Pearson

Examiners' Report
Principal Examiner Feedback

January 2018

Pearson Edexcel International Advanced Level In Biology (WBI02) Paper 01 Developments, Plants And The Environment

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Introduction

Most students demonstrated a sound grasp of the factual content of the course, such as the role of the rough endoplasmic reticulum and Golgi apparatus, the function of the male nuclei in plant reproduction, the importance of nitrate ions in plants and the use of contemporary drug testing protocols, which were all well understood by many students. Questions that required the application of knowledge to a particular context were not dealt with so well. Those who had learnt a particular stock answer to a topic were often able to gain only the 'generic marks' available and were not able to gain full marks because they did not apply their knowledge to the specific context.

The use of correct biological vocabulary is vital in this paper but it was often evident that terms such as genes and alleles or centriole and centromere were being confused. Reference to polar bodies instead of polar nuclei was another example of two terms frequently being confused. The failure by a significant number to understand the difference between the term gene and allele seems to occur in every WBI02 paper.

There was clear evidence that students often failed to read the question thoroughly enough and included much irrelevant information in their answers. Examples of this were writing about crossing over in meiosis when the question only asked about independent assortment or describing the germination of pollen grains in answering a question about the role of male nuclei in sexual reproduction in plants.
Some students did not gain a mark when answering some questions because they used the term that they were explaining in their explanations. Examples of this were using the term assortment to explain independent assortment or using the word totipotent to explain the difference between pluripotent and totipotent cells.

Students were not very good at selecting the **relevant** details from information provided in the stem of a question. This was particularly evident in the question that asked students to suggest advantages to a pangolin of ingesting small stones.

It is essential that students appreciate the requirement to not only recall information but to also be able to apply their knowledge and understanding of biology.

Question 1(a)(i) and (ii)

These definitions were well known by the majority of students. However, some did refer to organisms or individuals rather than to species when defining species richness in part (i). The most frequent mistake in part (ii) was to refer to genes rather than to alleles.

Question 1(b)

Students need to ensure they can distinguish between similar terms when using biological terminology. For example many referred to interbreeding instead of inbreeding.

Many more students were able to gain a mark for giving two factors that could decrease biodiversity than could gain a mark for giving two factors that could increase biodiversity.

Question 2(a)(ii)

Although the majority correctly stated that structure P was a microfibril there was a significant number that thought it was the middle lamella.

Question 2(b)(i)

It was evident that many students did not read the question carefully enough. Answers needed to compare **changes** in values and not the absolute values. Although many described the cellulose content decreasing and the lignin increasing, much fewer could successfully quantify the changes in a comparative way.

Question 2(b)(ii)

Some students wrote about the structure and function of xylem rather than lignin itself. While most gave answers that showed they understood the role of lignin in providing support far fewer included any comments about waterproofing.

Question 3(a)

Although most could give a definition of the term niche, a significant number failed to use the pangolin as an example and did not gain the second mark.

It is very important that students read questions carefully.

Question 3(c)

Answers to this question were varied with many imaginative suggestions including a significant number that offered the idea that ingesting stones would make the pangolins feel full so they wouldn't need to eat as much. Others thought the stones were needed to provide minerals. The stem of the question did direct students to refer back to the information given on the previous page but it was evident that only a minority had done this.

Question 3(d)(i)

It was pleasing to see that the majority of students were able to use the data and calculate the correct answer. However, some incorrect answers were seen that were the result of not knowing the number of days in a year.

Question 3(d)(ii)

There were some very weak answers that did not go beyond suggesting that the values were estimates. Other answers centred on seasonal differences showing they had not appreciated that the data was an annual figure. Better answers gave good accounts of the variation in mass of ants and an understanding that the pangolin also feeds on termites that would have different masses compared to ants.

Question 4(a)(i) and (iii)

These multiple choice questions asked about independent assortment and crossing over. Although we do not expect details of the stages of meiosis to be known we would expect students to know the appropriate context of independent assortment and crossing over including when both of these occur.

Question 4(a)(ii)

The question asked about independent assortment so it is important for students to realise they cannot use the word assortment, as it is in the stem, to describe the meaning of assortment. Poor expression of answers often meant examiners could not award a mark. Examples of this included answers that failed to refer to homologous chromosomes or to the random nature of the process. The phrase 'recombination of alleles' is given in the question so we expected students to do more than just repeat the stem before we awarded a mark. Here indicating that the new combinations of alleles would be in the gametes would have been sufficient. Answers often contained references to crossing over which are irrelevant to the question asked.

Question 4(b)(ii)

Many students successfully completed the diagram. However, some seemed to have just written the letters B, C and D at random and filled every space.

Question 5(a)(i)

A common error was for students to suggest that having faulty DNA would cause a mutation when it clearly is already a mutation. Many answers were limited to suggesting that cancer would occur. We accepted answers that either described the advantages of stopping the cell cycle or those that described the consequences if it was not stopped.

