



Mark Scheme (Results)

January 2013

GCE Biology (6BI07) Paper 3B
Practical Biology and Research Skills

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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.

Question Number	Answer	Comments	Mark
1 (a) (i)	percentage of explants { showing growth / forming calluses } / dry mass of calluses ;	IGNORE mean NO mark if another incorrect variable given	(1)

Question Number	Answer	Comments	Mark
1 (a) (ii)	glucose { concentration / percentage / stated units e.g. g per dm ³ , g dm ⁻³ , g l ⁻¹ } ;	NOT mass, amount	(1)

Question Number	Answer	Comments	Mark
1 (a) (iii)	<p>1. idea of concentration of { mineral salt / auxin / cytokinin / eq } ;</p> <p>2. reference to same { mass / eq } of chemical ;</p> <p>3. idea of adding to known volume of { water / medium / eq } ;</p> <p>OR</p> <p>1. temperature (of incubation) ;</p> <p>2. water bath / incubator / eq ;</p> <p>3. sensible temperature value e.g. 15-30 °C ;</p> <p>OR</p> <p>1. light ;</p> <p>2. idea of same light source e.g. light bulb ;</p> <p>3. idea of how same intensity / wavelength obtained e.g same distance, same wattage, same filter ;</p> <p>OR</p> <p>1. pH ;</p> <p>2. use a buffer / eq ;</p> <p>3. idea of buffer content or appropriate pH e.g. 6 to 8 ;</p> <p>OR</p> <p>1. humidity / eq ;</p> <p>2. idea of closed container used ;</p> <p>3. idea of reduces evaporation ;</p>	<p>ALLOW Mp1 in control description IGNORE ref. to carbon dioxide, oxygen, volume</p> <p>2.ACCEPT thermostatically controlled room e.g. air conditioned room.</p>	(3)

Question Number	Answer	Comments	Mark
1 (b) (i)	<p>A axes correct (x – glucose concentration, y – mean dry mass);</p> <p>L axes correctly labelled, and with units (% and mg) ;</p> <p>P correct plotting ; ;</p> <p>S line joining points accurately ruled ;</p>	<p>NB two P marks extrapolation to 0, 0 loses one P mark</p> <p>bar chart gets max 3 loses one P mark and the S mark</p>	(5)

Question Number	Answer	Comments	Mark
1 (b) (ii)	<ol style="list-style-type: none"> idea that an increase causes a rise to {4% / a mass of 175 mg} ; idea that further increase causes a fall ; credit correct manipulation of figures e.g. rises by 153 mg, falls by 73 mg, steepest rise is 92 mg (from 2% to 3%), 4% is 7.95 / 8 times more than 1% ; 	<p>1. ACCEPT ref. to a peak at 4%, 175 mg</p>	(3)

Question Number	Answer	Comments	Mark
1 (b) (iii)	<ol style="list-style-type: none"> idea that SD indicates reliability ; idea of that (all) these results are reliable ; idea that a small SD means better reliability ; idea that SDs do not overlap ; 	<p>3. ACCEPT converse</p>	(3)

Question Number	Answer	Comments	Mark
1 (b) (iv)	<ol style="list-style-type: none">1. idea that an increase causes a rise to 3% ;2. idea that further increase causes a fall ;		(2)

Question Number	Answer	Comments	Mark
1 (b) (v)	<ol style="list-style-type: none">1. appropriate comment on the number of explants becoming calluses ;2. appropriate comment on the rate of growth of calluses ;		(2)

Question Number	Answer	Comments	Mark
2(a)(i)	<p>Advantages Maximum of three from the following</p> <ol style="list-style-type: none"> 1. idea of crops resistant to (disease / pests / insects / eq) ; 2. idea of survive adverse abiotic factors e.g. drought, weather ; 3. less use of chemicals e.g. agro-chemicals, pesticides, insecticides ; 4. saves money ; 5. idea of reducing soil erosion / eq ; 6. idea of bigger yields ; 7. improved nutritional value ; 8. might help with food shortage / reduce famine/ make LEDCs more {self sufficient / economically stable}; <p>Disadvantages Maximum of three from the following</p> <ol style="list-style-type: none"> 9. escape of (resistant / eq) genes / alleles ; 10. expense (especially to LEDC farmers) of seeds ; 11. loss of beneficial insects / birds / eq ; 12. idea of damage due to increased use of glyphosphate ; 	<p>Where relevant must be higher/bigger etc. e.g. would not allow no agrochemicals but less is OK</p> <p>ACCEPT desertification</p> <p>ACCEPT productivity</p> <p>NOT just increasing economy</p> <p>9. ACCEPT hybridisation</p>	(4)

Question Number	Answer	Comments	Mark
2(a)(ii)	paragraph { 11 / 12 } / at the end;		(1)

Question Number	Answer	Comments	Mark
2(a)(iii)	1. 76.68 ; 2. $\div 6 = 12.78$;	ACCEPT correct answer with no working for 2 2. ALLOW CE	(2)

Question Number	Answer	Comments	Mark
2(a)(iv)	1. idea of yields two types of maize grown in Spain ; 2. bar chart / bar graph ; 3. idea of two identifiable, comparable bars for {each region /all regions} ; 4. mean yield and units identified on sketch / eq ;	ACCEPT <i>all six</i> regions listed as alternative to Spain 3. must be able to identify type of maize and the region if 6 regions used	(4)

Question Number	Answer	Comments	Mark
2(b)	1. reduce agro-chemical use / eq ; 2. idea of reduced impact on environment described e.g. non-target organisms survive, less pesticide in food chains ; 3. idea of use of GM reduces need for {cleansing soil / fallow fields} ; 4. idea of reduces {erosion / loss} of soil (when fields fallow); 5. idea of escape of {GM/ resistant / eq} genes into wild population ; 6. idea of consequences on organisms in the ecosystem ; 7. idea of toxin present in GM crop gets into food chain; 8. effect on food chain described e.g. loss of beneficial insects / detail (ladybirds /lacewings / birds) ;	Can give credit for relevant points wherever they occur 3 and 4 ALLOW reverse argument for non-GM 4. ACCEPT reduces loss of soil flora / fauna 6. e.g. idea of producing a resistant weed / unwanted plant, reject hybridisation on its own	(4)

Question Number	Answer	Comments	Mark
2(c)(i)	<ol style="list-style-type: none"> 1. paragraph { 3 / 4 } ; 2. refers to {gene / DNA / genetic material} transfer ; 3. idea of physical means e.g. gene gun, electroporation ; 	3. ACCEPT reference to vectorless methods	(3)

Question Number	Answer	Comments	Mark
2(c)(ii)	<ol style="list-style-type: none"> 1. authors, date, title and publisher (and Cambridge) only present ; 2. correct order of at least 3 of the 4 elements above information ; 	<p>Authors in either order Reiss, M. and Straughan, R. Date (1996). Title <i>Ethics, Morality, and Crop Biotechnology</i> Publisher Cambridge University Press,</p> <p>2 IGNORE omissions and additional information ALLOW CE from above</p>	(2)

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