Examiners' Report
Principal Examiner Feedback

November 2023

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B and
Science Double Award (4SD0) Paper 1B

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Chief Examiner's Report International GCSE Biology 4BI1 1B November 2023

This November series provided centres an opportunity to take the International 9-1 GCSE.

The examining team were pleased with the secure knowledge and understanding shown by many of the students taking the November papers.

Most students were able to apply their knowledge and understanding of biology to novel contexts and unfamiliar experiments. They were able to analyse and evaluate data and information from different scenarios and experiments. Centres have worked hard to prepare students for the examination, and this was reflected in the responses of many of the students. Many students performed well on the evaluative questions requiring students to comment and discuss results and conclusions. There was little evidence of students being short of time on this paper.

Question 1 gave students a food web from a woodland ecosystem. In (a) most students were able to identify the producer, the secondary consumer and which organism is both a secondary and a tertiary consumer. In (b) (i) most students were able to explain the effect of pesticide on the blackbirds in the woodland. In (b) (ii) students were required to describe a different method the farmer could use to reduce the number of greenfly on his crops. The best responses scored 3 marks for explaining how biological control, using a predator of the greenfly such as a ladybird, would reduce the number of greenfly with the ladybird consuming the greenfly.

Question 2 described how a student investigates the effect of different concentrations of sucrose on potato tissue. The student first makes a series of sucrose solutions using this dilution table. In (a) almost all the responses could correctly complete the table by writing the volume of distilled water for test tube 2. In (b) students were required to explain the purpose of drying the cylinders after removing them from the bathing solutions with filter paper before weighing them. The best responses explained that this step would remove excess solution that would affect the mass and so allow a valid comparison to be made. In part (c) students were given a results table and in (i) most could correctly calculate

the percentage change in mass. In (ii) students were required to comment on the effect of the different concentrations of sucrose on the potato tissue. Most responses earned some credit for noting that mass increased in a dilute solution and that the mass decreased in a concentrated solution. The very best responses linked this to the movement of water by osmosis from a region of higher water potential to a region of lower water potential. They also noted that in the solution of 0.6 moles per litre no movement of water occurred as this has the same concentration as the potato tissue.

Question 3 gave students a diagram of apparatus used to investigate the differences between inhaled and exhaled air. In (a) (i) most responses could correctly name the solution used to compare the concentration of carbon dioxide in inhaled and exhaled air. In (ii) only the best responses fully explained the changes that will take place in the solution in test tube A and in test tube B. These explained that limewater would not change in tube A, as it contained inhaled air, but would change in B, as it contained exhaled air, due to the higher concentration of carbon dioxide exhaled. In part (iii) some responses correctly gave another difference between exhaled air and inhaled air. In part (b) a table showed the results of an investigation into the effect of the duration of exercise on breathing rate. In (i) most students were able to identify the duration of exercise as the independent variable in this investigation. In (ii) students had to plot a line graph to show the effect of duration of exercise on breathing rate. Most students were able to accurately plot the data scoring full marks. Those graphs that did not gain full marks usually chose a poor scale or failed to label the axes. In part (iii) many students gained full marks for describing the effect of duration of exercise on breathing rate. In part (iv) most responses gave one way that the student could improve the reliability of their investigation.

Question 4 gave a diagram showing two samples of blood seen using a high-power microscope. One sample was of normal blood and the other sample was from a patient with a blood condition. In part (a) almost all students could (a) state two differences between the normal blood sample and the sample from the patient with the blood condition. The most frequent correct answers being more red cells and fewer lymphocytes in the blood condition. In part (b) students were told that the line P–Q shown on the diagram has an actual length of 25 μm. they then had to calculate the magnification of the diagram. Many students were able

to correctly calculate the magnification with others picking up one mark for correctly measuring the length of the line or dividing by 25. Centres should remind students to always show their working in calculations. In part (c) students were told that in a healthy person 1 cm^3 of blood contains 5.0×10^9 red blood cells and that an adult has 5.0 litres (5.0 dm^3) of blood in their body.
They then were asked to calculate the number of red blood cells in the body of a healthy adult and give the answer in standard form. Most responses scored 2 marks. In part (d) students were required to comment on the likely effect of the blood condition on the patient. Many students scored 3 or 4 marks with the best responses commenting on the effect of reduced red cells as less haemoglobin being available so less transport of oxygen leading to less energy from respiration. They also commented on the effect of increased white blood cells leading to a greater immune response with more antibodies and more phagocytosis. Some students commented on the increased white cell numbers being a response to infection which was also worthy of credit.

Question 5 gave information about guinea pigs having either long hair or short hair. The hair length is controlled by one gene with two alleles. In part (a) students had to state what is meant by the term allele. Many responses gained the mark for writing that an allele is alternative form of a gene. This is a direct quote from the specification. In part (b) students were told that breeder did three crosses. Cross 1 a male long-haired guinea pig with a female short-haired guinea pig, this produces five offspring all with short hair. Cross 2 a male short-haired guinea pig with a female long-haired guinea pig, this produces four offspring all with short hair. Cross 3 a male short-haired offspring from cross 1 with a female short-haired offspring from cross 2, this produces some offspring with long hair and some offspring with short hair. They were then asked in part (i) to draw a genetic diagram to show the parents, gametes and all possible genotypes and phenotypes of the offspring from cross 3. Many students gained full marks for correctly showing parent genotypes, gametes formed and genotypes and phenotypes of the offspring. In part (ii) the best students could combine the probability of being male with the probability of being short haired. By convention probability is usually given as a decimal but the examiners also accepted it expressed as a fraction or a percentage.

