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Examiners' Report/ Principal Examiner Feedback

Summer 2015

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

Pearson Edexcel International in Science Double Award (4SC0) Paper 1BR

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Summer 2015
Publications Code UG040945

Examiner's Report International GCSE Biology 4BI0 1BR

Question 1

Question 1 part (a) was a gentle introduction to the paper and most candidates were able to appreciate that the food web contained two different types of plant, six animals and two primary consumers. Counting the number of food chains was more challenging, but many correctly established that there are five food chains in the food web. It was pleasing to note that most candidates were able to recall that the plants in the food web are called producers and that the hawk is a tertiary consumer. Credit was also given if the hawk was described as a predator, or as a carnivore.

In part (c) most candidates realised that if the grasshoppers were killed the number of shrews would decrease whilst the number of marsh grass plants would increase.

Question 2

Question 2 part (a) was well answered by most candidates.

In (b) (i), many candidates appreciated that plasma proteins are large molecules but only the better candidates explained that this prevented them from leaving the capillaries of the glomerulus end entering the Bowman's capsule.

In part (b) (ii), many candidates understood that the glucose is reabsorbed but only the better candidates explained that this process occurs at the proximal convoluted tubule using active transport. Candidates need reminding that the use of abbreviations such as PCT is a risky business because examiners are discouraged from interpreting abbreviations, other than obvious ones such as ATP.

Most candidates appreciated, in part (b) (iii), that mineral ions are found in urine and the better candidates were also aware that urea will also be present.

In part (c), most candidates appreciated that lack of insulin was involved but only the better candidates stated that this would result in high blood glucose levels so that the number of molecules being filtered into the nephron would be too high to enable all of them to be reabsorbed. Candidates lost credit if they referred to 'sugar' levels in the 'body'. More detailed responses are required, and in this case credit was for reference to 'glucose' levels in the 'blood'.

In part (d), many appreciated that ADH release would increase the permeability of the collecting duct to allow water reabsorption to take place. Candidates lost credit if they stated that less ADH would be released, or that there would be decreased permeability of the collecting duct. Weaker candidates discussed water loss by sweating, either not understanding the stem of the question or failing to read it clearly.

Question 3

In question 3 part (a) (i), most candidates appreciated that the insects eat the crops and any reduction in insect numbers would benefit the growth of the rice plants. Candidates need to be aware that unqualified answers often do not gain credit. For example, answers that claim that insects damage plants would not be credited. A qualified answer that goes on to say that the damage is caused by eating would gain credit. In part (a)(i), many candidates appreciated that removal of weeds would reduce competition for mineral ions or light. Candidates are encouraged to use technical terms such as 'competition' because answers that use layman terms such as 'fight for' or 'steal' do not gain credit.

In part (b), most candidates appreciated that faeces is a source of mineral ions, but only the better candidates explained the role of bacterial decomposition in the release of these ions.

In part (c), most candidates understand that oxygen is required for respiration, but only the better candidates explained that the energy released is then used for the active uptake of minerals. Weaker candidates simply state that respiration helps the plants to grow better.

Candidates found part (d) (i) challenging with many stating that herbicides kill pests. The examiners rewarded those who correctly suggested that herbicides kill or prevent the growth of weeds or unwanted plants.

Part (d) (ii) required candidates to state the advantages of using biological control rather than pesticides. Weaker candidates write bland statements that lack the level of detail required. Answers such as 'does not harm people' or 'is environmentally friendly' do not demonstrate the degree of knowledge worthy of credit. The examiners rewarded candidates who made it clear that biological control lasts longer, does not need reapplication, is specific and avoids the risks of bioaccumulation and pest resistance. Candidates need to be made aware that pesticides would not be used if they killed crops or harmed humans.

Question 4

This question tested knowledge of the cloning process. The examiners saw some excellent answers, but the overall quality of written expression was poor. Candidates need to plan their answers before putting pen to paper so that their ideas flow in a logical sequence. Some confuse the process of cloning with that of genetic modification. Common errors included naming the cell division as meiosis and claiming that mitosis would result in a zygote.

Question 5

The examiners were pleased to note that many candidates were able to point out that student B would obtain the most reliable estimate because this student had used more quadrats than student A and had placed them

randomly compared to student C. Candidates were also able to offer acceptable definitions of the term ‘population’ in part (a)(ii).

In part (b), most candidates were able to correctly identify the students.

Question 6

Identification of the parts labelled in the diagram posed little difficulty for most candidates apart from C, which is the heart.

Part (b) expected candidates to describe how the rib cage and diaphragm are involved in breathing in. This question discriminated very well with only the best candidates able to gain full marks. Many candidates wasted time by describing exhalation and it is clear that candidates struggled to link ideas together to create erudite prose.

Part (c) (i) asked for the parental and offspring genotypes to be written in the boxes. Most candidates were able to score full marks for this question but many made it difficult for the examiners to distinguish between the dominant and recessive alleles. One mark was still available if the parental genotypes were wrong but the offspring genotypes for the erroneous parental genotypes were correct.

In part (c) (ii), most candidates appreciated the role of bacteria in causing lung infections but only the better candidates explained that they would be able to reproduce using the mucus as a food source, and that the mucus containing bacteria is difficult to remove due to its stickiness.

Part (c) (iii) required students to appreciate that less air would be able to pass along the blocked lung tubes to reach the alveoli. Most candidates mentioned alveoli as the site of gas exchange but only the best candidates correctly described the consequence of mucus blockage to the passage of air. A number of candidates believe that the bronchioles play a major part in gas exchange.

