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Examiners' Report/ Principal Examiner Feedback

Summer 2014

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

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Chief Examiner's report June 2014 International GCSE Biology – 4BI0 1B

The examiners were once again impressed by the knowledge and understanding demonstrated by many of the candidates on the paper. Candidates were also able to apply their knowledge and understanding, analysis and evaluation and investigative skills to novel or unfamiliar experiments or situations. Many centres have worked hard to carefully prepare candidates for the examination and this was evident in the responses of many candidates. Only a small number of candidates failed to attempt questions. There was no evidence of candidates running out of time on the paper.

Question 1

Question 1 (a) required candidates to complete the table by filling in the missing names and descriptions of processes involved in the digestive system. Most were able to do this, with the best candidates scoring 5 marks. The terms that gave most difficulty to candidates were egestion, which they often confused with excretion, and recognising the description of assimilation or synthesis.

Part 1(b) asked for a description of digestion in the mouth and many candidates were able to gain full marks for describing the breakdown of large starch molecules into maltose by amylase and mechanical digestion by the teeth. In part (c) only the better responses clearly identified A as starch and B as glucose. Some candidates stated that one was glucose and one was starch but that they were not carbohydrates. Other candidates wrote that 'Benedict's test is for glucose and iodine is a test for starch'.

Question 2

Question 2 presented some data on smoking and cancer deaths. In part (a) (i) candidates needed to calculate the total number of deaths caused by all three diseases and this simple calculation was correctly performed by almost all candidates. In part (ii) they then had to calculate the percentage the total number of deaths that are caused by smoking, most could do this correctly.

In (b) more than half of the candidates gained full marks for explaining the term mutation. In 2 (c) candidates were given a diagram of an alveolus from a non-smoker and an alveolus from a smoker suffering from emphysema. They were asked to suggest and explain the effect of emphysema on gas exchange. Most candidates scored 2 marks for explaining how the reduced surface area would slow down diffusion and therefore limit absorption of oxygen.

In 2 (d) candidates were asked to explain how coronary heart disease can cause death. The best candidates were able to gain full marks for describing how smoking can lead to narrowing of the coronary artery, depriving the heart muscle of oxygenated blood reducing aerobic respiration and causing angina and a heart attack. Weaker candidates wrote about tar blocking blood vessels or less blood flow around the body. As with many longer prose items, those candidates who had thought about their answer before writing produced more organised answers that gained higher marks.

Question 3

Question 3 gave candidates a table showing the area of land used, in hectares, to grow tea plants at different altitudes (height above sea level) in Sri Lanka. In part (a) they were asked to describe the changes that have taken place in the area of land used to grow tea plants between 1990 and 2000. A substantial number of responses gained no marks while other responses earned full credit. All the examiners were looking for was three statements about how land use had changed over time. Those candidates who had been given practice looking at data and trends easily scored full marks. Some responses described in detail the changes from one year to the next but did not comment on the overall change.

Question 3(b) (i) required candidates to explain how growing plants at higher altitude could affect their growth. Most gained 2 marks by recognising that at high altitude the lower temperature reduces rates of respiration and photosynthesis thus reducing growth. In (b) (ii) most candidates could name two factors, other than temperature, that could affect the growth of tea plants.

In 3(c) candidates were asked to describe how the tea grower could use a quadrat to estimate the total mass of tea plants growing in a large area of land. This item discriminated well between candidates. Only the best were able to gain full marks for explaining how they would use random numbers and coordinates to sample several quadrats, taking samples of plants from each and weighing them, and finally multiplying the average mass from a quadrat by the size of the field. Some responses described ‘spinning around to launch a quadrat’ or ‘throwing the quadrat over the shoulder’ or ‘throwing with eyes shut’.

Question 4

Question 4 gave a diagram showing the stages in the cloning process that produced Dolly the sheep. In (a) candidates were required to match the stages with descriptions. Most could get all three correct. In (b) almost all correctly identified which sheep was Dolly and in (c) identified which sheep were genetically identical.

Question 5

Question 5 gave data on the effect of altitude (height above sea level) on the mass of haemoglobin found in human blood. In (a) (i) candidates were required to plot this data on a graph. Most candidates scored 4 or 5 marks for their graphs. The most common errors were poor choice of scale, usually due to not truncating the y axis and having a range from 0 to 140 or not including correct units on each axis. In (a) (ii) candidates were asked to use the graph to describe how altitude affects the mass of haemoglobin in human blood. Most could score 1 mark for describing the increase in mass of haemoglobin with altitude with only the better candidates also noting the mass only increases from 1000m. In (iii) candidates had to suggest why a long distance athlete who trains at high altitude may have a better chance of winning than a long distance athlete who trains at sea level. Many candidates earned full marks for describing how more red cells would lead to more oxygen transport and thus more aerobic respiration and more energy release.

In (b) (i) candidates were asked to suggest why a blood sample was taken from a vein rather than an artery. Most could give one reason and many gave two. The most common answers being less pressure in a vein and that they are nearer the surface, so easier to find. In (b) (ii) a proportion of answers indicated that some candidates did not know what a capillary was. In (b) (iii) most candidates could explain why the needle used to obtain a blood sample needs to be sterile.

