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Examiners' Report/ Principal Examiner Feedback

January 2016

Pearson Edexcel International GCSE in Biology (4BI0) Paper 1B

Or

Pearson Edexcel Certificate in Biology (4BI0) Paper 1B

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The examiners were, once again, impressed by the range of knowledge and understanding demonstrated by many of the candidates on the papers. Candidates were able to apply their knowledge and understanding, analysis and evaluation and investigative skills to some unfamiliar experiments or situations. Many centres have worked hard to carefully prepare candidates for the examination and this was evident in the responses of candidates. Few candidates failed to attempt all questions. There no evidence of candidates being short of time on this paper.

The first **question 1**(a)(i) required candidates to draw a food web to show the information given in the question. Over half of the candidates scored full marks on this item. The most common errors were omitting plants or putting the arrows the wrong way. Most candidates were able to correctly identify the description of primary consumer in 1(a)(ii). In part (b) candidates had to interpret graphical data form an experiment using quadrats. In b(i) almost all answers gave the correct response to the preferred habitat. In (b)(ii) most candidates could suggest one or two reasons why hares might prefer a habitat but only the best candidates were able to give three correct suggestions. Correct suggestions included availability of plants, greater nutrient content, easier to digest and an area away from predators. In part (c)(i) most candidates could correctly calculate the percentage of quadrats containing hare faeces. In part (d) only about a third of candidates were able to describe how quadrats should be laced at random and should be of the same size to ensure the data collected is valid.

Question 2 described an experiment in which a student added bile, lipase and protease to some lipid. In part (a) (i) candidates had to match the solutions added to a diagram of the appearance of the solutions. Most candidates gained some credit with the best being able to correctly match all three solutions. In part (a)(ii) candidates had to explain the appearance of the oil and water mixture after bile and lipase are added. Two thirds of candidates were able to gain some marks with the best explaining emulsification to increase the surface area of the oil droplets, provide an optimum pH for digestion by enzymes to produce fatty acid and glycerol. In (b)(i) almost all candidates were able to identify a villus and in (b)(ii) the full range of marks was seen with 20% of candidates gaining full marks for their explanation of the adaptations of the villus to absorb glucose.

In question 3(a) candidates were given a cell wall outline and had to draw and label three structures that would be found in a bacterium. About 50% of the answers gained 1 or 2 marks with a further 33% gaining all 3 marks. The most commonly credited structures included the cell membrane, cytoplasm, chromosome, plasmid, flagellum and capsule. In 3(b)(i) candidates were given data on the sources of food poisoning and the number of cases and the number of resulting deaths. They were required to plot a bar graph to show the number of people who became ill and the number who died from each food type. Over half of the candidates gained 4 or 5 marks with the most frequent errors being omission of units or trying to plot deaths on one axis and cases on the other. In (b)(ii) candidates needed to calculate which food is most likely to produce food

poisoning that leads to death. This proved challenging with about 25% gaining full marks. In part (c) many candidates scored well and most were able to explain how the immune system protects the body from illness such as listeriosis.

Question 4 concerned inheritance of hair colour in mice. In part (a) candidates had to identify the genotypes of parents and offspring in a cross. Most scored 2 marks for this. In (b) candidates needed to complete a Punnett square to show the gametes and genotypes of offspring between F1 mice. Most candidates gained full marks for this item. In part (c) candidates needed to fill in the gaps in a passage describing reproduction in mice. The full range of marks was obtained with 28% of candidates gaining all 6 marks. The most frequent errors were confusing mitosis with meiosis and diploid with haploid.

Question 5 was the experimental design item. Again the whole range of marks was seen in the candidate answers with 23% gaining full marks. Those candidates that gained no credit often described how a plant could be genetically modified rather than an experiment to compare yield between a GM and non–GM crop. Examiners were pleased to report that almost all candidates are now writing, as the rubric requires, in full sentences and including experimental details.

Question 6 was about photosynthesis. In (a) candidates had to write the balanced chemical equation for photosynthesis. Despite this being clearly stated in the specification (2.18) only 50% of answers gained full marks. Common errors were writing the equation for respiration or putting carbon dioxide as a product. In part (b) candidates were given the stages of testing a leaf for starch. In part (b)(i) they needed to explain a safety precaution that should be taken. We expected candidates to describe how ethanol could be heated safely using a water bath as it is a flammable liquid. However, although some candidates recognised this from the stages given in the paper, others wrote about lab coats or wearing gloves. Other acceptable answers are given the published mark scheme. In (b)(ii) candidates needed to state the purpose of holding the leaf in boiling water. The correct response of stopping all chemical reactions in the leaf was only given by 38% of candidates. Candidates did slightly better in (b) (iii) when giving the purpose of boiling in ethanol with about 40% stating that this is to remove chlorophyll or decolourise the leaf. In part (c) candidates had to explain how the experiment could be modified to enable testing to show the requirements for photosynthesis of (i) light (ii) chlorophyll and (iii) carbon dioxide. Again despite these experiments being clearly listed in the specification (2.22) they appeared to be unfamiliar to some candidates. For light 26% of answers gained full credit, for chlorophyll 6% and for carbon dioxide 14%. Centres should ensure that candidates are as familiar with the experiments described in the specification as they are with the rest of the content. In these items candidates who had carried out and discussed these experiments would be at an advantage.

