Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel
International Advanced Subsidiary Level
in Biology (WBI02)

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Overall impressions

Once again there were some very good answers provided to the questions in this paper, indicating a sound understanding of the content of the specification. It was encouraging to see many students taking into account the context of the questions. However, there are still many examples of students trying to apply answers from previous mark schemes to the current paper. Candidates need to appreciate that even though there will be some questions on topics that have appeared on previous papers these may well have different contexts and therefore different answers will be required. It was interesting to note that candidates performed less well on question seven which was a topic that had not been tested in depth before.

The data analysis questions again asked students to determine relationships between variables presented in line graphs and in tables. Good answers were given by students who identified trends and patterns and supported these by manipulating data. However, these questions were not always answered well as a consequence of candidates not reading the column headings in tables carefully enough. It is still clear that a number of candidates are just quoting points from graphs without showing evidence that they had analysed the data.

The question based on knowledge of the core practical on observing the stages of mitosis, was in general not well answered. Students should be aware of the need to apply the skills developed through core practical work to unfamiliar contexts. The majority of candidates wrote about root tip squashes which was not the context of this particular question. Relatively few described the dependent variable or how a comparison of the two sets of results obtained would be made.

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

Question 1(a)

There were some excellent drawings of a mitochondrion seen by examiners but it was also apparent that some candidates had drawn a prokaryotic cell and others sadly a chloroplast. Frequent errors were the incorrect labelling of cristae as cisternae: the inclusion of labelled structures such as granum, stroma, nucleus, cytoplasm; mesosomes that are not present in a mitochondrion. It was also relatively common for the mitochondrion to be drawn with two smooth membranes and no evidence of the inner membrane having a folded structure.

Question 1(b)

This was mostly well attempted with the majority correctly stating circular DNA and ribosomes. Only a few made the error of stating 80S ribosomes.

Question 1(c)

The majority of candidates correctly named the domains, although the spelling of archaea was frequently incorrect. A significant number stated prokaryotes instead of bacteria. Weaker answers included the names Animalia and Fungi.

Question 1(d)

The question only asked for one organelle to be named but a significant number of candidates stated two names and sometimes one of these was an incorrect name. Candidates need to be reminded that examiners cannot choose which answer to accept. There were a number of answers that referred to a vacuole but did not qualify it to distinguish it from vacuoles found in animal cells.

Question 2(a)(i)

Many candidates thought banana plants in the same plantation would have the same genotype. Two marks were available in this question and candidates should note that examiners could not give marks for vague references to bananas having the same environment. Although some candidates successfully referred to making the investigation valid, it was disappointing to see so many describing that it was to make the investigation a fair test or to make the investigation more precise or more accurate.

Question 2(a)(ii)

There were many good answers that stated that the process was to soften the stem tissues or to allow microbial decomposition and relatively few poor answers stating ‘to remove impurities’ or ‘to dissolve the tissues’. However, a large number did not understand the process and thought that soaking in water would make the fibres stronger because of osmosis.

Question 2(a)(iii)

A positive statement was needed here to describe how the fibres should be treated and many did give the expected answer of soaking the fibres in water. Unfortunately almost as many stated what treatment would not be given and the context of their answer was that the fibres would not be soaked in sodium hydroxide. Candidates should note the importance of reading all of the details of the question.

Question 2(a)(iv)

The majority of candidates correctly realised the need to remove the sodium hydroxide although a few vague responses were seen that simply stated to remove chemicals or to clean the fibres.

Question 2(a)(v)

This question proved to be straightforward for most candidates with most gaining the two marks available. The most common correct reason stated for making several measurements was to be able to calculate a mean value, but some gave another acceptable reason to improve the validity of the investigation.

Question 2(a)(vi)

This multiple choice question tested whether candidates were aware of the units used to measure tensile strength, and it was pleasing to see that the vast majority stated the correct answer.

