



Examiners' Report Principal Examiner Feedback

January 2024

Pearson Edexcel International Advanced
Level In Biology (WBI14)
Paper 01: Energy, Environment, Microbiology,
and Immunity

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Introduction

We saw a wide range of responses from candidates, with some really excellent answers from the more able candidates. The MCQs generated a range of responses as did the calculations. Some of the calculations did seem to score better than in previous series. The two levels-based questions were accessible and very few blank responses were seen. In fact, very few blank responses were seen in general. A vast number of centres are using our mark schemes and examiners reports to prepare their candidates; this is evident in the answers where mark points have appeared on previous mark schemes.

Question 1

The MCQ right at the start of this paper caused few issues as candidates are very familiar with this topic.

Part (b) was set in a novel context but this did not seem to throw candidates, with (i) being particularly well-answered with many candidates picking out generalisations. The second part was less well-answered as many candidates repeated what they had written in part (i) instead of trying to explain the data.

Question 2

The majority of candidates selected the right answer for the MCQ with distractor B being the most frequently selected wrong answer.

The commonest error in (b)(i) was to describe similarities instead of focusing on the differences. Candidates were not penalised for this but it did mean that some candidates thought that they had written sufficient points when in reality they had not.

We have noted in the past that candidates struggle with Q_{10} calculations and this was no exception. The commonest error is to read off the rate at the lower temperature value and add 10 to this rate value, and then to divide one by the other. Very few candidates seem to appreciate that you have to add 10 to the lower temperature and use this rate value in the calculation.

Question 3

A question defining sympatric speciation has not been asked for a long time and this was evident in the responses we saw. One error was to write, or imply, that one species becomes two new species instead of forming another species in addition to the original one. The other error was to state that it was not due to geographical barriers instead of stating that the organisms remain in the same area.

Many candidates found the MCQ challenging but it was targeted at the more able candidates.

The rest of the question saw a range of responses with candidates generally coping with the context of the question. In (c)(ii) we saw the expected responses where candidates describe the selection pressure as causing the mutation, a misconception that we have pointed out before in this paper. In (c)(iii) most candidate recognised that competition for food or space would be reduced but very few extended their response to explain how this would benefit both species of fly.

Question 4

The calculation at the start of question 4 caused more problems than we had anticipated; very few candidates actually divided their height value by 20, dividing by 10 instead. There were some errors in the units given with $\text{m} / \text{year}^{-1}$ being a common error.

Part (a)(ii) scored well with only a few candidates omitting to tell us that the ice would melt (mark point 3).

The first MCQ was far lower scoring than the second one, with distractor D frequently selected.

In the levels-based question we saw some really exceptional descriptions of succession, immediately giving candidates access to four marks. Unfortunately, these descriptions filled up quite a few lines giving candidates the impression that they had answered the question so accounts of biodiversity and the ratios were less extensive, limiting responses to the four marks. We know that calculating ratios cause candidates problems but responses in this question also showed that candidates cannot interpret them either so we saw wrong descriptions of the relative changes in carbon and nitrogen. Surprisingly, a number of candidates described the increase in soil carbon being used for enhanced photosynthesis.

Question 5

Questions on HIV and *Mycobacterium tuberculosis* are not uncommon on this paper but combining the two conditions into one question is far less common. In part (a), candidates scored the HIV mark points but few candidates appreciated the effect that no antibodies would have on TB so mark points 5 and 6 were rarely awarded.

The two component questions to part (b) scored reasonably well and candidates seemed more able to express their answer in standard form than we have seen in previous series.

Candidates were able to identify the correlation in the graph in part (c) but few commented on the limited correlation shown at lower percentages of the population with HIV. In part (ii) only the more able candidates recognised that a correlation test would need to be carried out to test the strength of the relationship. Many less-able candidates talked about drawing lines of best fit.

