Mark Scheme (Results)

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Pearson Edexcel International Advanced Level
Biology (WBI03) Paper 01
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 and alternative response.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/   means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.
Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

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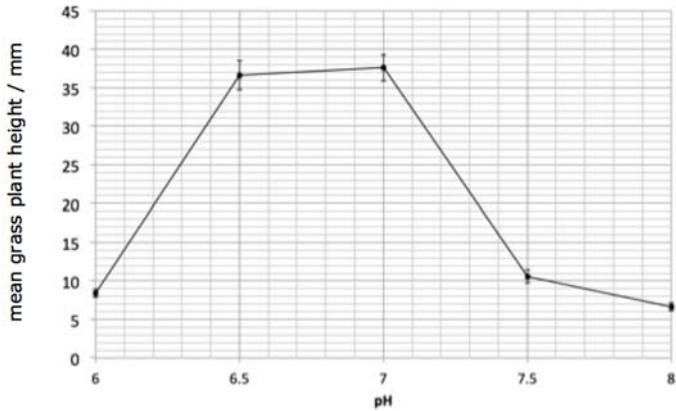Questions which involve the writing of continuous prose will expect candidates to:

- 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.

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	pH	**ACCEPT** if pH appears *anywhere* in the answer	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	1. temperature ; 2. temperature controlled room / growth chamber / thermostatically controlled water bath / incubator / eq ; 3. light intensity ; 4. use same bulb / same distance from bulb / light bank / same windowsill / eq ; 5. humidity ; 6. air conditioned room / eq ; 7. {soil in pots / minerals} ; 8. use compost from same bag / eq / add equal volumes of mineral (solutions) to each pot / eq ; 9. {age / storage conditions / genotype / size} of seeds ; 10. seeds from same {packet / plant / eq} / {weigh / measure seeds} / eq ; 11. depth of planting / space between seeds ; 12. same depth of soil above seeds / measure distance between seeds / eq ;		(4)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	A axes right way round (x = pH y=mean grass plant height) and a suitable linear scale which uses minimum half the graph paper ; L axes correctly labelled, and with units ; (x = pH y= mean (grass) plant height / mm) ; P correct plotting of means ; S line joining points accurately ruled and not extrapolated ; V SDs shown correctly on all points ;	e.g. Accept a smooth curve that goes through the points S unavailable if a bar chart only plotted	(5)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. quantitative comparison of the mean heights at pH 6.5 and / or 7.0 with the mean heights at other pH values / quantitative comparison of the mean heights at pH 6.5 and 7.0 (only) 1 (mm);	**1** 6.5 26 mm taller than 7.5 30 mm taller than 8.0 28.2 mm taller than 6.0 7.0 27 mm taller than 7.5 31 mm taller than 8.0 29.2 mm taller than 6.0 **ACCEPT** a number of times taller or shorter if correct	
	2. the {SDs / error bars} for 6.5 and / or 7.0 do not overlap with those of {6.0 / 7.5 / 8.0} ;		
	3. idea that this difference is significant ;		
	4. the SDs of 6.5 and 7.0 overlap ;		**(3)**

Question Number	Answer	Additional Guidance	Mark
1(c)(i)	1. {highest / most} growth occurred at pH 6.5 and / or 7.0 / eq ;	**ACCEPT** Greatest height	
	2. idea that (all) mineral ions are most available (at pH 6.5 and/or 7.0) ;		
	3. below pH 6.5 {phosphate / calcium / magnesium} limit the growth ;		
	4. above pH 7.0 another factor limits the growth ;		**(4)**

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	1. nitrates are needed for {proteins / amino acids / DNA / RNA / nucleic acids / ATP / eq} ; 2. magnesium is needed for chlorophyll / eq ; 3. calcium is needed for the {middle lamella / calcium pectate / pectin / eq} ;	4. phosphate needed for {ATP / DNA / RNA / eq} ; 5. potassium needed for {enzyme activation / the stomatal mechanism / eq} ; 6. sulfate needed for {proteins / amino acids / eq} ;	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	1. Ebola qualified ;	e.g. high mortality, incurable, no vaccine, highly contagious	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	1. main solution involves (injecting) ZMapp ; 2. (antibodies / ZMapp) {neutralise(s) / block(s) / eq} the virus ; 3. alternative involves giving blood transfusion from (Ebola) survivor ; 4. which contains antibodies ;		**(4)**

Question Number	Answer	Additional Guidance	Mark
2(b)	through broken skin / from {body fluids / named example} / direct contact / sexual transmission ;	**DO NOT ACCEPT** object contaminated with the virus unqualified.	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(c)	1. {arrows / lines } shown at 3, 4 and 5 days (as a minimum) ; 2. labelled A, B and C ; 3. ZMapp dose identified as 50 mg kg^{-1} ; 4. days 14, 21 and 28 identified as {sample days / temperature / clinical scores} ;	e.g. 	(4)

Question Number	Answer	Additional Guidance	Mark
2(d)	1. volume (number) ; 2. article title / eq ; 3. {part / issue} (number) ; 4. names of co-authors ; 5. page/s ;	**IGNORE** wrong answers	(3)

Question Number	Answer	Additional Guidance	Mark
2(e)	1. idea of using experimental animals ; 2. idea of (informed) consent needed from human blood donors / recipient ; 3. (religious) issues about {donating / receiving} blood for some people ; 4. idea of treatment of patients with {experimental / eq} {transfusions / ZMapp} ; 5. risk of infections from blood transfusion ;	**ACCEPT** drug / medicine	(3)

Question Number	Answer	Additional Guidance	Mark
2(f)(i)	1. 2758 ÷ 9446 ; 2. × 100 = 29	**2. ACCEPT** 29.2 / 29.197…….	(2)

Question Number	Answer	Additional Guidance	Mark
2(f)(ii)	1. table format with complete row and column headings including {percentage / %} ; 2. all data entered correctly, Sierra Leone 29 ;	**Do not accept** % if only in cells of table **ACCEPT** ecf from 2fi e.g. | country	(number) infected	(number) who died	mortality (rate) / %
Guinea	2806	1814	65
Liberia	8331	3538	43
Sierra Leone	9446	2758	29		(2)