Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2024

Pearson Edexcel Advanced Subsidiary
In Biology (8BI0) Paper 01 Core Cellular Biology and Microbiology.

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Introduction

This paper was representative of previous 8BI0 01 papers with a range of questions on many of the key topic areas. The paper performed well, and the candidates achieved higher marks than previously scored. Candidates scored well on the questions that demanded basic factual recall and simple maths questions but struggled with the specific details relating to the practical-based questions and the multi-stepped maths questions. The analysis and levels-based questions where interpretation of the information was required tended to score poorly, often with candidates simply restating the information provided in the question stem, rather than drawing together the specific details of the question with the subject knowledge from the specification.

Question1

Q1ai) Most candidates were able to correctly identify the ions required by each of the molecules.

Q1aii) Most candidates identified the importance of the (di)polarity of water in allowing ions to dissolve, but fewer were able to provide the detail as to why the ions dissolved.

Q1b) This question was well answered with most candidates able to describe the two trends illustrated by the graph. Very few candidates were able to explain the reason for the differences between the uptake of nitrate ions in the presence/absence of oxygen.

Question 2

Q2a) Most candidates correctly drew the trisomy at chromosome 21 and the XX at chromosome 23. Some candidates mistakenly drew XY at chromosome 23, having missed the detail about the karyotype from a female.

Q2b) Most candidates provided an acceptable diagram depicting translocation.

Q2ci) Most candidates correctly calculated the BMI; however, there were several candidates that missed the question, and some did not provide their working out, so were unable to access a salvage mark when their answer was incorrect.

Q2cii) Many candidates simply described the differences in terms of height and mass between the control group and those with Turner's Syndrome. Only a handful of candidates identified and described the relevance of a sample size and the lack of standard deviation information on BMI was missed.

Question 3

Q3ai) most candidates correctly identified the pair of structures present in the two species of bacteria.

Q3aii) This question was mostly answered well, although several candidates missed the instructions to identify three other structures and referred to the genetic material and ribosomes.

Q3bi) This question was answered well, although some candidates missed the instruction that the answer should be to two significant figures, although n:1 was allowed. We saw all sorts of expressions for the ratio, and accepted the ratio either way round if the order was correct. It is important that candidates understand the order that their ratio should be stated from the order left to right in the question and must match what the numbers mean.

Q3bii) The thickness of the peptidoglycan wall was correctly identified as the key structural feature that identifies a Gram-positive bacterium. A small proportion of candidates were able to explain the effects of the antibiotic on the peptidoglycan wall.

Q3c) Most candidates correctly calculated the mean rate of increase in the number of bacteria in the culture, although some rounded incorrectly.

Question 4

Q4ai) Identifying the different stages of meiosis/mitosis is frequently tested, and this question was answered well with the vast majority selecting the R (telophase) as the correct answer.

Q4aii) This was based on core practical 3. Most candidates applied their experience of this practical to the question and picked up the marks for the main stages of the preparation of a specimen. Many simply wrote everything they knew about a root tip squash preparation and did not identify that this was to investigate meiosis, so did not start with the tissue where meiosis takes place.

Q4b) The majority of candidates correctly identified the two sources of genetic variation in flowering plants, however the crossing over mark was lost by not specifying that it takes place between homologous pairs of chromosomes. The effects of the two processes were rarely explained in terms of new combinations of alleles/chromosomes to produce genetic variation.

Question 5

Q5a) The parts of the mitochondrion were frequently identified correctly, although some confused the cristae with cisternae.

Q5b) The quality of the drawing was often poor with shading and overlapping lines. Very few candidates included enough of the cristae to be representative of the number visible in the photograph. Some candidates drew a fictious mitochondrion which bore no relation to the mitochondrion in the photograph.

Q5ci) Magnification calculations are a relatively frequent occurrence and candidates have clearly been prepped on how to do them. The correct answer was D, but a few candidates selected B – due to an incorrect conversion from their measurement to μm. Candidates should measure in mm rather than cm to simplify the conversion calculation.

Q5cii) This question was poorly answered, with many candidates leaving the answer blank. The answer line provided an indication of the way the question should be answered with the units μm. As the question linked to the answer provided in Q5ci ECF was applied.

Q5d) Most candidates were able to provide a reason why specimens needed staining when using a light microscope, with most stating that they provided a contrast. Not many explained why a specimen viewed under an electron microscope did not require staining.

Question 6

Q6a) This question was very similar to a question on the 2023 paper; it was very poorly answered with many candidates incorrectly identifying HIV as the virus with a helical capsid.

