Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel International GCSE in Biology (4WSD1) Unit 1B

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Summer 2025
Publications Code 4WSD1_1B_2506_ER

Introduction

This was the first paper of the examination for the modular Biology specification.

This paper examined content from Unit 1 of the specification. The paper carried 60 marks and consisted of eight questions in various styles similar to those of the questions on the linear paper. Three of the questions were the same as three on the linear paper.

The examining team were pleased with the knowledge and understanding shown by many of the students taking this examination. Many students were able to apply their knowledge and understanding of the relevant biology topics to novel contexts. Many students were also able to apply their knowledge to unfamiliar practical protocols. Most could analyse and evaluate data and information. The responses of many students indicated that centres had worked hard to prepare their students. Most students attempted all questions and finished the paper.

Question 1 was about microorganisms and cell structure. Students were given a diagram of *Euglena* showing detail that would be seen with an electron microscope. Many could correctly show, in (a) (i) that *Euglena* is in the group protoctists, although a significant few opted for bacteria or viruses. For question (a) (ii) nearly all students chose a response indicating that mitochondria are the site of respiration. For (a) (iii) most indicated that the nucleus houses the chromosomes and for (a) (iv) most could indicate the position of the cell membrane. In part (b) students were asked which labelled structures in *Euglena* are found in plant cells and most students correctly chose the chloroplasts. In part (c) students were asked to state the meaning of organelle. This was not so well answered as many thought it was a small organ or gave the answer as 'a particle inside a cell'. Some students correctly said that it was a part of a cell that has a specific function and many also gave an example to support their answer. Part (d) was answered correctly by many students who identified R /flagellum for swimming and U/mitochondria for providing energy. Some lost a mark by referring to producing energy and a few seemed to be guessing. This question was also on the linear paper.

Question 2 was about respiration, energy and the Benedict's test for glucose. Students were given some data about the results of a Benedict's test for four different flavoured waters. For (a) (i) students were asked to give one variable that the teacher controls and most gave time, temperature or volume of one of the solutions. For (a) (ii) most students said that a water bath, or a

description of a water bath, would be used to safely heat the boiling tube at 70 ^{o}C. A few incorrectly gave the response 'use a thermometer'. For part (b) many students scored highly. Most identified water B because it went brick red during the Benedict's test and therefore contained the most glucose so would gain more energy from respiration for muscle contraction and the athlete could run for longer. A few incorrectly identified water C because it had no glucose and would not make the athlete fat. Candidates who gave an incorrect water could still gain some marks if they referred to respiration and energy. In part (c) most students referred to people with diabetes benefitting from drinking a flavoured water that does not contain glucose, or that it would contain less energy and help prevent people becoming overweight. This question was also on the linear paper.

Question 3 was also in common with the linear paper. The question was about nutrition in plants. In part (a) students were asked to give the energy conversion that happens during photosynthesis. Many students did not answer this well and instead of giving light energy to chemical energy they referred to heat energy or kinetic energy. In part (b) students were asked how to destarch a leaf. Many said to put the leaf or plant in the dark but failed to state for how long. Some students may have missed the command word did not explain why this would destarch the plant and many referred to the plant not being able to photosynthesise but the required answer was a reference to starch being broken down or used up. Some students confused this with the test for starch and referred to killing the leaf, decolorising it and then adding iodine solution. Some students did not attempt part (b) (ii) where they were shown an experimental set up where part of a leaf had access to carbon dioxide and light and part of the same leaf with access to light but not to carbon dioxide. Students were then asked to indicate the results of a starch test on the whole leaf after 24 hours but many indicated correctly that the part of the leaf that had been outside the jar with access to carbon dioxide would have become black indicating the presence of starch and the part of the leaf without access to carbon dioxide would stain yellow/brown because there was no starch. Most students answered part (c) well – give the functions of two named mineral ions - and the most frequent responses were about nitrate ions and magnesium ions. A few students lost a mark by referring to nitrogen rather than nitrate ions, as did those students who gave phosphorus instead of phosphate for nucleic acids/ATP or cell membranes. They gained the function mark but not the mark for the name of the ion. Part (d) was the most challenging part of the question and there were some good responses indicating that waterlogged soil contains no air so no oxygen, therefore no or less (aerobic) respiration and not enough ATP for active transport of mineral ions into the roots.

