass} of plant ; 5. & 6. Controlling abiotic factors, maximum 2 from list: • time (at least a week) allowed for growth • other mineral ions constant • temperature • light (intensity) • water provided • pH of {solution / soil} • CO_2 concentration ;; 7. idea of control described, e.g. no nitrate/ soil with no extra nitrate ;	**(5)**

Question Number	Answer	Mark
4 (a) (i)	1. centre of point added to graph at 700µm for 10% ; 2. error bar from 720 µm to 680 µm ; 3. points correctly joined by neat ruled straight lines ;	**(3)**

Question Number	Answer	Mark
4 (a) (ii)	1. up to 10% sucrose, {an increase in sucrose increases (mean) length of pollen tube / positive correlation } / eq ; 2. greatest increase between 5% and 10%/ eq ; 3. greatest (mean length of pollen tube) at 10% / eq ; 4. idea that above 10% the pollen tubes are shorter e.g. negative effect or correlation ; 5. credit correct manipulation of the data e.g. 570-580 µm longer when grown in 10% sucrose compared to 0% sucrose ; 6. appropriate comment on significance of overlapping {error / range} bars between {5% and 30% / 10% and 20%} ;	**(3)**

Question Number	Answer	Mark
4(b)	1. idea of {forms a pathway/ grows down } through the style / eq ; 2. grows towards { ovary / ovule / micropyle / egg cell / eq} ; 3. reference to digestive enzymes; 4. transports {generative nucleus / haploid nuclei / male gametes / eq} / eq ; 5. fuses with embryo sac (membrane) / tip breaks down when it enters the micropyle / allows male nuclei to enter embryo sac /eq ;	**(3)**

Question Number	Answer	Mark
5 (a) (i)	Archaea / Archaebacteria / eq ;	**(1)**

Question Number	Answer	Mark
5 (a)(ii)	Peer review / conclusions drawn from data are { logical / valid / eq } / data are {acceptable / reliable} / check for plagiarism ;	**(1)**

Question Number	Answer	Mark
5 (a)(iii)	Any **two** from: 1. (scientific) conference/ poster / presentation/ seminar / lecture ; 2. internet / eq, e.g. websites – blogs ; 3. book / scientific magazine ;	**(2)**

Question Number	Answer	Mark
5 (a)(iv)	1. idea of {checking his methods / repeating experiments / eq} ; 2. to collect more data /review his data / test his results / eq ; 3. to see if his results could be replicated / check reliability of data / eq ;	**(2)**

Question Number	Answer	Mark
5 (b)	<table><tr><th rowspan="2">Feature</th><th colspan="2">Domain</th></tr><tr><th>Bacteria</th><th>Eukaryota</th></tr><tr><td>Ribosomes</td><td>✓</td><td>✓</td></tr><tr><td>Smooth endoplasmic reticulum</td><td>×</td><td>✓</td></tr><tr><td>Cell (surface) membrane</td><td>✓</td><td>✓</td></tr><tr><td>Slime capsule</td><td>✓</td><td>×</td></tr></table> ;;;; Any two correct for one mark	**(4)**

Question Number	Answer	Mark
6 (a)	1. plants can be {re-grown / sustainable / eq} OR starch {renewable / sustainable} OR oil is { non- sustainable / non-renewable eq} ; 2. idea of biodegradability ; 3. idea of cheapness ;	**(2)**

Question Number	Answer	Mark
6 (b)	<table><tr><th>Statement</th><th>Starch</th><th>Cellulose</th></tr><tr><td>Consists of microfibrils held together by hydrogen bonds</td><td>×</td><td>×</td></tr><tr><td>Found in amyloplasts</td><td>✓</td><td>×</td></tr><tr><td>Made up of ß-glucose monomers</td><td>×</td><td>✓</td></tr></table> 1 mark for each correct row ;;;	**(3)**