Q6b) Many candidates recognised that an enzyme has a globular / tertiary structure with the 3D folding of the protein held together by named bonds. Some recognised that these bonds were between the R groups of amino acids. However, some named peptide bonds as being involved in the folding of the protein so were not given credit for the bonding. Most recognised the importance of the active site as a specific part of all enzymes.

Q6c) In the first levels-based question most students did not achieve anything beyond a level 1 response where they had correctly described some aspects of the lytic cycle. Level 2 required some interpretation of the information provided on either haemagglutinin or neuraminidase, and level 3 required information on all three key areas; few candidates were able to make links to the specifics relating to the effect of either glycoprotein on the spread of viral infection. Most simply restated the information provided to them in the question stem.

Question 7

Q7a) Most candidates indicated the increase and decrease in the amount of DNA during the mitotic cell cycle, but a surprising number of candidates did not recognise that it should double before returning to the same level. Other errors included the decrease occurring too early with-it taking place within the mitotic section indicated on the X axis, or the increase/decrease occurring before the indicated mitosis section.

Q7b) In the second of the levels-based questions most of the mark points were achieved, although rarely within the same answer. Candidates were required to analyse the data provided to explain how Meselson and Stahl provided the evidence to support our understanding of DNA replication. A proportion of candidates did not state that DNA replication was semi-conservative and only gave an overview of the evidence provided in the graphs. Where reference was made to the information provided, many candidates described the location of the bands visible at different densities but did not link to the physical composition of the DNA molecules within each band. The better answers described the process of semi-conservative replication and accurately provided the reason for the relative positioning of the bands at each stage.

Question 8

Q8a) This question was generally answered well, but some candidates were not able to identify the types of glycosidic bonds present in starch with most often having them incorrectly indicated as having 1-4 bonds only.

Q8bi) The majority of candidates gained both marks, with the limitations of using a colour chart in identifying concentrations of reducing sugar.

Q8bii) Most candidates scored at least two marks in this question by describing the stages of the test for a reducing/non-reducing sugar. Many ignored the fact that the student was provided with a mixture of both glucose and sucrose and described testing each individually or separating them before testing them individually. The better answers had students providing equal volumes of the moisture before testing one sample with the reducing sugar test, and the second sample with the non-reducing sugar test, before comparing the results to identify the relative concentration of each sugar.

Question 9

Q9ai) Most candidates were able to accurately describe the different properties of the phosphate head and fatty acid tails in relation to their position within the cell membrane, but few were able to provide details on the type of molecules that can travel across the membrane because of these properties.

Q9aii) This question proved to be very tricky, with most either scoring one or no marks. The main issue was the inability to convert between μm^2 and nm^2, with most conversions being a factor of 1,000 out.
The better candidates understood the number of phospholipids should be doubled as they were in a bilayer. Candidates were credited for the correct conversion of their answer into standard form.

Q9bi) Most candidates were able to gain one mark here – the most common answer referred to the tails being different lengths, with some describing the difference in terms of saturated and unsaturated.

Q9bii) It was clear that centres have spent time establishing the difference between compare and contrast, with many candidates separating their answers into two clear sections. We saw some high-scoring responses to this question, with actual comparisons and not descriptions. Weaker candidates simply described the composition of the phospholipids within each type of membrane, rather than the comparing the composition of phospholipids of each membrane relative to each other.

Q9biii) This question generally scored no marks as the candidates simply gave a generalised response about the two structures having a similar role, rather than identifying that the endoplasmic reticulum vesicles membrane fuse with the Golgi apparatus membrane.

Paper Summary

Based on their performance on this paper, students are offered the following advice:

- read the whole question carefully, including the introduction, to help relate your answer to the context asked. In particular, make sure you are answering the question asked, rather than restating the information provided as an answer;
- use information provided in the question to help you with your answer, e.g. graphs and tables of data including the labelling;
- 'explain' questions require your answer to have the reason for the process/pattern included. Using the word 'because…' will help you to provide a sufficiently detailed response;
- aim to adapt your description of a practical procedures to consider the specific context that has been provided to you in the question;
- set out calculations carefully showing each stage of your working in case a mistake is made at the final step and check that the magnitude of the answer makes sense in the context of the question;
- be specific in your vocabulary, avoiding vague terms such as amount, and use something measurable with an appropriate scientific quantitative value;
- diagrams should be drawn accurately to represent exactly what is being drawn and the rules governing biological drawings should be followed;
- all questions should be attempted and leaving blanks avoided. Careful reading of the information should reduce the chance of questions being missed;
- look at the appendix 6 and 7 of the specification to familiarise yourself with the command words and the examples of the mathematical calculations you are expected to be able to perform at AS level.

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