Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2024

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B

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

The examining team were pleased with the knowledge and understanding shown by many of the students taking the November papers. Most students were also able to apply their knowledge and understanding of biology to novel contexts and unfamiliar experiments. Most students 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. Most students performed well on the evaluative questions requiring students to respond to command word 'comment' and 'discuss' results and conclusions. There was little evidence of students being short of time on this paper and most students attempted all questions.

Question 1 gave students a diagram showing an insect-pollinated flower with some structures labelled. In (a) almost all students were able to identify the structures labelled in the diagram from the descriptions given in the question. In (b)(i) students were able to describe how a strawberry plant reproduces asexually. Most students gained at least one mark with the better responses describing how the plants use runners with a stem growing along the ground and breaking off to form a new plant. In (b)(ii) students were required to discuss how a farmer could use sexual and asexual reproduction to produce a plant that has strawberries with a different flavour. Almost all students gained some marks with the best responses discussing how the farmer could use sexual reproduction by crossing with a different variety and how they could use cross pollination to produce a variety with a different flavour. They could then use cuttings to produce large numbers of genetically identical plants.

Question 2 asked students to complete the passage about the lung function by writing a suitable word in each blank space. Again, almost all responses gained some marks with many gaining full marks. Some weaker responses did not distinguish between bronchi and bronchioles or confused bronchioles with alveoli.

Question 3 provided a diagram showing the digestive system of a dog with some structures labelled. In 3(a) the examiners were pleased to note that the candidates were able to apply their knowledge of digestive systems to a novel organism. Most students gained full marks in 3(a)(i) to (iv) correctly identifying the structures in the diagram from the descriptions provided. In 3(b) students were asked to describe how food is moved along the gut of the dog. Most students gained at least one mark, with many gaining two, for describing how muscular contraction behind the food moves it along the gut by peristalsis.

In 3(c) students were given a table listing some ingredients in food given to young dogs and in food given to adult dogs. The students were asked to discuss the differences between the composition of the two foods. Almost all responses gained some marks with the best gaining four marks for a discussion that linked the differences in composition with the dietary requirements of young or old dogs. So, for example noting that there is more protein in young dog food as young dogs are still growing. Some weaker responses merely pointed out the differences or quoted data from the table without linking these to requirements. In 3(c)(ii) students were required to explain the possible effects of feeding domestic dogs large quantities of carbohydrates such as starch. This item proved more challenging to students but many gained credit for explaining that the excess carbohydrates would be converted to fat. That this fat could lead to the dog gaining too much mass or becoming obese. Other credited points included that the dog may develop heart disease or may become diabetic. Others noted that the dog may fail to thrive due to lack of protein.

Question 4 gave a diagram showing a section through a human eye with some structures labelled. In 4(a)(i) and (ii) most students could correctly identify the structures that refract light onto the retina and control the amount of light reaching the retina. In (a)(iii) slightly fewer students were able to identify which structure contains light sensitive cells. In 4(b) students had to describe the changes that take place in the eye when it focuses on a near object. On this longer descriptive item most gained some credit. The best scoring full marks for describing the process of accommodation. The

ciliary muscles contract so this reduces the tension in the suspensory ligaments and the lens becomes thicker so light is refracted more. Students need to be precise in their language use avoiding descriptions of ligaments contracting. Weaker responses contained descriptions of pupil changes. In part (c) students were told that some people develop cataracts in their lenses as they get older. They were given a diagram showing how a cataract changes the appearance of a person's eye. The students, in part (i), were asked to explain how cataracts affect a person's vision. Almost all responses at least one mark with the best responses explaining that the lens would be opaque so less light would enter the eye and image formed would be blurred. In part (ii) the students were told that the treatment for a person with cataracts is to remove the affected lenses. They were asked to suggest what additional treatment is needed for the person. Most students correctly suggested the use of glasses or contact lenses.

Question 5 gave information and results data from an investigation into the effect of exercise on breathing rate. In (a)(i) most could correctly calculate the percentage change in the breathing rate from the start of exercise to the breathing rate at 10 minutes. Those that did not gain full marks could earn credit for their working. Centres are reminded to encourage students to show all the stages in their calculations. In (a)(ii) students had to plot a line graph to show how breathing rate changes during exercise. Most students were able to plot a graph clearly and accurately those who did not get full marks either chose an unsuitable scale or failed to correctly include units on their axes. In (iii) students were asked to explain the change in breathing rate during the 12 minutes of exercise. Again, most students scored marks with the best responses explaining that as exercise proceeded more oxygen was required and more carbon dioxide was released due to respiration in muscles. Credit was also awarded for explaining that from 10 minutes the rate of breathing levelled out. In (b) students were asked to explain why the breathing rate would remain high for a few minutes after the exercise has finished. Most responses gained credit with the best explaining how during exercise lactic acid builds up in the muscles due to anaerobic respiration and this needs oxygen to break it down. In part (c) students were asked to suggest one advantage and one disadvantage of using a shirt that measures

breathing rate by recording chest movements rather than using a face mask. Most response gained at least one mark. Full credit being given to an advantage such as the mask covers the face and a disadvantage such as the shirt may record other muscle movements or be too heavy or uncomfortable.

