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Examiners' Report
Principal Examiner Feedback

Summer 2019

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

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Chief Examiner's Report International GCSE Biology 4Bi1 2BR June 2019

This June series was the first opportunity for candidates to take the new reformed Edexcel International 9-1 GCSE.

The examining team commented on the knowledge and understanding shown by many of the candidates on this June' papers. Candidates were able to apply their knowledge and understanding of biology to analyse and evaluate data and information from unfamiliar contexts and experiments. Schools work hard to prepare candidates for the examination, and this was once again reflected in the responses of many of the candidates. The candidates performed well on the new style of questions and on the new specification content. Only a few candidates failed to attempt all questions. There was no evidence of candidates being short of time on this paper.

Question 1 provided a passage on Free air carbon dioxide enrichment (FACE) is when scientists increase the concentration of CO2 in the air surrounding crop plants. In Q01a most candidates were able to explain why the carbon dioxide concentration is predicted to increase further by 2050. Most responses gained marks with the best responses stating that population was increasing with increased use of fossil fuels and deforestation. In Q01b most responses were able to suggest why wind direction and speed are measured in FACE plots. In Q01c candidates were asked to evaluate the conclusion that that FACE experiments are more useful than experiments in glasshouses. Most responses scored 2 or 3 marks, with the best noting that FACE are more valid as they take place in a natural ecosystem with many other species but that they lack the control of light, temperature and water that can be provided in a glasshouse. In Q01d almost all candidates could explain why an increase in carbon dioxide concentration would lead to an increase in the rate of photosynthesis. In Q01e candidates were asked to describe an experiment to estimate the rate of water loss from a plant. Almost all responses gained some credit with the best responses describing a bubble or weight potometer and how the distance moved by a bubble or the change in mass can be recorded for a stated time period, the readings repeated, and abiotic variables controlled. Weaker response confused this required practical with another, the production of oxygen from a water plant. In Q01f candidates were asked to explain the compromise that plants must make over opening or closing their stomata. Most responses scored 2 marks for explaining that fully opening the stomata would allow increased diffusion of carbon dioxide into the leaves but would also increase transpiration. Finally, Q01g asked candidates to describe three other methods of reducing climate change. Most responses described 2 or 3 methods such as using renewable energy, using public transport, preventing deforestation or reducing rice farming.

Question 2 asked questions on ecology. In Q02a most candidates could state what is meant by the terms population, community and ecosystem. Some weaker responses confused population and community. In Q02b almost all could identify soil acidity as the abiotic factor and in Q02c almost all could identify a quadrat as the apparatus suitable for estimating the population size of a woodland plant. In Q02d about half of the candidates were able to describe how the biodiversity of a woodland differs from biodiversity of a farmed field of wheat plants. Some responses indicated that some candidates had no idea what biodiversity is.

Question 3 gave candidates a diagram showing part of a kidney nephron. In Q03a most could correctly identify the location of this part as the cortex. In Q03b candidates had to study a graph showing the effect of age on the number of glomeruli in the kidneys. They then had to use the graph to determine the age of a person with 1 600 000 glomeruli in their kidneys. Almost all could correctly determine the age as 65 years. In Q03c candidates were given a table listing the concentration of protein, glucose and urea in the glomerulus, the Bowman's capsule and the bladder. They had to explain the difference between the concentration of each substance in the glomerulus and in the bladder. Almost all candidates gained some marks with many scoring full credit for explaining that protein is a large molecule and therefor cannot pass through the glomerulus into the Bowman's capsule. They also explained that glucose is reabsorbed from the nephron into the blood in the proximal convoluted tubule by active transport. Some responses also explained that urea was in a high concentration the bladder due to reabsorption of water.

