Examiners' Report

Principal Examiner Feedback

January 2019

Pearson Edexcel International GCSE
In Biology (4BI0) Paper 2B

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January 2019
Publications Code 4BI0_2B_1901_ER

Q1 The comprehension tested knowledge and understanding of microorganism structure, the effect of climate change on the spread of pathogens and the role of vaccination.

Part 1(a) revealed that many candidates struggle to recall differences in the structure of viruses and bacteria. Credit was given for appreciating that viruses are smaller, have a protein coat, are non-cellular and contain either DNA or RNA. The converse of these points was allowed if answers made reference to the structure of bacteria. The most common error was that bacteria have a nucleus.

Candidate performance was much better in part (b). The most common correct response was global warming or increase in air temperature. Credit was also given for increased humidity and increased rainfall.

The calculation in part (c) posed difficulty for some. The correct answer of 3.3 gained two marks and a variety of other correct responses were also credited with full marks providing that the rounding up was acceptable. For this reason only one mark was awarded for an answer of 3, 3.3, 3.3 recurring or 3.30. One mark was also available if the working showed 43 ÷ 1300. Many incorrect responses had 1300 ÷ 43.

Part (d) was answered reasonably well by candidates with 63.7% gaining full marks. The abiotic factors rewarded were temperature, humidity and rainfall with certain acceptable derivations. Marks were lost when some candidates gave biotic factors.

Part (e) proved to be one of the most challenging questions to gain full marks. Most were able to get one mark for appreciating that the birds contained the virus but only the best candidates completed the story by stating that mosquitoes bite these infected birds before biting humans. A good number of candidates believed that the birds bite humans or that humans are infected by eating the birds. Many also believed that birds spread the virus in their faeces.

In part (f), credit was given to candidates who appreciated that neglected swimming pools provide standing water for mosquito reproduction. Most candidates understood that water is needed for the mosquitoes to breed but only the better candidates made reference to the nature of the water in an abandoned swimming pool.

Part (g) required candidates to discuss how vaccination produces a secondary immune response to protect people from the West Nile virus. Credit was given for appreciating that the vaccine contained an attenuated virus or pathogen with an antigen that stimulates the production of memory cells and greater or faster antibody production.

Q2 This question examined understanding of fetal development in the uterus.

Part (a) (i) was well answered. Identifying label A with less technical terms such as lamb or baby failed to gain credit: the examiners required the term fetus or embryo. In part (a) (ii), credit was given for naming a substance and the direction in which the substance is transported in the umbilical cord. Terms for the substance, such as food, nutrients or waste failed to gain credit. The examiners only credited detailed terms such as oxygen, glucose, carbon dioxide or urea.

The calculation in part (b) challenged many candidates with only 54.4% gaining full marks for the correct answer of 21,024. One mark was available for any indication of 14.6 in the working or the number 23,904 or the number 2,880.

Part (c) required an explanation for the advantage of increased blood flow to the uterus of a pregnant sheep. Many candidates appreciated that more glucose and oxygen would be supplied to the fetus which would help with respiration and growth. The better candidates also mentioned the role of a named mineral ion or a named vitamin, such as calcium or vitamin D for bones. A mark was also available for appreciating that carbon dioxide and urea would be removed from the fetus.

Q3 This question tested knowledge and understanding of the nitrogen cycle.

Part (a) demanded recall of the location on a diagram of processes involved in the nitrogen cycle. Most candidates identified E as where decomposition occurs and D as where excretion occurs. Only the best candidates identified I as denitrification, F or H as nitrification and A or B as nitrogen fixation. A common error was to confuse nitrification and nitrogen fixation.

Part (b) discriminated well with most candidates stating that active transport moves molecules against a concentration gradient and the better candidates also noted that it is an energy requiring process. Some confused the direction of movement claiming that molecules move from a high concentration to a low concentration. The use of the term ‘diffusion’ negated the first marking point.

Part (c) challenged candidates with only 6.0% gaining full marks. Credit was given for appreciating that fertiliser is added to soils that lack sufficient mineral ions to improve the growth of crops. The addition of nitrates to make amino acids and proteins gained credit as did other named mineral ions and their function. A few mentioned the use of organic fertiliser to retain water and to be decomposed to release mineral ions such as nitrates. Students who made reference to nitrogen rather than nitrates were not credited.

Q4 This question tested knowledge and understanding of how to investigate the energy content in a food sample.

Candidates who were familiar with this investigation scored highly. In part (a)(i), many struggled to note that the dependent variable was temperature or energy content. However, in part (a)(ii), most appreciated that replication improves reliability of data and the better candidates also gained marking point 2 by commenting on how to deal with anomalous results. In part (a)(iii), marks were given to answers that made it clear that a slow transfer would mean more energy being lost to the surrounding air leading to an inaccurate estimate of energy content. Part (iv) produced some good answers in which candidates understood the value of insulation, oxygen provision, and using a larger volume of water to improve the accuracy of the energy content calculated. However, this question challenged most candidates with only 15.1% gaining full marks. Many lost credit by modifying the procedure rather than the apparatus, illustrating the need to read questions carefully.

Most struggled to correctly complete the formula in part (b) with only the better candidates noting that the mass of water is multiplied by the temperature rise before dividing this value by the mass of the food sample.

Q5 This question tested knowledge and understanding of cloning.

Part (a) required candidates to recall the cloning procedure. The most challenging element of recall involved appreciating that the nucleus of a body cell is put into an enucleated egg cell. Imprecise wording cost many this mark. Thereafter, most understood the role of electricity to stimulate mitosis to develop an embryo that is placed into the uterus of a surrogate, not foster, mother.

In part (b)(i), most appreciated that the cells from a dead dog would also be dead. In (b)(ii), the examiners credited those candidates who made it clear that behaviour is influenced by the environment. Sadly, 72.4% of candidates failed to appreciate this idea.

Q6 This question tested knowledge and understanding of digestive enzymes and the effect of pH.

Part (a) discriminated very well with only the best candidates gaining all four marks. Candidates needed to note that the salivary glands are the site of amylase production, so the mouth was not credited. The examiners were generous with the spelling of protease and reward was given for noting that pepsin is produced in the stomach. The examiners gave a generous range of pH for pancreatic lipase. Common errors were to note several places where amylase or protease enzymes are produced and credit was not given for the correct answer in a list of incorrect answers.

In part (b), the examiners rewarded candidates who appreciated that the pH of the mouth is neutral or the pH of the stomach is acidic. The organs rather than the enzymes had to be named to gain credit. Students who wrote about both organs had to get each correct. For example, an answer that stated that the mouth is alkaline and the stomach is acidic would not be credited. The remaining marks were given if candidates made it clear that these enzyme are involved in digestion and that they are denatured if in the wrong pH.

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