Question 6 gave students a photograph of the fruit fly *Drosophila melanogaster.* These flies are the most commonly used organisms for genetic research. They have a life cycle of around 10 days and each female can produce hundreds of offspring. In (a) students had to explain one reason why *Drosophila* are a popular choice for scientists to use in genetic studies. Only the best students gained full marks for explaining that short life cycle will allow scientists to obtain results quickly. Producing many offspring means that reliable data can be obtained to check ratios and hypotheses. *Drosophila* also have many clear inherited characteristics. In (b) students were given details of a series of crosses and in (i) were asked to draw a genetic diagram of the second cross. Most students did well on this genetics item and were able to score full marks for a clear diagram or Punnett square that shows the genotypes and phenotypes of the parents and the ratio of genotypes and phenotypes of the offspring. In 6(b)(ii) students had to calculate the expected probability of a fly being male and having long wings in this second cross. Many students gained full credit and those did not correctly calculate the probability as 0.375 or 3/8 could gain a mark for appropriate working if shown. In (b)(iii) the students were given the results showing the number of male and female offspring with long wings or with short wings from this second cross. They students were asked to comment on these results compared with the expected results. Most students scored marks with the best commenting on the actual number of male / female flies compared to the expected numbers and the same for long wing/short wing. Responses that gained little or no credit often quoted unprocessed data from the table. In item 6 (c) students were asked to explain why with short wings are not found in wild populations *of Drosophila*. Most students gained some credit with the best answers explaining that flies with short wings would be at a selective disadvantage as not being able to escape predators or reach new food sources. These flies would not survive to reproduce or pass on alleles.

Question 7 gave a food chain from a Swedish lake. In (a)(i) almost all students could name the trophic level of the algae in the food chain and in (a)(ii) the trophic level of the pike in this food chain. In (b) students were given a diagram of the algae *Chlorella*. They were told that the actual diameter of the *Chlorella* is 10 μm and were asked, in (b)(i), to calculate the magnification of the diagram. Centres are reminded that students will be expected to carry out magnification calculations as this skill is derived from the mathematical skills listed in the appendix 4 of the specification skill 2I. Most responses scored at least one mark. In (b)(ii) students were given the formula for the volume of a sphere and asked to calculate the volume of the *Chlorella*. Most students were able to correctly calculate the volume. In part (iii) students had to describe the function of the chloroplast. Most students gained both marks for describing the role as trapping light to be used in photosynthesis to produce glucose. In part (iv) they were asked to describe the function of the starch granules in the organism and students di less well on this item. Only the best responses scored both marks for describing the role of starch granules as an energy store storing carbohydrate to be used in respiration. In part (c) the question asked how the student could compare the number of individuals in seaweed populations on two different beaches. Most responses gained credit with many gaining full marks for a description of this core practical.

Question 8 (a) gave a table showing the effects of some of the hormones and the gland that produces each hormone. Students were required to complete the table by giving the missing information. Most responses gained credit with only the best students correctly completing all of the table. In part (b)(i) students were asked to explain how plants benefit from the responses of their roots and stems to the direction of light they receive. Again, almost all responses gained some credit with the best explaining that stems show positive phototropism and bend towards the light enabling an increase in photosynthesis. Roots show negative phototropism and bend away from the light to grow into the soil to absorb water and minerals. Part (c)(ii) asked students to suggest why flowering in many plants is stimulated by the number of hours of daylight rather than by temperature. This item proved challenging for most and only a few responses gained any

credit. The best students suggested that hours of daylight is a better indicator of season or time of year as daylight does not vary day to day. However, temperature can vary from day to day within a season. Responses that suggested that more hours of daylight allow insects to see flowers, so enables more insect pollination, were also credited.

Question 9 showed a photograph of a larva of a moth feeding on a leaf of a maize plant. In (a) students were asked to explain how the larvae of the moth cause a reduction in the yield of the maize crop. Some students found this item difficult and only the best responses gained full credit for explaining that there would be less leaf so fewer chloroplasts for photosynthesis to make carbohydrate. Part (b) asked students to explain the advantages of using biological control rather than chemical pesticides to control a pest species. Almost all responses earned some marks but only the very best students gained full marks for explaining that biological control does not need reapplication, that it is specific so does not affect food chain or cause bioaccumulation and that the pest does not become resistant. In part (c) students were told that a parasitic wasp is used as a biological control of the larvae of the Fall Armyworm moth. They were given a graph showing the change in the numbers of the larvae of the Fall Armyworm moth. It also shows the change in the numbers of the parasitic wasp. The students were asked, in (c)(i), to explain the relationship between the number of moths and the number of wasps during the 24-month period. Most responses gained some credit with the best scoring full marks for explain how the moth population rises (up to 6 months) so wasp population also rises as more moths are available to eat. Then the moth population falls as they are eaten by wasps leading to the wasp population falling as they have fewer moths to feed on. The best answers explained the change in numbers by predation or food availability, weaker answers just described the data without explanation. In part (c)(ii) students had to use the graph to determine the maximum range in the number of moths in the period from 6 months to 24 months. Only the best students gained credit on this item even though the term range was explained in the question. Finally, part (c)(ii) asked students to suggest why some maize farmers choose not to use biological control to control the moth. Here most responses gained at least one mark, and suitable suggestions

included some moths remain, delay to kill moths, or that wasps may become pest and kill other organisms.

Question 10 was the experimental design item and asked students to design an investigation to determine whether a small change in temperature in a glasshouse will produce a significant increase in crop yield. 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 changing the temperature in two glasshouses by $3^{O}C$ quantitatively measuring the crop yield in g after two months. These responses also used the same species and controlled other factors such a carbon dioxide concentration and water and minerals provided.

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

- ensure that you read the question carefully and note the number of marks available and include sufficient points to gain all of the marks
- identify the command word, described in the specification appendix 5 on pages 45 and 46, such as explain or discuss and use it to inform you what you should include in your response
- when plotting graphs make sure you choose a scale that is simple to plot and covers most of the grid, ensure you include correct units on your axes
- always show the stages of any calculation so that even if your answer is incorrect you may gain some marks
- 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 including the experimental listed on page 28 of the specification and the mathematical skills listed in the appendix 4 on pages 43 and 44.