



Examiners' Report Principal Examiner Feedback

January 2023

Pearson Edexcel International GCSE
in Biology (4BI1) Paper 2B

General Comments

The examiners were very impressed with the high standard of many of the scripts. It was clear that many candidates and centres have prepared very thoroughly for these examinations. Factual knowledge was generally excellent and most candidates use scientific terminology accurately and with confidence. Mathematical skills were also very strong and it is clear that candidates and centres have now come to terms with the longer evaluative and discussion questions that are a feature of the reformed specification. Some candidates confused the demands of the different command words such as describe and explain. A few candidates gave general answers to questions that required a level of data analysis and interpretation. Some candidates also tend to underestimate the depth and technical terminology needed to gain full credit at this level.

Question 1

(a) This question was well answered by many candidates and was indicative of the strong mathematical skills shown by most. Approximately three quarters of candidates were able to gain at least one mark for correctly calculating the number of people with kidney disease, but only about half went on to gain the second mark for using standard form.

(b) Over 80% of candidates were able to correctly identify water or carbon dioxide as an excretory product. A few incorrectly stated urea which is not released from the lungs.

(c) This question required candidates to identify ways in which the dialysis machine is designed to maximise the rate of urea removal. Approximately one third of candidates gained at least two marks. Strong answers identified two features and went on to explain how they increased urea removal. Some answers simply stated two features without explaining how they would increase the rate of removal. Some candidates did not refer to diffusion – candidates should always try to use technical vocabulary where appropriate.

(d) (i) Most candidates were able to correctly identify the Bowman's capsule as the area of the nephron where ultrafiltration occurs.

(d)(ii) This question required candidates to describe how glucose is absorbed back into the blood. Many candidates found this question challenging and gave vague answers that often restated the question stem. Strong answers correctly described the role of selective reabsorption, active transport, the need for ATP and movement against a gradient.

(d)(iii) Around half of candidates identified that the blood supply to the artificial kidney would be through the renal artery and that the tube that transports urine to the bladder is the ureter.

(e) This question required candidates to describe the role of the pituitary gland and nephron cells in osmoregulation. Strong answers referred to the increased release of ADH, the increased permeability of the cells, reabsorption of water into the blood, and the production of a low volume and concentrated urine. Most candidates gained at least one mark with many going on to gain all three. A few candidates incorrectly stated that ADH release would be reduced.

Question 2

(a)(i) More than half of the candidates were able to correctly identify the cornea on the diagram of the eye.

(a)(ii) Many candidates found this question challenging. Candidates were required to explain how the iris changes when light intensity increases. Strong answers explained that the circular muscles contract and radial muscles relax. Many candidates confused ciliary muscles and circular muscles. A significant number of candidates gave vague answers about muscles contracting without referring to the circular or radial muscles.

(b)(i) This question required candidates to identify the independent variable in an experiment. A significant number of candidates confused the independent variable with the dependent variable or gave lists of control variables. Candidates should be clear about the meanings of terms such as independent variable, dependent variable, and control variable.

(b)(ii) Over a third of candidates were able to correctly identify a factor that should be kept constant. Common, correct answers included light intensity, and the distance of the block from the person.

(b)(iii) Approximately half of the candidates were able to calculate both the medians and the modes for the data. Some candidates confused the mode with the mean. Candidates need to be familiar with the mode, mean, and median as measures of central tendency.

(b)(iv) Most candidates scored at least one mark for this question. The question required candidates to use the information in the diagram and in the results table to explain why predators have two forward facing eyes. Strong answers explained that having a wide field of view seen by both eyes enabled effective judgment of distance of the predator from prey.

Question 3

(a) Only stronger candidates were able to give an accurate definition of a gene. Several terms, such as gene, are defined within the specification. Candidates should ensure that they are fully conversant with terms that are defined within the specification. Many candidates gave vague answers, such as 'genes coding for the characteristics of organisms'.

(b)(i) Approximately half of the candidates were able to give the correct genotype. A significant number of candidates gave the alleles

that would be present in a gamete rather than the genotype of the organisms.

(b)(ii) The drawing of genetic diagrams was generally good with most candidates gaining at least two marks. Stronger answers gave clear parental genotypes, gametes, and offspring genotypes. Some candidates did not appreciate the nature of codominance – candidates should remember that codominant genetic crosses can be assessed on Paper 2. Some candidates did not take into account that the probability required was for a male roan calf and gave an answer for just a roan calf.

(c)(i) This challenging question generated answers of a wide range of quality. Strong answers correctly recognised that height is a polygenic trait and so is affected by several genes. Some candidates confused the terms allele and gene – candidates should be clear about definitions of terms such as allele and gene. The most common correct response was for stating that height, although being mainly genetically controlled, may be influenced by the environment.

(c)(ii) Most candidates gained at least one mark for this question, with over a third going on to gain both. A few did not fully understand what selective breeding is and gave suggestions about choosing animals with desirable characteristics – candidates should relate their answers to the questions posed.