Question 2(b)

This question required candidates to compare data provided in two tables. To gain full marks it was essential that a candidate realised that the data was difficult to compare because only one of the diameters was the same in both tables. Few answers made any reference to these points and examiners found that marks were restricted to statements that referred to the overall effect of sodium hydroxide reducing tensile strength and to statements that correctly manipulated data for the diameter that was the same in both tables. A common approach that students made was to describe the relationship between diameter and tensile strength, showing that they had not read the question carefully enough.

Question 3(a)

Candidates were asked to describe the effects of radiation shown in two graphs. Some wasted valuable time trying to **explain** the effects, indicating they did not appreciate the type of answer required by the command word 'describe'. Although many gained one mark for describing the effect of radiation on cell number, relatively few were successful in describing the effect of radiation on mean cell length. Answers often quoted incorrect values when trying to give the context of when the two lines crossed on the graph of cell length. A lot of answers were more concerned with rate of growth which was not relevant to the question.

Question 3(b)

A significant number of candidates concentrated on discussing mutations but this is not relevant to the question. As with part (a), rate of growth is also not relevant. The question was not mark yielding because very few directly related their answer to the height of the coleoptiles. It was common to see answers that seemed to indicate that the terms cell length and coleoptile length were the same.

Question 3(c)

The majority of candidates had clearly done an investigation to observe the stages of mitosis, however, too often they just recalled their own work in the laboratory rather than relate it to the context of the question. The consequence was that most answers referred to root tips rather than to coleoptile tips. Many did not refer to the need for some coleoptiles to be exposed to radiation and some not exposed to radiation so their account was never comparative. The most frequently awarded marks were for knowledge of a suitable stain, the process of teasing coleoptiles apart and for the technique of squashing the coleoptiles.

A significant number of answers gave descriptions in which at least one of the stages was in the wrong sequence. It was disappointing that so many students ignored the dependent variable and gave no indication what would be measured or how the data for treated and untreated coleoptiles would be compared.

Question 4(a)

This was generally well answered. However, it is important that when describing phase I testing it is clearly in the context of **healthy** volunteers whereas phase II and phase III testing is in the context of **patients**. The majority of candidates were aware of the use of a placebo in a double blind trial during phase III testing. It was clear that some candidates did not read the question carefully enough or misunderstood the phrase of the question stem as they appeared to think “three-phased testing” meant phase III testing.

Question 4(b)

A large number of candidates made no reference to the specific phase they were writing about and it was often not possible for examiners to give credit because they could not tell which testing stage the student was trying to explain. However, some very good answers were seen in which the candidate methodically explained reasons that some drugs are rejected at each stage in the process.

Questions 5(a)-5(d)

These multiple choice questions all tested knowledge of xylem vessels and sclerenchyma fibres. They were not well answered, particularly part **(b)** in which very few could correctly identify these tissues in a photograph. More were successful in part **(d)** where knowledge of functions of the tissues was more evident.

Question 5(e)

Most candidates gained a mark for stating two correct mineral ions. Candidates should note that if they are going to use chemical symbols they have to be correct. A relatively small number of candidates unfortunately stated organic molecules.

Question 5(f)(i)

This was well answered with many concise responses stating that this showed a positive correlation and the increase was linear. It should be noted by students that data needs to be manipulated and merely stating two values from the graph is not enough. Here it was necessary to calculate the difference between two selected values.

Question 5(f)(ii)

As with part **(f)(i)** there were many good responses referring to positive correlation but this time recognising a non-linear increase. Once again it was necessary to calculate the difference between two selected values and not to simply quote the values.

Question 6(a)(i)

Most successfully measured the head of the sperm shown in the photograph although some divided their answer by 2000 showing they had not read the question carefully enough. This is not required until the next part of the question. A few gave answers in which the quoted value didn't match the quoted unit (for example 0.9mm was seen instead of 0.9cm).

Question 6(a)(ii)

The majority were able to do this calculation and express their answer with an appropriate number of significant figures. There were some candidates, however, that stated the diameter of the female gamete was 60 000cm because they had multiplied by the magnification (x2000) instead of dividing by 2000. It is always a good idea for candidates to look at their numerical answers and check that the answer is realistic – if the answer is not feasible they can then look for an error in their working.