Question 6

Question 6 provided a pedigree diagram showing how cystic fibrosis was inherited in a family. In (a) almost all could identify the genotypes but in (b) a significant minority could not give the number of people without cystic fibrosis. In (c) (i) most could give the probability of having a child with cystic fibrosis. In (c) (ii) most candidates gained the mark for describing the role of chance in production of and/or fusion of gametes.

Question 7

In question 7(a) almost all candidates could correctly draw a food chain with only a small percentage drawing the arrows incorrectly. In 7 (b) students were given a table of results of an investigation into the ability of two different species of predator, lacewings and hoverflies, to control aphids. In (b) (I) most candidates could suggest a reason why lacewings might be better predators to use to control aphids than hoverflies, with the better responses earning two marks. In (b) (ii) fewer responses gained credit for one reason why hoverflies might be better predators to use to control aphids than lacewings. In part (c) (i) and (ii) candidates were asked to identify biotic and abiotic factors that could affect aphid numbers. Most could name one biotic and one abiotic factor and the best could identify two of each.

Question 8

Question 8 gave a passage describing cell division and reproduction in humans. Candidates had to complete the passage by writing a suitable word or words in each of the spaces. Most candidates scored at least 6 marks on this item. The most common errors were the 'tube the sperm cells pass out of in the male' and the site of fertilisation.

Question 9

Question 9 (a) asked candidates to name the type of organism that produces antibiotics and the pathogen that they are used to kill. Many students got these correct but some confused antibiotics with antibodies and this led to problems here and in 9(b). So a number of responses in (a) gave the type of organism as a white blood cell. In 9(b) the modal mark was 5 with more than half the responses scoring 3 or more. However, some candidates did not understand what bacterial resistance is and confused the development of resistance in a population of bacteria with immune response within a person.

Question 10

Question 10 was on pyramids in ecology. In (a) most students could explain what a trophic level was. In (b) almost all candidates could correctly draw a pyramid of number using the data provided. In part (c) most candidates were able to suggest why the number of the caterpillars might be different during the winter. Most common correct answers stated fewer caterpillars due to fewer plants for food or lower temperatures. In part (d) candidates were asked to explain why total mass of the organisms at each level in the pyramid decreases as you move up the pyramid. This item discriminated well between candidates with only the best candidates scoring full marks. Some candidates did not appreciate the link between mass and energy within a pyramid so did not discuss energy loss at each level.

Question 11

Question 11 (a)(i) asked candidates to give the meaning of osmoregulation. Most were able to earn the mark for describing it as maintaining the concentration of solutions within body cells or variations on this idea. Some candidates seemed to have no idea what the term meant. In 11 (a)(i) most candidates could identify another organ of excretion.

In (b)(i) most could identify a substance present in urine with water, urea and salt being the most common correct answers. In (b)(ii) candidates were required to explain why no protein is present in the urine. Most candidates earned 3 marks for a description of ultrafiltration in the Bowman's capsule and how it prevents large molecules entering the glomerular filtrate. Some candidates confused ultrafiltration and selective reabsorption. In part (b) (iii) candidates were asked to explain why the body does not excrete glucose. Although many scored full credit students did not do as well in (iii) as they had in (ii). The best responses included that glucose is required for respiration, as an energy source and that it is selectively reabsorbed in the proximal convoluted tubule by active transport.

Question 12

Question 12 (a) asked candidates to explain how plants absorb water from the soil and transport the water to their leaves. Many of the best responses scored full marks. Common correct points included absorption of water from soil by root hair cells, using osmosis, from a dilute solution to a more concentrated one, into xylem vessels and reference to transpirational pull due to evaporation from leaves.

In (b) most could name a mineral ion. In 12 (c) candidates had to describe one precaution you would take when setting up the photometer. Only the best candidates could give a precaution that is relevant to this practical. Those candidates that had experience of this practical could gain the mark. Others wrote about wearing safety glasses to stop water splashing their eyes or not balancing the apparatus on the edge of a bench. Likewise in part (c) (iii), those candidates who had carried out this type of experiment had no difficulty in scoring full marks. Most responses could give two conditions but were unable to describe how to vary them.

Question 13

Question 13 (a) most candidates could name the small circle of DNA that is genetically modified in bacteria and name the two enzymes used to genetically modify the DNA of the bacteria. A common error was giving the enzyme as lipase as ligase.

In part (b) candidates were asked to describe an investigation to find out if temperature affects the amount of insulin made by genetically modified bacteria. A significant minority of students gained no marks or left this item blank. However the majority of students scored 3 or more marks. Most answers were written in sentences and gave experimental detail. The most difficult aspect was probably describing how the yield of insulin could be measured. Sensible suggestions such as mass, volume, concentration and percentage were among those credited as correct. The best candidates could describe setting up several fermenters at different temperatures containing the same mass of modified bacteria of the same species. They would ensure that the conditions in the fermenters contained the same mass of glucose, were at the same pH and had equal oxygenation. After a suitable time period of 48 hours the mass of insulin produced would be measured. The experiment would be repeated at each temperature to ensure the results are reliable.

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