Question 4

(a) Over half of the candidates gained at least one mark for this question and most clearly understood the purpose of micropropagation in producing genetically identical offspring. Strong answers also explained that this would mean that all the plants would have the same level of saturated fat. Many candidates also understood that the method is fast and means that there is no need to repeat the genetic modification.

(b) (ii) Most candidates were able to gain at least one mark for this question asking how to make a valid comparison of the energy in the two types of soy bean. The question asked for a valid comparison so candidates needed to focus on both the calorimetry method and how to maintain validity. Strong answers showed an appreciation that the seeds would need to be weighed to calculate energy per gram of seed. Other correct points given in strong answers included the need to measure the rise in temperature (rather than simply taking one temperature), the use of a stated mass or volume of water, and the need to keep trying to ignite the beans. Weaker answers gave vague details, for example, stating that the seed would be burnt until it went out rather than describing relighting the seeds.

(b)(ii) This question asked candidates to give a safety precaution relevant to the experiment. Most candidates were able to give an

appropriate safety precaution, the most frequent answers included the use of eye protection and lab coats.

(b)(iii) This question asked candidates to explain two reasons why a calorimeter would give more accurate energy values than holding a burning soy bean under a test tube. Many excellent answers were seen that identified and explained features such as the insulation, the internal ignition coil, and the stirrer. Many candidates gained at least two marks with many going on to gain three or four. Weaker candidates tended to give vague references to the apparatus reducing energy loss without identifying the features.

Question 5

(a)(i) This question required candidates to calculate the mean rate of decrease of rainforest. Over half the candidates gained at least one mark. Candidates had to calculate the change in rain forest between 1990 and 2015 and then divide this by the time taken (25 years). A number of candidates tried to calculate the mean area of rain forest rather than simply calculating the overall decrease in rain forest over the 25 years.

(a)(ii) This question was well answered by most candidates with over three quarters gaining at least one mark and nearly one third going on to gain all three. Most candidates recognised that carbon dioxide is a greenhouse gas, contributes to global warming and then went on to give negative consequences such as a loss of habitats.

(b)(i) Just over half of the candidates were able to gain at least one mark. Many candidates correctly stated that decomposer bacteria break down organic waste. A significant number of candidates confused the roles of nitrifying bacteria with nitrogen fixing or denitrifying bacteria. Candidates should be clear about the functions of each of the bacteria involved in the nitrogen cycle.

(b)(ii) This question required candidates to suggest why counting numbers of animal species was not a good overall measure of biodiversity. Only about a quarter of candidates correctly stated that the measure used did not consider organisms such as plants or that it did not take the populations of organisms into account.

(b)(iii) This challenging question presented candidates with data showing the effect of deforestation on biodiversity and nitrate ion concentration in a river. Stronger answers explained that the reduction in biodiversity could be due to eutrophication in the river from the run off of mineral ions. A significant number of candidates simply described the data and did not realise the significance of the increased nitrate ion concentration. The question asked for an explanation for the change in biodiversity rather than a description of the data. When presented with data, candidates should always explore all aspects of the data fully when reaching a conclusion.

Question 6

(a) This multiple-choice question was well answered by many candidates with over half correctly recognising that each of organisms contains pathogens.

(b) (i) There were many excellent answers to this question and it is clear that many candidates have a full understanding of how vaccines induce immunity. Most candidates appreciated that a vaccine leads to the production of memory cells, and it was pleasing to see that most candidates referred to increased or faster production of antibodies on re-exposure.

(b)(ii) This longer answer question required candidates to discuss the impact of vaccinating dogs on cases of human rabies. Over three quarters of candidates gained at least one mark with over one third gaining three or more. Many candidates were able to identify the decrease in number of cases in humans and dogs and the correlation between them. A significant number of candidates also recognised that the fall in human cases meant that most cases must have been due to domestic dog bites and that the cases after vaccination may be due to wild animal bites. The examiners commented on how well many candidates structured their answers by taking each piece of evidence or data pattern at a time and then suggesting explanations. Candidates and centres are preparing well for these extended answer questions.

(b)(iii) This question asked candidates to describe how RNA introduced into cells would lead to the production of proteins. Strong answers fully explained the role of ribosomes, transfer RNA and the joining of amino acids in translation. Some candidates confused translation with transcription. A number of candidates were aware of the key elements involved but were confused how they interact, for example, a common error was to suggest that amino acids join with RNA, or that RNA is composed of amino acids.

Summary Points

In future series, students should:

- be fully familiar with the requirements of all command words
- understand the differences between mean, mode, and median
- when answering evaluation and discussion questions, structure answers clearly
- use key vocabulary accurately and precisely
- be fully conversant with the terms independent, dependent, and control variable
- ensure that they know the formal definitions for terms, such as gene, that are listed in the specification
- fully understand the processes of transcription and translation
- give detail that is commensurate with the level required by International GCSE