Question 7 concerned using yeast to make beer. In part (a)(i) most candidates could correctly name fungi as the group that yeast is in. In (a)(ii) almost all could describe anaerobic as being in the absence of oxygen. In (a)(iii) the best candidates could write a word equation for anaerobic respiration in yeast. Common errors included the inclusion of water as a reactant or a product and the omission of carbon dioxide as a product. In part (b) about half of the candidates could describe how and why the bottles needed to be sterilised. In part (c)(i) and (ii) most candidates could give the enzyme that digests starch and the product of this reaction. In part (d) candidates needed to explain why the number of live yeast cells decreases towards the end of the fermentation process. Only the very best candidates were able to gain two marks by referring to the reduction in the availability of glucose or maltose and the build-up of ethanol being toxic to the yeast.

Question 8 gave candidates a diagram of a fish circulation system showing the simple heart. In (a) (i) most candidates were able to identify the vessel leaving the heart as an artery. However in (ii) fewer candidates could name the heart chamber that takes in blood to the heart as the atrium. In part (iii) candidates needed to describe how the structure of the fish heart differs from that of a human. Most candidates were able to come up with at least one difference with the best correctly giving three differences. Acceptable answers included fewer chambers, fewer valves, no septum and fewer blood vessels. Some candidates failed to get credit because they described the circulation system not the heart. In part (b) candidates were required to explain the differences in concentrations of gases leaving the fish and human heart. About half of the candidate answers gained some credit with only the very best gaining all 4 marks. Acceptable points included lower oxygen concentration leaving the fish heart, higher carbon dioxide concentration leaving fish heart, oxygen used in respiration, carbon dioxide produced in respiration and linking oxygenation and removal of carbon dioxide in the blood to human lungs. In part (c) candidates had to explain the difference in pressure in blood returning to the fish heart compared to the human heart. Again only the very top candidates scored both marks for explaining singe circulation and for describing the thinner walled chambers in the fish heart.

Question 9 was about sexual reproduction in plants. In (a) candidates had to give ways in which the structures present in insect-pollinated flowers differ from structures in wind-pollinated flowers. Most candidates were able to give at least one way and about 30% gained all three marks. Candidates that failed to gain credit did not confine their differences to structures but instead wrote about pollen or nectar or scent. In part (b) most could correctly identify the petals and the anther but fewer could correctly name the filament. in part (c) candidates needed to describe the events from pollination to seed formation. The candidates who had carefully revised this process had no difficulty in securing full marks.

Question 10 concerned deforestation. In part (a) candidates needed to give two reasons why humans are removing rainforest. Most candidates could give at least one reason and many gave two correct suggestions. Common acceptable answers included building homes, constructing roads and for farming. In part (b)(i) candidates were required to explain how deforestation can change the balance of gases in the atmosphere. Here one mark was available for the change in gases and the second for the cause of the change. Many candidates were able to give the changes in the gas concentrations but not all linked this to a reduction in photosynthesis. In (b)(ii) candidates were often able to give one change in the soil structure but only the best responses were able to identify soil erosion and leaching of minerals. In part (c) many answers suggested that the impact of deforestation could be reduced by replanting or replacing trees but fewer were able to suggest how legislation could reduce deforestation.

Question 11 was about viruses. In part (a)(i) candidates had to explain why viruses are not classified as living. Some answers showed the right idea but some merely stated that viruses do not show the characteristics of living organisms but did not elaborate on this. Most candidates scored at least one mark for their answers. In part (ii) almost all could correctly name a disease caused by a virus. Ebola and HIV were the most commonly given correct answers. In part (b) candidates were given some information about prions and then had to compare them to viruses. Some could one way and the best could give two, acceptable answers that featured frequently included prions do not contain DNA, are not recognised by immune system, are smaller, and are always fatal.

Question 12 gave candidates data from a student experiment on breathing rate before and after exercise. In (a) candidates needed to put the data into a table. Most candidates gained some credit but some failed to gain the second mark for not including the units in their table. In part (b) candidates had to explain why breathing rate is higher after exercise. Most candidates gained credit with 24% gaining all 4 marks. The best answers referred to increased respiration in muscles, requiring more oxygen, an accumulation of lactic acid that needs to be removed, an oxygen debt and the need to exhale more carbon dioxide. Part (c) asked candidates to explain how the investigation might be improved. Most responses gained one mark with only the best giving two ways. Acceptable answers that gained credit included repeating the experiment, measuring the rate during exercise, using a data logger or spirometer and controlling the duration or intensity of exercise.

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