Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE

In Biology (4BI1) Paper 2BR

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This January series was another opportunity for students to take the reformed Edexcel International 9-1 GCSE.

The examining team commented on the knowledge and understanding shown by the students on this January's papers. Students were able to apply their knowledge and understanding of biology to analyse and evaluate data and information from unfamiliar contexts and experiments. Schools have worked hard to prepare students for the examination, and this was reflected in the responses of these students. There was no evidence of students being short of time on this paper. A very small proportion of students did, however, leave some items unanswered.

Question 1 provided students with a passage about 'moving plants'. The passage contained information cross-pollination and seed dispersal.

In **Q1(a)** students were asked to explain how cross-pollination can lead to an increase in genetic variation. Many students were able to explain that cross-pollination involves two parent plants that would have different alleles that would combine at fertilisation.

In **(b)(i)** students were asked to explain the advantages of the seeds germinating away from the parent plant. Most answers gained some credit with the best responses explaining that germinating away from the parent plant would mean that the new plants would not need to compete with the parent plant for water, sunlight, or mineral ions.

In **(b)(ii)** the best responses could also explain the advantage of the new plant germinating near the parent plant. These included the fact that the soil and habitat would be suitable for growth as the apparent plant had successfully grown there.

In **(c)** students were asked to explain the conditions required for germination. Many responses merely listed the conditions without explaining them. The best responses explained that a warm temperature is required for enzyme action, oxygen is required for respiration and water is required to mobilise enzymes so that chemical reactions can occur.

In part **(d)** students had to explain why some seeds are surrounded by a brightly-coloured and sweet-tasting fruit. Some answers correctly explained that this fruit would attract animals that would eat the sweet tasting fruit. Some answers confused fruit and seed dispersal with pollination so wrote about insects being attracted.

In part **(e)** students were asked to suggest a reason large numbers of tomato plants are often found growing along the sides of drains and settling beds on sewage farms. The best responses were able to suggest that these plants had grown from seeds egested.

In **(f)** some students could link the evaporation of water with increased temperature associated with sunlight.

In part **(g)** many students were able to fully describe an experiment you could carry out to investigate how the presence of fluff on dandelion seeds affects how fast they fall. The best answers used dandelion seeds with and without fluff dropped from a stated height and used a stopwatch to record the time taken to fall.

Question 2 gave students a diagram of the human nephron.

In part **(a)** students were able to identify the structure from where ultrafiltration takes place, the site of glucose reabsorption and the loop of Henle.

In **(b)(i)** many responses could describe what is meant by components of plasma as substances dissolved in plasma.

In **(b)(ii)** many students correctly calculated the mean mass of urea excreted per day.

In **(b)(iii)** many responses cold explain that glucose is reabsorbed so that it is not excreted in the urine as the glucose is needed for respiration to provide energy.

In **(b)(iv)** students were told that a person eats a meal with a high protein and salt content and drinks a small volume of water. They were asked to comment on how this may change the values in the table and the effect it will have on urine production. Many students knew the consequences of drinking a small amount of water or of eating a meal with high salt content. There were a number of references to the blood concentration increasing and to its detection by the hypothalamus. The increased secretion of ADH by the pituitary was widely known, as was its effect on the collecting duct and the resulting increased reabsorption of water. Many students knew what the effect on urine production and concentration would be.

Question 3 concerned root hair cells.

In **Q3(a)** most students were able to name the nucleus, vacuole, cell wall and cytoplasm.

In **Q3(b)** many students were able to correctly calculate the magnification of the diagram. Students are reminded to show their working as even those who calculated the magnification incorrectly could gain a mark for their correct measurement.

Part **(c)(i)** asked students to explain the role of the root hair cell in absorption of water from the soil. Most responses gained credit for explaining that the large surface area of the cell facilitates absorption of water. The best responses also explained that water enters the root hair cell by osmosis down a water potential gradient.

In **(c)(ii)** students were told that gardeners sometimes give their plants too much water which fills up the air spaces in the soil around the plant roots. Only the very best responses gained full marks for explaining that this would limit the oxygen so reducing respiration and preventing the plants absorbing minerals by active transport.

Question 4 provided a diagram of the nitrogen cycle.

In **Q4(a)** some students could correctly name the processes labelled in the diagram.

In **Q4(b)(i)** students needed to use the data from the table to calculate the total mass of nitrogen removed from the atmosphere by these processes and give the answer in standard form. Many responses correctly calculated the mass but some struggles with using standard form.

Also, in **(b)(ii)** many could correctly calculate the percentage of the nitrogen released into the atmosphere that comes from burning of biomass.

In **(b)(iii)** students were asked to explain how burning biomass returns nitrogen to the atmosphere. The best students could explain that biomass contains nitrogen containing compounds such as protein which will produce nitrous oxides when burned.

In part **(c)** many students wrote about acid rain when asked to explain the effects of nitrous oxide on global warming. The best students explained that nitrous oxide was a greenhouse gas that would increase global warming.

Question 5 was about fish farming.

Part **(a)** provided graphs showing the changes in the tonnes of fish caught by traditional fishing and produced by fish farming in three countries. Students were required to comment on the changes in the mass of fish caught by traditional fishing and the mass of fish produced by fish farming from 1960 to 2016 using the information from the graph. The best students discussed the increase in fishing over the years using both methods and for each country. They also compared the mass of fish caught and produced by each country.

In part **(b)** most students were able to give very good explanations of the methods used to maximise fish production. They demonstrated good knowledge of needing to separate fish by species and by size and usually gave reasons for this. Some students knew that food should be provided in small amounts at frequent intervals. Some responses confused antibiotics with antibodies. Some responses referred to selective breeding being used to maximise fish production.

Question 6 gave students a description of a demonstration to show the effect of different concentrations

of salt solution on red blood cells. In part **(a)** most responses correctly identified the independent variable in this investigation as the concentration of the salt solution used.

In part **(b)** most students identified the correct control variable as either the volume of sodium chloride solution, the volume of diluted blood or the time the tube was left for.

In part **(c)(i)** students were asked to explain the differences in the teacher's observations that tube A had a clear solution whilst tubes B and C contained a cloudy red suspension. The best responses explained that no red cells were present in A, but cells were present in B and C.

In part **(c)(ii)** some students gave very good explanations for the differences in the appearance of the three slides. Many students knew that no cells were seen in tube A because water had entered the cells, by osmosis, causing them to burst, and that water had left the cells in C.

Finally in part **(d)** students were given a diagram to show how a sample of blood looks after it has been spun in a centrifuge. The students were then asked to describe how the blood in tubes A, B and C from the teacher's demonstration would look after they had been spun in a centrifuge. Many students described tube B as looking the same as the sample of blood shown. Fewer students gave an accurate description of how tube A would appear.

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

- Ensure that you read the questions carefully and include sufficient points to gain full credit.
- 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.
- Make sure you have practiced calculations especially percentage calculations
- Ensure that you know the relationship between units.
- Ensure you can express your answers correctly in standard form.
- Show all stages of working in calculations, so that if the final answer is incorrect some credit can still be gained.
- Write in detail and use correct and precise biological terminology.
- Ensure that you are familiar with all the content, including the practicals included in the specification.

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