Question 5(a)(ii)

Some decided to draw a whole cell in metaphase rather than just drawing a single chromosome. Although this type of drawing was accepted the extra time taken by the student in completing this question could have been put to better use. Some students failed to label their diagram suggesting some had not read the question carefully enough.

Question 5(a)(iii)

There were five marking points in the mark scheme with a maximum of three marks available. It was pleasing to see a significant number of students that could describe all five marking points. One error that was seen a number of times was where the terms centriole and centromere were confused.

Question 5(b)

This question expected students to apply their experience of a practical procedure to an unfamiliar setting. Unfortunately a significant number ignored the context and simply described the standard root tip squash procedure. This meant that some marks were unavailable to them.
The other common error was a failure to state what would be measured. Here many just wrote that the cells in mitosis would be observed. There was no mention of counting cells undergoing mitosis and counting the total number of cells.

Question 6(a)

A lot of students gave very good answers that scored all six available marks. The loss of marks was often due to a lack of precision in the answer. Examples of this included responses in which the site of translation was not linked to the ribosomes on the rough ER or failing to indicate that polypeptide chains are folded in the rough ER. Others just referred to vesicles rather than secretory vesicles forming from the Golgi and some did not make it clear that exocytosis involved the release of **enzymes**.

Some other students were not able to score marks because they concentrated on writing about the rough ER and Golgi apparatus but ignored the pollen tube nucleus.

Question 6(b)(i)

It was often the case that students referred to 'the growth of the pollen tube' but did not make it clear whether they were describing the change in length of the pollen tube or the change in the rate of growth of the pollen tube. Other students referred to times at which the two lines on the graph intersect and did not appear to realise these are on different scales so the point of intersection has no meaning.

Question 6(b)(ii)

The vast majority knew the correct sequence.

Question 6(b)(iii)

Although there were many good answers which gained all three available marks, there were some that lacked precision by not stating diploid or triploid for the products of fertilisation. Others incorrectly used the term polar bodies instead of polar nuclei or referred to a generative nucleus instead of a male nucleus or male gamete. Answers often started with descriptions of the germination and growth of pollen tubes which is irrelevant to the question being asked and would have wasted valuable time.

Questions 7(a)(i)

Too many students ignored the command word 'explain'. Examples of answers that fall into this category include those that failed to state what is dissolved or transported by water and answers that refer to support but with no context of turgor pressure or to temperature regulation but with no context of evaporation or transpiration. It is very important that students read questions carefully.

Question 7(a)(ii)

This was another 'explain' question but many students just gave a list of molecules that were synthesised using nitrates. This type of answer was therefore restricted to only one of the two marks available.

Question 7(a)(iii)

The majority correctly referred to yellow leaves but there were several that stated incorrect colours.

Question 7(b)(i) and (ii)

These multiple choice questions proved to be relatively straightforward with many gaining both marks.

Question 7(b)(iii)

Students often gained the majority of the marks here even if one or two important features of the investigation were missed. Relatively few referred to the use of buffer solutions and even fewer described the need for all of the mineral ions to be present.

Most students described using seedlings in culture solutions but we also saw the acceptable alternative of using explants in agar. Some failed to consider the relatively slow pace of plant growth and suggested measuring growth after only 24 hours.

Question 8(a)(i)

A few students described the terms the wrong way round and thought pluripotent cells could give rise to all cell types. This was another example of a question where you cannot use a term given in the stem as part of the explanation. This can be illustrated by the example of students stating that pluripotent cells can give rise to all cell types except totipotent cells.

Question 8(a)(ii)

Many students failed to read that the context was that of the regulatory authorities and so many answers were concerned about the right to life of an embryo. There were, however, a significant number of good answers and it is pleasing to see that all five of the marking points in the mark scheme were used by examiners.

Question 8(b)

Some of the marks available were for giving generic statements about differential gene expression and these were the marks most commonly awarded. It was disappointing that the marking points that required students to respond to the specific context of heart cells were awarded much less frequently.

Question 8(c)(i)

Students were not able to express clear, relevant points and the only response commonly seen that gained credit was a realisation that fewer animals would need to be used in testing drugs. Surprisingly few described the need to find out if the drugs work on heart cells before testing them on people.

Question 8(c)(ii)

There were plenty of good answers that gained the full three marks. A common error was to fail to indicate that phase I testing is carried out on healthy volunteers. Other answers were not well organised so that it was impossible for examiners to know which phase of testing was being described.

Paper Summary

Based on their performance on this paper, student should:

- Read all of the details in the questions carefully, especially the context of the question.
- Understand that when asked to give examples as part of the answer, marks will be lost if none are included.
- Make sure they do not use the word they are defining in their definition.
- Ensure they can distinguish between the terms gene and allele and between centriole and centromere.
- Develop a familiarity with the terminology encountered at this level and learn how to define key phrases accurately.

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