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Examiners' Report
Principal Examiner Feedback

January 2018

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

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January 2018
Publications Code 4BI0_2B_1801_ER

Examiner Report 4BI0 2B 1801

Question 1

This comprehension question tested student understanding of the effects of ragwort growing in fields.

Part (a) was a gentle introduction to the paper asking for a definition of the term 'insect-pollinated'. The mark was only allowed if it was clear that the transfer of pollen was from the anther to the stigma. Many students gave answers that lacked this required level of detail.

Part (b) tested knowledge of the features of insect-pollinated flowers. Only features that were mentioned in the passage were credited. As such, the only correct responses were yellow flowers and the presence of nectar.

Part (c) was more challenging but there were many pleasing responses. Marks were given to student answers that made it clear that the feeding of the insect larvae would reduce the surface area of the leaf and reduce the number of available chloroplasts to absorb light for photosynthesis. These events reduce growth because less carbohydrate is manufactured. Weaker students tend to use inappropriate words at this level of assessment such as 'food' instead of 'carbohydrate'. They also give answers that lack any detail, such as 'they damage leaves and prevent the plant growing'.

Part (d) challenged students to think about the consequence of introducing biological control to a different country. Many appreciated that the moth larvae could become a pest by eating other plants and that this scenario would have a detrimental effect of food chains. However, many just repeated information from the passage about the cinnabar moths containing poison.

Part (e) required students to apply their knowledge of natural selection to explain how cinnabar moths are not killed by poison. The examiners rewarded candidates who discussed the role of mutation in producing resistance to poison, and that the survivors were then able to reproduce, and pass on the allele for resistance to their offspring. Most candidates were able to gain a mark or more, with many gaining full credit. The most common error was reference to immunity rather than resistance.

Part (f) tested understanding of the structure of the eye. Many candidates appreciated that a cloudy cornea would restrict the light entering the eye and the better candidates made it clear that this would also restrict the stimulation of the light receptors in the retina.

Part (g) required the calculation of the mass of ragwort that needs to be eaten for a 520kg horse to be poisoned. The correct answer of 57.2 was evident in many candidate scripts. An alternative of 57 was also credited with full marks. If examiners failed to see a correct answer they were told to allow one mark in the working if it was clear that the number 11 had been divided by 100 and multiplied by 520.

The only acceptable answer in part (h) was hepatic portal vein.

Answers to part (i) made it clear that candidates have an excellent knowledge of the abiotic factors required for germination. Warmth, oxygen and water were seen in equal frequency. Some candidates try to hedge their bets by providing a list of responses. These candidates lost credit if one of the factors in their list was incorrect.

Finally, in part (j), candidates were asked to suggest why the ragwort population can be reduced if farm animals are kept out of the fields in which it grows. The examiners rewarded candidates who appreciated that grass would grow and that this would create competition for a named abiotic factor. They also credited answers that made it clear that the loss of animal faeces would hinder ragwort growth. The question challenged most candidates but allowed discrimination in favour of the most able.

Question 2

Most candidates were able to recognise the vena cava, the left atrium and the left ventricle. In part (b), candidates were asked to describe the structure of the aorta. Most were able to comment on its thick wall and the better candidates noted the presence of muscle and elastic tissue. Weaker candidates failed to read the question carefully and wrote about the role of the aorta, or arteries, in general.

Part (c)(i) challenged many candidates. The correct answer of 0.5 gained two marks. The most common incorrect answer was 2.0, but one mark was still available if the examiners could see the number 40 in the working. In Part (c)(ii), weaker candidates failed to interpret the differences in the numbers in the table, which clearly show that the blood flow in capillaries is the slowest. One mark was available for this observation and the second mark was given to those candidates who made it clear that by flowing slowly, sufficient time is available for effective diffusion. There were many candidates who incorrectly wrote that a fast blood flow allowed faster diffusion. Many also wrote about the large surface area for diffusion provided by lung capillaries, but this response fails to answer the question.

Question 3

This question tested understanding of graphical data showing the changes in the number of fish, algae and bacteria in a river polluted by sewage. Weaker candidates offered no explanation of these changes and gained no credit for describing the changes. Many also failed to note that the algae numbers decreased at the sewage outlet. Instead they wrote about eutrophication and the consequent algal bloom blocking light. The explanation for the immediate fall in algal numbers was only credited if candidates made it clear that the sewage turbidity was responsible for blocking light and preventing photosynthesis.