Question 4 was about water movement into and out of an amoeba. Students were given a photomicrograph of an amoeba with a contractile vacuole and also given some information about water continually entering the amoeba, water being produced inside the amoeba and excess water being expelled via the contractile vacuole that is moved to the cell membrane. In (a) (i) students were told that the diameter of the contractile vacuole in the image is 9 mm and that its actual diameter is 75 μm and were asked to calculate the magnification. Most students scored 2 marks here and some scored 1 for being out by a factor of 10, or for just carrying out one correct conversion of either mm to μm or vice versa. Most students correctly stated for (a) (ii) that water enters the amoeba by osmosis. Part (a) (iii) was slightly more challenging, but many said that water is produced by respiration but those that said anaerobic respiration lost the mark. Most students correctly stated active transport for (a) (iv) and in part (b) many students deduced that the many mitochondria are for movement of the contractile vacuole. A few gave an incorrect answer for anaerobic respiration and some opted for other incorrect options such as for osmosis of for diffusion of oxygen. In part (d) students were given a table of data and asked to plot a graph. Many responses showed good graph skills and axes were the correct way around, the scale was suitable, axes were labelled and points plotted correctly and joined do to dot with ruled straight lines. However, some students lost marks by plotting three lines instead of one line for the mean values; some did not label the axes and some got the axes the wrong way round. Part (b) (ii) was very challenging and only the very best students answered this well. Many described the trend rather than explaining it but some deduced that as the concentration of salt solution in which the amoeba is immersed increases, less water enters the amoeba as there is less difference in concentration/water potential gradients, so there is less water to be expelled from the amoeba. In part (d) students were asked how reducing the temperature to 5^{o}C would affect the results. Many realised the rate of emptying would be slower/less frequent and tried to give an explanation in terms of molecules having less kinetic energy but they then switched to referring to collision theory of enzyme reactions. However, some students referred to kinetic energy of the water molecules or of less activity of the enzymes involved in respiration so less water made in the amoeba.

Question 5 presented students with an unfamiliar fungus, *A. niger* that may infect maize and peanut plants. They were also told that an unfamiliar bacterium, *Bacillus amyloliquefaciens,* is a pathogen of some eukaryotic organisms. Students were given some data about yields of peanuts of uninfected plants, plants infected with the fungus and plants infected with the fungus but then treated with the pathogenic bacterium. Most students

carried out the calculation correctly although some lost a mark by not giving the answer to one decimal place as instructed. In (a) (ii) students were asked how adding the bacteria to plants infected with *A. niger* increased the yield and this was challenging for all but the very best students. Many said that the bacteria would add mass to the peanuts. However, a good proportion of answers showed that students had deduced that because the bacterium was a pathogen of eukaryotic organisms it would harm/kill the fungus and so they gained at least one mark. Some went on to say that with the fungus removed the plant could carry out more photosynthesis and use the glucose produced to produce more seeds. Part (a) (iii) was a little easier and many students answered with two correct differences between fungi and bacteria, but some lost a mark by being too vague and not indicating which organism they were referring to, or by getting the differences the wrong way round. In part (b) most students devised two correct safety precautions, mainly referring to masks and gloves or sterilising the peanuts or not touching the peanuts. The final part of this question was the CORMS question and students were asked to design an experiment to find if humidity increased infection of peanut plants with the fungus. Many students scored highly stating the condition to be changed, referring to the same species/type of the peanut plants (or the fungus), carrying out repeats (at each humidity), stating a suitable time and a method of measuring infection such as measuring how many stems or seed pods were rotted, and giving two control variables – light intensity and another such as temperature. Some students lost marks by not clearly stating that the repeats were for each humidity level, or by giving a vague answer about how to measure infection. Some knew what the acronym CORMS represented but then said 'leave for a suitable stated time' instead of actually stating a suitable time.

Summary

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

- read each question carefully and note any special instructions such as giving a numerical answer to a certain number of decimal places
- always show your working for calculations as you may then score some marks for process even if you get an incorrect answer
- identify the command word and when asked for an explanation of the results of an investigation do not just describe the results
- study the meanings of the command words that may be used in an exam; these are given in the specification
- write in detail and use biological terminology such as trachea rather than windpipe
- avoid referring to 'producing energy'. It is fine to say that respiration produces ATP but when referring to energy say that respiration releases energy
- read though your answers and check that they make sense and that you have covered everything you have been asked to do
- look at the number of marks allocated to the question part and think about whether you have given enough information to gain that amount of marks
- for experimental design questions make sure you write about how to carry out an investigation
- always read the information given in the question stem; it may help you to answer the ensuing questions and help you recall information and apply your knowledge
- make sure you are familiar with the content of the specification and with the mathematical skills you may be expected to demonstrate.

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