Question Number	Answer	Mark
6 (c)(i)	1. chloroplast (s) ;	**(1)**

Question Number	Answer	Mark
6 (c)(ii)	1. (it has) ribosomes {floating / inside membrane / eq}/ in rER {ribosomes not floating / are attached (to membranes) / not inside} / eq ; 2. it has DNA / rER does not contain DNA / eq ; 3. idea of presence of internal membranes e.g. thylakoid membrane, grana ; 4. (it has) a {double membrane / envelope}/ rER does not have a {double membrane / envelope} / eq ; 5. no {flattened sacs / cisternae} / eq ; 6. contains starch / eq ;	**(2)**

Question Number	Answer	Mark
6 (d)	1. <u>both</u> are used for (structural) support / eq ; 2. only xylem (vessels) transport water / eq ; 3. only xylem (vessels) transport mineral ions / eq ; allow converse for 2nd and 3rd marking points	**(3)**

Question Number	Answer	Mark
7 (a)	1. positive correlation (between concentration of extract and diameter of zone of inhibition / eq ; 2. decrease small between 100 and 60% / larger decrease {between 60 and 20% / below 60%} / eq OR idea of difference in gradient before and after 60% ; 3. idea of direct proportionality {above / below} 60% e.g. linear {above / below} 60% ; 4. correct manipulation of the data (e.g. diameter decreased by 10mm as concentration of extract drops by 80% / from 100% to 20%) ; allow converse statements referring to increase in concentration of extract Ignore reference to rate	**(3)**

Question Number	Answer	Mark
7 (b)	1. 100% /full strength / eq ; 2. largest zone of inhibition / eq ; 3. means most bacteria {killed / not reproducing / prevented from growing } / fewer bacteria able to grow / eq ; 4. faster diffusion at higher concentration / eq ;	**(3)**

Question Number	Answer	Mark
7 (c)	(disc) {soaked (only) in water / with no garlic extract on it / 0% garlic extract } / eq ;	**(1)**

Question Number	Answer	Mark
7 (d)	1. so no { bacteria/ fungi / microbes } (alive) on them / prevents contamination by microbes/ eq ; 2. that could be {harmful / pathogenic / eq} ; 3. idea that could compete with {*Micrococcus luteus* / those on the plate} / affect growth of *Micrococcus luteus* / eq ;	**(2)**

Question Number	Answer	Mark
7(e)	1. reference to increase in zone of inhibition / reference all results would have shown an equal zone of inhibition ; 2. alcohol would have killed {the bacteria in the plate / named bacteria} / alcohol is antimicrobial / eq ; OR 1. reference to decrease in zone of inhibition; 2. extract may have been { diluted / effectiveness reduced by the alcohol / eq } ;	**(2)**

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

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

Question Number	Answer	Mark
8 (a) (iii)	C ;	**(1)**

Question Number	Answer	Mark
8 (b) (i)	maze dull/ maze bright / eq ; ACCEPT maze running ability	**(1)**

Question Number	Answer	Mark
8 (b) (ii)	Any **two** from: 1. breed of rat / eq ; 2. age of rats / eq ; 3. sex of rats / eq ; 4. physiological state / provided with same diet / eq ; 5. maze (arrangement) / eq ; 6. number of attempts at maze / eq ; 7. environment conditions e.g. temperature, lighting ; 8. (type of) toy / eq ;	**(2)**

Question Number	Answer	Mark
8 (b) (iii)	1. same (for both) in poor conditions / eq ; 2. {improved / fewer errors} for both in enriched conditions (compared with poor) / eq ; 3. In enriched conditions, {improved / fewer errors} made by maze-bright (than maze dull) / little difference / eq ; 4. correct manipulation of the data e.g. 40 arbitrary units fewer errors in maze-bright rats from enriched compared to poor conditions OR 2 arbitrary units better for maze-bright than maze-dull in enriched conditions ;	**(3)**

Question Number	Answer	Mark
8 (b) (iv)	1. idea of fewer errors ; 2. idea that this is due to the environment e.g. more toys, more stimulating environment ;	**(2)**

Question Number	Answer	Mark
8 (b)(v)	1. no difference / eq ; 2. idea of having {maximum potential / genetic potential / eq} ;	**(2)**

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