Question 6

The style of question used in part (a) has been used in previous series and it was encouraging to see that centres have used our feedback to prepare their candidates. Far more candidates used the food chain shown to illustrate their answer than in previous series.

Part (b) was well-answered but it was evident that a number of candidates do not appreciate the difference between abundance and distribution as the two terms were frequently used together as though they meant the same thing.

Part (c) was high scoring; candidates know the dendrochronology story well and expression of answers was improved, presumably because past mark schemes have been used to school candidates.

Question 7

We had anticipated that the calculation in part (a) might cause candidates problems due to the unit conversions that were expected. However, candidates generally converted their units correctly but selected the wrong values to use in their calculations.

Responses to the pair of MCQs were a bit surprising as they were really only testing candidates on the difference between prokaryotes and eukaryotes but few candidates seemed to get both right.

In (b) part (i) candidates picked up the calculation marks but could not explain how to select which yeast cells to include within the haemocytometer and which not to. Many candidates stated that you should just ignore the cells on the edge lines which surprised us a little. We thought that if they had not been taught how to do this that they would at least take an average of the two cells on the two edges.

A range of responses were seen for the drawn and labelled growth curve, with many candidates not including time units on the x axis. There were some careless drawings that did not show the horizontal line for the lag phase or the straight line for the exponential phase; this did cost some candidates the line mark.

In part (iii) there were a high number of candidates who correctly wrote down the growth rate equation despite the fact that candidates do not actually have to learn this actual equation. There were some good responses but many candidates did not tell us where the log numbers had come from. The less-able candidates just described working out the gradient of a line but could still pick up the time mark and mark point 2 if they mentioned that the line used was during the exponential phase.

Question 8

This question started with another pair of MCQs and again, few candidates seemed to answer both correctly.

In (b) we saw the expected references to B cells becoming plasma cells, B cells producing antibodies and plasma cells being antibodies. Most candidates could tell us that the T helper cells stimulated the immune response.

In (c)(i), candidates could tell us how to control the investigation, but few gave reasons for their control measures.

The calculation in (ii) was poorly answered but we expected this as only the more-able candidates can work with log numbers. Very few converted the log value back to actual numbers and worked with those (method 1). Most attempted method 2 but divided the numbers instead of subtracting them.

Part (iii) caused few problems.

We saw some excellent responses to the second levels-based question, despite it being based on an immunology topic. Candidates recognised that vac 1 stimulated a primary response in group 1 whereas it stimulated a secondary response in group 2. There were some detailed accounts of what happens in both these responses. Some candidates limited their answers to a level two mark by focussing on explaining one graph and virtually ignoring the second graph; in these levels-based questions, all stimulus material needs commenting on. Very few candidates could offer an explanation for vac 1 and vac 2 resulting in similar levels of antibodies in group 2. The commonest idea was that the body had produced sufficient levels of antibody so did not produce any more.

Summary

A few suggestions for improving candidate performance are given below:

- Candidates need to take notice of the mark allocation for each item to help them decide if they have written enough points to be awarded that many marks.
- Candidates should consider the questions asked in the early question parts as they are quite often trying to give a clue as to what is expected in the latter question parts.
- Candidates should avoid repeating information in the stem of the question in their answers as this will not gain marks.
- Answers should include A level detail and terminology.
- Candidates should check the command word for each question before attempting their response. In particular, if the command word is 'explain', then they need to make sure that some science has been used to say why

something has happened. Their answer should include terms like: because, therefore, as a result, so. Appendix 7 in the specification lists all the command words and their meanings.

- Any information given in a question is there for a reason, albeit in a table, a graph, a diagram or in the text of the question, so must be used in the response.
- Maths skills as outlined in Appendix 6 should be practiced and in particular candidates need to be able to convert one unit into another, write a ratio in the form $x : 1$, express a value in correct standard form (only one digit to the right of the decimal point), round up values to a given number of decimal places or significant figures and work out percentages. Using logs is also needed sometimes.