The better candidates appreciated that sewage is broken down by bacteria and that their respiration reduces the level of oxygen. These candidates also explained that the increase in algal numbers was due to more light being available for photosynthesis as more sewage was decomposed. Credit was also available for the idea that decomposition of sewage releases mineral ions. Finally, a mark was available for answers that recognised that the fall in fish numbers meant there were fewer fish to eat the algae.

Question 4

This question tested understanding of an investigation of the effect of sulfur dioxide pollution on the rate of translocation. Part (a) required recall of various variables in the investigation, the independent variable being sulfur dioxide gas and the dependent variable being the rate of translocation. Some candidates confuse these descriptions. There were many acceptable abiotic and biotic control variables that were credited.

Answers to part (b) showed that many candidates have a good understanding of the direction in which translocation occurs. Credit was given for an arrow from the mature leaf towards the stem, or from the stem to the young leaf. Many candidates were able to recall that the phloem is the main site of translocation. Those who hedged their bets and wrote phloem and xylem lost the mark. A generous list was provided for part (b)(iii), and the examiners were pleased to note that sucrose was evident in many answers. Glucose was the most common incorrect response.

Candidate struggled to express themselves clearly in part (c). Many simply wrote that changing the rate of photosynthesis would change the rate of translocation. The better candidates appreciated that an increase in the rate of photosynthesis would increase the mass of products made and this would enable the rate of translocation to increase. Additional credit was available for those who appreciated that respiration providing the energy for active transport is also involved.

4d Many candidates believe that sulfur dioxide plays a major role in global warming or has a detrimental impact on the ozone layer. As such, these candidates scored poorly. The examiners rewarded answers that made it clear that sulfur dioxide combines with water in clouds to make sulfuric acid. This falls to earth as acid rain, lowering the pH and causing leaching of minerals, damage to plant life or damage to aquatic organisms. Credit was not given for the effect of acid rain on stone buildings. Many candidates offer general statements such as ‘causes harm to the environment’. These general responses lack the specific detail needed to gain credit.

Question 5

This question tested knowledge and understanding of yoghurt. Part (a)(i) asked for a description of how yoghurt is made and many candidates did well. Most appreciated the need to heat the milk at high temperature to kill bacteria, and to ensure it is then cooled before adding *Lactobacillus* or *Streptococcus*. Fewer candidates wrote about the need to then leave the cooled mixture for a stated time in hours at an optimum temperature. Weaker candidates gave answers that lacked detail. For example, 'heat the milk and then add bacteria to make lactic acid'. Clearly, almost every candidate is aware of the function of calcium in the diet as most gained the mark in (a)(ii). Many candidates were able to offer an acceptable health benefit of eating fat-free yoghurt.

Part (b) challenged students, though many appreciated that lactose is not present in yoghurt because the carbohydrate is used during anaerobic respiration to make lactic acid.

Part (c) also challenged students. The examiners only gave credit for answers that gave sufficient detail. As such, an answer simply stating that fruit contains vitamins, or even named vitamins, was not credited. However, an answer stating that fruit contains vitamin C which helps prevent scurvy was credited. Other acceptable responses made reference to the function of vitamin A and dietary fibre, and the fact that there is less requirement to add sugar.

Question 6

This question examined understanding of genetically modified transgenic organisms. In part (a)(i), credit was only given if answers made it clear that these organisms contain genetic material, however described, from different species. Many stated that the DNA came from another organism which was not credited. Candidates are encouraged to be precise in their answers and not to use colloquial language. As such, an answer that stated that genetically modified transgenic organisms contained foreign DNA would not gain a mark.

In part (a)(ii), examiners credited the idea that more genetically identical organisms could be produced and that this allows the possibility of producing a named desirable characteristic such as insulin, human organs for transplantation and resistance to disease. The most able candidates also appreciated that cloning removes the need to continually repeat the GM process. Many candidates confuse the benefits of cloning with the benefits of micropropagation.

Part (b) rewarded those candidates able to suggest sensible precautions when culturing bacteria. Most candidates gained at least one mark for offering a description of containment such as sealing the Petri dish, or by suggesting that protective clothing should be worn such as a mask or gloves. Many were also aware of the need to adopt sterile technique. Very few candidates discussed other acceptable ideas such as use of a safe incubation temperature and the need to avoid using pathogenic strains.

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