In part (iii) only the best students were able to explain how a breeder could use a cross to determine the genotype of a short-haired guinea pig. They did this by crossing the short-haired pig with a long-haired pig. If the offspring are all short the genotype is homozygous but if any are long-haired the genotype is heterozygous. In part (c) students had to explain how the guinea pig behaviour of staying completely still has evolved by natural selection. Many students scored full marks for explaining how a mutation gives rise to animals who stay still. These are more less likely to be noticed by predators so survive, reproduce and pass on their alleles to their offspring.

Question 6 showed a diagram of a reflex arc. In part (a) most students could identify the sensory receptor, the cell body of relay neurone, the motor neurone and the effector. In part (b) (i) students were told that a nerve impulse travels at 50 m per second and were required to calculate the time taken, in seconds, for an impulse to travel 180 cm. Most students gained at least one mark with many scoring both marks. In part (ii) students were asked to explain why the actual response time is different from the time taken for a nerve impulse to travel 180 cm. Candidates found this item challenging and only the best responses scored full marks. These responses explained that the actual response time is slower as the impulse needs to travel between neurones with a neurotransmitter diffusing across a synapse. The generation of the impulse in the receptor and contraction of the muscle also contribute to the delay.

Question 7(a) gave students a passage about bacteria to complete. Most responses gained at least 4 marks with many gaining full credit. The words that most students failed to get were chromosome and pathogen. In part (b) students had to describe how yeast is used to produce bread. Again many scored 3 or 4 marks for describing how aerobic then anaerobic respiration by yeast releases carbon dioxide which inflates the dough. Only the best responses included the role of amylase in converting starch to maltose.

Question 8 gave diagrams showing the female reproductive system and the male reproductive system with some structures labelled. In part (a) almost all students could identify the structure that produces gametes, the site of fertilisation and the structure in which the placenta usually develops. In part (b)(i) most could draw two lines to show where the sperm ducts are cut in a vasectomy. In part (ii) many

candidates gained full marks for explaining why this operation can be used as a permanent way of preventing pregnancy. These responses explained that no sperm cells would exit the penis or travel to the fallopian tube to fertilise the egg. Weaker responses wrote about no sperm being produced. In part (c) students were given a table of data collected by scientists comparing female and male sterilisation, looking at the outcomes of the operations. Students had to discuss the conclusion that male sterilisation should be recommended for most couples considering a permanent way of preventing pregnancy. In this item many students gained full marks often including reference to the male operation being less invasive, resulting in fewer complications and no deaths in males. They also noted that the operation in males had fewer failures and was cheaper to perform. Others commented on the large size of the study but that no other data was available on age, illness body mass or other factors that could impact the outcomes.

Question 9 was about selective breeding and in part (a) students were asked to explain why selective breeding with crop plants is easier and quicker than selective breeding with farm animals. Many responses merely repeated that it is faster in plants. Only the best responses were able to include: plants produce more offspring, are quicker to reach maturity, can be self-pollinated and that it is easier to control plants environment. Some students wrote about asexual reproduction rather than selective breeding. In part (b) students were required to describe how selective breeding can be used to improve milk yield in dairy cattle. Students did better here with most scoring at least 1 mark. Many however wrote about selecting male cows based on their milk yield. The best students were able to clearly describe how male cattle would be selected based on their daughter's/mother's/ sister's milk yield and mated with cows with high milk yield. This process would then be repeated selecting offspring using the same criteria. In part (c)(i) students had to suggest why an animal with a calmer temperament may be more suitable for the farmer on a dairy farm. Most responses gained 1 or 2 marks for suggesting that these cows would be easier to milk, less likely to fight, less likely to run away or use energy that could increase their milk yield. In (c) (ii) most students could describe the production of adrenaline and its effects on the body. Most responses gained at least 2 marks with the best students having clearly revised this part of the specification. Finally in question 9 (c) students were asked to describe the role of the placenta in reproduction. Again those students that had learnt the

knowledge content of the specification had no problem in gaining full marks for describing how the placenta enables the mother to provide the foetus with oxygen, amino acids and glucose and enables the foetus to transfer waste products such as carbon dioxide and urea into the mothers blood via diffusion.

Question 10 was the experimental design item and asked students to devise an investigation to discover which colour of light results in a higher rate of photosynthesis. Many responses gained high marks as students were familiar with these item types and used prompts such as CORMS to plan their answer. The best students described using a water plant as this enables the rate of photosynthesis to be quantitatively measured by collecting the volume of gas released in a stated time.

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

- ensure that you read the question carefully and include sufficient points to gain full credit
- identify the command word and use it to inform you what you should include in your response.
- when plotting graphs make sure you choose a scale that covers most of the grid
- always show the stages of any calculation so that even if your answer is incorrect you may gain some marks
- in discuss and comment items include as many points as there are marks available and remember to use all the information in the question and your own knowledge.
- in experimental design items ensure you write about how to conduct an investigation.
- write in detail and use correct and precise biological terminology.
- always read through your responses and ensure that what you have written makes sense and answers the question fully.
- ensure that you are familiar with all the specification content.

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