Mark Scheme (Results)

January 2017

Pearson Edexcel
International Advanced Subsidiary Level
in Biology (WBI06)
Paper 01 Practical Biology and Investigative
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.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

  i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
  ii) select and use a form and style of writing appropriate to purpose and to complex subject matter
  iii) organise information clearly and coherently, using specialist vocabulary when appropriate

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/TE/cq (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
1a	1. control of temperature with a thermostatic waterbath/eq ; 2. range of at least 5 concentrations of detergent ; 3. description of how to obtain quantitative results; 4. suitable named source of membranes ; 5. preparation of beetroot cubes/eq ; 6. {same/stated} time for exposure to each concentration ; 7. repeats (at each concentration) and calculate a mean ;	**MP1 ACCEPT** description of how temperature is controlled eg Bunsen burner and thermometer **MP3** eg use of colour standards or colorimeter **MP 5** eg washing/drying/same size ;	**Exp 5**

Question Number	Answer	Additional Guidance	Mark
1bi	1. concentration of detergent ;	**NOT** amount or two different answers	**Grad 1**

Question Number	Answer	Additional Guidance	Mark
1bii	1. age of beetroot / eq ; 2. {species /variety} of beetroot / eq ; 3. pH of solution ; 4. {size/mass} of beetroot ; 5. temperature ; 6. time of incubation ;	MP2 **ACCEPT** type	**Grad 2**

Question Number	Answer	Additional Guidance	Mark
1biii	1. variable with suitable control method described ; 2. results are not valid / affects the concentration of pigments released / idea of affecting membrane permeability / eq ;	MP1 **ACCEPT** 'use a waterbath'	**Exp 2**

Question Number	Answer	Additional Guidance	Mark
1c	1. permeability increases / eq ; 2. idea of {disrupting / dissolving} phospholipids ; 3. so pigments can diffuse out ;		**Exp 2**

Total for question 1 = 12

Question Number	Answer	Additional Guidance	Mark
2a	1. there will be no significant difference / eq ; 2. between the effectiveness of insecticide A and B ;		**Exp 2**

Question Number	Answer	Additional Guidance	Mark
2b	1.suitable table format ; 2. complete table headings ; 3. all raw data included ; 4. both means correctly calculated ;	**MP2 ACCEPT** insecticide A and B and number of larvae alive after 7 days **MP ACCEPT** eg A 11 or 10.9 B 7 or 7.1 or 7.08	**(clip with c) Exp 4**

Question Number	Answer	Additional Guidance	Mark
2c	1. axes linear scale and labelled ; 2. mean data correctly plotted as two bars ; 3. correct range bars ;	ECF from (b). Q02b and c must be clipped and marked together. **MP3 RANGE BARS** A 15-7 B 15-3	**(clip with b) Exp 3**

Question Number	Answer	Additional Guidance	Mark
2d	1. critical value is 37 ; 2. calculated value (21.0) is less than critical value ; 3. therefore reject the null hypothesis ; 4. there is a significant difference between insecticide A and insecticide B ; 5. comment on the variability of results for both insecticides ;	**ACCEPT FOR MP1 and 2** '21 is less than 37' **MP4 - ACCEPT** the difference between the results is not caused by chance	**Exp 4**

Question Number	Answer	Additional Guidance	Mark
2e	1. another named variable related to larvae that might not have been considered/eq; 2. small sample size ; 3. credit a comment to variability of results ; 4. errors of assessing dead or living larvae ;	**MP 3** eg large /overlapping range bars	**Exp 3**

Total for question 2 = 16

Question Number	Answer	Additional Guidance	Mark
3a	1. protease breaks down peptide bonds ; 2. producing amino acids ; 3. which are soluble ;		**Exp 2**

Question Number	Answer	Additional Guidance	Mark
3bi	1. practise the method to see if it works ; 2. find suitable substrate concentration ; 3. find suitable enzyme concentration ; 4. find the time taken (for the casein to become colourless) ; 5. find a method to extract inhibitor from the leaf ; 6. find a suitable {temperature / pH} ;		**Exp 3**

Question Number	Answer	Additional Guidance	Mark
*3bii	**QWC -Spelling of technical terms must be correct and answer must be organised in a logical sequence** 1. use leaves with a range of ages ; 2. incubate solutions separately until they reach appropriate temperature ; 3. use a { thermostatically controlled waterbath / waterbath at stated temperature / eq } ; 4. use of buffer (to maintain pH) ; 5. (mix all the solutions together and) time how long it takes to become clear /eq ; 6. repeat each leaf age and calculate a mean ; 7. idea of using as few leaves as possible to avoid damage to plants ; 8. description of suitable safety precautions e.g. avoid contact with enzyme or idea that enzymes are irritants/cause allergies ; 9. description of suitable safety clothing ;	QWC-emphasis is for clarity of expression **MP 2 ACCEPT** equilibration	**Exp 10**

Question Number	Answer	Additional Guidance	Mark
3biii	1. table with headings ; 2. means calculated from repeats ; 3. { scatter / line } graph format with labelled axes ; 4. use of an appropriate statistical test ;	**MP 1 ACCEPT** 'age of leaf' and 'time to go clear' **MP2 ACCEPT** repeats and mean in a table **MP3 ACCEPT** bar graph **MP4 ACCEPT** eg (Pearson's) correlation coefficient or Spearman's rank	**Exp 4**

Question Number	Answer	Additional Guidance	Mark
3biv	1. difficult to control {all variables/or a named variable} ; 2. idea that it is difficult to know the age of leaves ; 3. idea of difficulty of judging end point ;		**Exp 3**

Total for question 3 = 22

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