Question 7

This question asked candidates to apply their understanding of natural selection to explain the data about mouse body mass in different places in the world. Only the best candidates were able to gain full marks, demonstrating excellent understanding and writing in a clear, erudite manner. Weaker candidates wrote about natural selection but failed to apply this theory to the data provided.

Many believe that a change in the environment will cause mutation as opposed to the latter being a random event. Other common errors included the belief that characteristics are passed on as opposed to the alleles for the characteristics, and thinking that bigger mice have a larger surface area to volume ratio.

Question 8

Part (a) tested understanding of where certain processes in sexual reproduction of flowering plants take place. Most candidates did well but deciding where most pollen tube growth occurs and where the seed will develop was challenging to some.

In part (b) the examiners rewarded those candidates who appreciated that the pollen grain had spikes which enable it to attach to the body of an insect. Candidates who discussed its colour or scent in attracting insects lost credit, as did those who made reference to its mass.

Part (c) (i) challenged students look at the graph and then to describe how the percentage germination changed during the two-hour period. The examiners rewarded those candidates who appreciated that the percentage germination increased and that it then levelled. Credit was given for a detailed description of what happened between 80 and 100 minutes.

The calculation in (c) (ii) discriminated well. A generous range of answers between 44 and 48 minutes was credited. If an answer was outside this range a mark was available if the value of 60% could be seen in the working. There were many who gained this mark but failed to use this value to obtain the correct time.

Most candidates were able to gain both marks in part (c) (iii). A generous range allowed answers that had been calculated from measuring the pollen grain between 9 and 14 mm. If the answer was incorrect, one mark was still available if examiners could see that an attempt to divide by 80 had been made in the working.

In part (d) examiners rewarded candidates for appreciating that sexual reproduction created genetic variation which gives a better chance of survival.

Question 9

Candidates had little difficulty in recalling that oxygen is given off during photosynthesis. The most common error was to name the gas as carbon dioxide.

In part (a) (ii), the examiners rewarded candidates who identified the main abiotic variables as temperature, light intensity and carbon dioxide. Many acceptable answers of how these variables could be controlled were given, though a surprising number of candidates believe that water temperature can be controlled by a thermometer. Credit was also available for reference to the biotic variable – the plant.

In part (b) (i), most candidates were able to calculate the average rate of photosynthesis for red light as 25. Candidates are encouraged to look at the number of significant figures used to provide other values. In this case, 25 is the best answer, but examiners were generous on this occasion and accepted 24.7 and 24.6 recurring.

In part (b) (ii), examiners rewarded candidates who appreciated that there had been repeated trials for red and blue light that produced a similar pattern of results, and that the anomalous result in green light had not been used in the calculation of the average. Simply recognising that there was an anomalous result was insufficient to gain credit.

The graph, in part (c), was well answered. Common errors included not using enough of the grid so the graphs were much smaller than they needed to be, failing to label the axes correctly and plotting all the data rather than the averages.

In part (d), candidates were challenged to deduce why blue light is better for photosynthesis than green light. The examiners were pleased to note that many candidates appreciated that green light is not absorbed and that blue light is absorbed.

Question 10

This question tested knowledge and understanding of the carbon cycle and the greenhouse effect.

Part (a) (i) challenged many which suggest that seeing an unfamiliar diagram of the carbon cycle posed problems. Weak candidates named A as fossilisation. Part (a) (ii) was well answered.

Part (b) required students to describe the consequences of an enhanced greenhouse effect. Most candidates were able to provide excellent accounts gaining full marks, helped by a generous mark scheme. A common error was confusing global warming with the destruction of the ozone layer.

Part (c) was well answered with most candidates appreciating that burning less fossil fuels, planting more trees, using renewable energy or reducing cattle farming are all ways to reduce the build-up of greenhouse gases in the atmosphere.

Question 11

The examiners were surprised that a seemingly straightforward question posed difficulty for many and that only 42.6% gained full marks. The most common error with the better candidates was to believe lymphocytes are molecules.

Question 12

This question tested knowledge of the structure of viruses.

Part (a) posed few problems with most candidates able to recall at least one reason, often two. The most common correct responses were that viruses do not respire and that they need a host cell to be able to reproduce. Many candidates misread the question and commented on the structure of viruses.

Part (b) was well answered and the examiners credited either the name of a virus or a disease caused by a virus, with the exception of AIDs.

Part (c) was also well answered and all six marking points were seen. The most common error was to believe that bacteria have a nucleus.

Question 13

Candidates were asked to design an investigation to find out if adding vitamin D to the diet of young children will help to prevent rickets. There were many excellent answers in which candidates had organised their written response in a well-structured manner. The C mark was often seen and many candidates gained an S mark by appreciating that whilst some were given vitamin D and others not, the remaining diet should be the same. Candidates gained the R mark by appreciating the importance of having large groups of children so that reliable results can be obtained. The O mark was often seen as candidates appreciate the importance of standardising the biotic variable of children so that a valid comparison can be made between those on vitamin D and those not. The M marks were awarded if candidates appreciated that some qualitative or quantitative assessment of rickets needed to be made and that the time period had to be a minimum of one month. Some candidates believed the assessment could be done within 24 hours or a week. The S marks were for attempt to standardise the abiotic variables such as diet and exposure to sunlight.

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