Question 6(b)

A well answered question with many gaining both of the available marks. The most frequently seen answers that gained marks were for knowing a sperm cell possessed a flagellum and an acrosome and for knowing that it did not possess a zona pellucida. Unfortunately several answers were seen that gave differences in function between a sperm cell and a female gamete despite the question specifically asking for structural differences.

Question 6(c)(i)

The question asked candidates to compare mitosis with meiosis but a number of responses were seen in which there were no comparative points. Candidates commonly gained two marks in one sentence for stating that mitosis produces two diploid cells whereas meiosis results in four haploid cells. Some candidates stated that "mitosis produces identical cells whereas meiosis produces variable cells" but they failed to give the context of **genetically** identical or **genetically** variable.

Question 6(c)(ii)

Examiners were frequently able to award all four marks and it was pleasing to note that there were many clearly written, detailed responses. However, some answers lacked clarity because the sequence of events was inaccurate. Examples of this were answers that described the acrosome reaction and digestion of the zona pellucida after a description of the head of the sperm fusing with the female gamete membrane had already been given.

The command word for this question was 'describe' so no explanations were expected or needed to gain marks. References to the prevention of polyspermy were therefore not relevant to this particular question.

Questions 7(a) and (b)

These multiple choice questions required candidates to analyse data about how phenotype is affected by the interaction of the genotype and the environment. They were not mark-yielding questions and seemed to indicate that this is an area of the specification that is not well understood by many candidates.

Question 7(c)(i)

The specification quotes MAOA as an example that should be considered when candidates study how a phenotype is the result of an interaction between genotype and the environment. However, it has not been tested in any depth before and it was clear that a sizeable number of candidates had no knowledge of this topic. Many vague answers were seen and there was only mark regularly awarded to candidates that could give a relevant example of an environmental factor such as stress or maltreatment.

Question 7(c)(ii)

The performance of candidates on this question was much better than that on the previous parts of question seven. The idea of polygenic inheritance was seen a number of times where candidates realised behaviour is affected by other genes but the most frequently awarded mark was when candidates showed they understood that there may be many environmental factors involved and that these were difficult to control or measure.

Question 8(a)(i)

Some candidates did not read the question carefully enough and thought that the first column in the table gave information about lynx in the wild so restricted their comments to the second column of data alone. Another common error was to state that the lynx originally from the wild increased in number until 2007 rather than to 2006. Stronger candidates described the changes evident in both sets of data and went on to manipulate the data by calculating a correct increase in the population.

Question 8(a)(i)

This proved to be a difficult question for the majority of candidates. Very few realised the significance of continuing to take lynx from the wild and it was extremely rare for anyone to understand that it is the animals born in captivity that demonstrate that the breeding programme was successful.

Question 8(b)

A significant number of answers were seen that suggested students thought all 60 lynx were released at the same time with suggestions that the lynx would hunt as a pack and protect each other from predators. Other answers were not written clearly so examiners found it difficult to know whether the answer was about the lynx released to the wild or to the lynx left behind in the breeding programme. Candidates need to appreciate that interbreeding is not the same as inbreeding.

Question 8(c)

Most started by writing about exchanging animals between centres and maintaining a stud book and gained the first two marks. However, at that point many lost track of the question which was asking how captive breeding centres should collaborate. Candidates therefore tended to write about the preparation of the lynx for release or the use of IVF rather than dealing with how the centres should work together.

Paper Summary

In order to improve their performance candidates should: -

- Read all of the details in the questions carefully, especially the context of the question.
- Ensure that the answer applies to the question being asked, with reference to the actual context.
- Take into account the command words, particularly ‘describe’ and ‘explain’ which require very different types of answers.
- When asked for similarities between two structures, make positive statements about what they both have rather than stating what they both do not have.
- Take time to read graphs and tables carefully, particularly the column headings in tables.
- Check that answers to mathematical calculations are realistic.

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