Question 4 gave a table showing the relative toxicity of the chemical theobromine. The table showed the mass of theobromine per kg of body mass that is poisonous for five different species. In Q04ai candidates were asked to compare the poisonous effect in cats and rats. Most responses earned at least 1 mark and the best students were able to quantify the comparison explaining that theobromine is 6 times more poisonous to cats than rats. In Q04aii the best candidates could explain that a man of mass 70 kg would not be poisoned by a bar containing 200 mg of theobromine and used the data in the table to calculate that he would need to consume 350 bars to be poisoned. Item Q04b described how theobromine prevents the release of ADH, candidates were asked to explain why preventing the release of ADH can be harmful to humans. Many responses scored full credit for explaining that osmoregulation would be affected, and the permeability of the collecting duct wall could not be increased so no water would be reabsorbed producing a dilute urine and leading to dehydration. Some students merely described the role of ADH or suggested that ADH can reduce the permeability of the collecting duct. In Q04c candidates were given a diagram of a calorimeter, which is used to measure the energy content of a food sample. They were asked to explain the measurements and the calculations you would use to compare the energy content of

milk chocolate and dark chocolate. Many responses scored 3 or 4 marks. The most common error was to include the mass of the food in the numerator of the equation rather than the mass of water. Some candidates just wrote a formula without explaining what the symbols were.

Question 5 gave students information about an inherited condition in dogs called Phosphofructokinase deficiency (PFK) that causes red blood cells to burst. In Q05a most candidates could explain why dogs with PFK find it difficult to exercise. They explained that with fewer red blood cells less oxygen could be provided for aerobic respiration. In Q05b most candidates could correctly predict the percentage of offspring likely to have PFK from the given crosses. In Q05c candidates had to explain the advantage for the dog breeder of using homozygous dominant dogs as parents. Many responses cored 1 mark for explaining that all the offspring would be free of PFK but only the best candidates went on to explain that all future offspring would also be homozygous dominant and free of the recessive allele. In Q05d candidates had to explain how crossing a healthy dog with a homozygous recessive dog would enable the breeder to determine the genotype of the healthy dog. Most candidates again scored at least 1 mark with the best responses gaining 2 marks for explaining that if any of the offspring have PFK the parent dog is heterozygous but if no offspring with PFK are produced the parent dog is more likely to be homozygous. In Q05e students were examined on new specification material on protein synthesis. In Q05ei most candidates were able to select the base sequence of mRNA produced from the strand of DNA. In Q05eii candidates were asked to explain why the mutated base sequence makes a different protein than the normal DNA. Most candidates were able to score some marks with many gaining all 3 for explaining that substituting T for G will change the mRNA strand leading to different tRNA bringing different amino acids and thus changing the order of amino acids in the protein. Some responses confused codon with anticodon.

Question 6 also examined new specification content. It gave students a graph showing changes in the levels of four hormones that control the menstrual cycle. In Q06ai most students could identify hormone A as LH. In Q06aii almost all responses could describe ovulation as the release of an egg or ovum but some then confused their answer by suggesting the egg was released into the uterus or that the egg was released from the oviduct. In Q06b most candidates could name hormone D as progesterone and, in Q06c, give its site of production as the ovary.

Question 7 provided candidates with information about world fish supply from 2009 to 2014. In Q07ai they had to calculate the difference between the percentage of total fish production that is farmed in 2009 and the percentage of total fish production that is farmed in 2014. This is a three-stage calculation and just under half of responses scored credit with most of these gaining all three marks. In Q07aii most candidates were able

to describe the changes in fish supply from 2009 to 2014 with many gaining full marks for describing an increase in total fish supply and an increase in farmed fish supply and little change or fluctuations in wild fish supply. Finally, Q07b asked candidates to discuss how fish famers can solve the problems of farming fish in large quantities. Almost all responses gained some credit with an even distribution of marks from 1 to 6. The very best responses mentioned some of the following: selective breeding, separating different sized fish, preventing predation by using nets, regular feeding using small amounts of high protein food, filtering the water to remove fish faeces, preventing disease by using antibiotics or removing parasites using wrasse, providing oxygen or flowing water and using growth hormone to increase size.

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

- in evaluate items include points for and against and make sure that you include as many points as there are marks available reach a conclusion that reflects the points you have made

- questions require students to make links between different parts of the specification, so when considering an item remember to use all the knowledge and understanding you have gained throughout the specification

- make sure you have practiced calculations especially percentages

- write in detail and use correct and precise biological terminology

- remember to use the knowledge and skills acquired during practical work to help in questions about unfamiliar or novel practical procedures

- always read through your responses and ensure that what you have written makes sense and answers the question fully