Examiners' Report

Principal Examiner Feedback

Summer 2018

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

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

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Examiner Report International GCSE Biology 4BI0 1B

The senior examining team commented on the knowledge and understanding shown by many of the candidates from home and overseas centres on this summer's papers. Candidates successfully applied their knowledge and understanding that had acquired the International GCSE course. They were able to analyse and evaluate data and information from unfamiliar contexts and experiments. Centres have worked hard to prepare students for the examination and this was reflected in the responses of many of the candidates. Few candidates failed to attempt all questions. There was little evidence of candidates being short of time on this paper.

Question 1 provided candidates with a diagram showing the alimentary canal of a rabbit with some parts labelled. In part (a) candidates were required to match the labelled parts to the description given in a table. Almost all candidates scored on this item with most gaining full marks. A few candidates confused large intestine with small intestine or rectum with anus. In part (b) they had to explain how the liver helps digestion in the alimentary canal. This item proved more challenging with about half of the responses gaining full marks. Weaker responses suggested that the liver produced lipase or that bile digested lipid, the best responses explained the role of the liver in producing bile that emulsifies lipid, increasing the surface area available for contact with lipase and also neutralises stomach acid. In part (c) candidates were required to complete a diagram of a plant cell. Almost all responses gained either 2 or 3 marks with the most common omission being the absence of chloroplast or labelling chlorophyll. Part (d) (i) asked candidates to give two differences between the structure of bacterial cells and the structure of plant cells. About half the response gained both marks, with common answers referring to plasmids, no nucleus, flagellum or absence of organelles such as chloroplasts. The last part of the first question asked for a description of a test to show that rabbit faeces contain glucose. Again most candidates gained full credit with only a few weaker responses failing to mention the heating of the Benedict's solution or even describing the test for starch or protein.

Question 2 gave candidates a table showing changes in blood cells in different situations. In part (a) most candidates could explain that a diet lacking in iron would lead to a reduction in the production of haemoglobin and thus fewer red blood cells. Some responses described the effect of a high fat diet on the cardiovascular system. In part (b) candidates were asked to suggest why athletes often live at high altitude before competing in a long distance race. Most respones were able to explain the increase in red blood cells shown in the table which would lead to increased oxygen transport and more aerobic and less anaerobic respiration when the athlete returns from altitude. In part (c) they were asked to explain how the change in the number of white blood cells during therapy for

cancer could be a risk to the patient. Many responses gained full credit for explaining that the patient would be at greater risk of infection. That they would have fewer lymphocytes and phagocytes so would produce fewer antibodies and engulf fewer pathogens.

Question 3 showed the common ancestor and some of the finch species now living in the Galapagos. Candidates were asked, in part (a) (i), to explain how the beak of the cactus finch could have evolved by natural selection. Most could give a generic explanation of variation, mutation, survival and passing on allele to offspring. The best responses explained that a mutation could give rise to a change in beak length or width, enabling these birds to feed on cacti flowers and survive. Thus providing a context for their answer. Centres should remind candidates to use the information given in the stem to provide a context for their explanation. In part (a) (ii) most responses could explain that why the large ground finch is found on Fernandina but the cactus finch is not. But only the best answers included reference to both presence of large hard seeds and absence of cacti flowers. In part (b) students were given a description of a study using model mice to investigate natural selection. In part (b) (i) they were required to calculate the difference between the number of damaged white model mice and the number of damaged brown model mice. Just under half of the candidates gained full marks on this calculation. In part (ii) many were able to suggest why the results would differ if the student used live white mice and live brown mice rather than clay models. Appropriate answers included live mice being able to move or hide and that any live mice may be taken away or consumed by the predators.

Question 4 gave a graph showing change in total supply of fish and the supply of wild fish between 1950 and 2017 and prediction from 2017 to 2050.In part (a) (i) students were asked to describe the change in the supply of wild fish and the supply of farmed fish between 1950 and 2017. About a third of responses gained both marks for describing an increase then decrease in wild fish and an increase in farmed fish supplies. Common errors included describing the total fish supply rather than the farmed or describing the predictions from 2017 to 2050. In part (ii) candidates needed to calculate the predicted rate of increase in the total supply of fish in tonnes per year between 2017 and 2050. Hardly any students gave the answer in tonnes per year and most wrote 1.82 tonnes when they meant 1.82 million tonnes per year. Candidates should ensure that they read the information in the question and use it to present the correct units. In part (b) candidates were asked to explain three other ways that farmers could increase production on a fish farm. To gain full credit the responses needed to describe a method and give an explanation for the method. So a suitable example would be keep adults and young fish separate in order to prevent intraspecific competition. This item discriminated very well across the grade range with only the best

responses scoring all 6 marks. Some candidates failed to gain full credit because they gave two example of interspecific completion or failed to read the question and wrote about water quality or feeding regimes.

Question 5 described a student experiment on the effect of deforestation on the number of insects living in the soil. In part (a) most students were able to identify the independent variable correctly. In part (b) almost all students were able to explain that in a forested area there would be trees to provide a food source and shelter. In part (c) candidates needed to suggest how the student could ensure that her results were valid and reliable. Most scored at least 1 mark but only the very top students scored all 4 marks. A complete answer referred to taking multiple readings from randomly distributed quadrats placed at the same depth at the same time of day. Part (d) required students to describe the advantages and disadvantages of deforestation. Candidates wrote responses ranging from poor to very good with most scoring 4 marks or higher. The best responses included advantages such as providing a source of timber for construction, land for farming, fuel for heating and employment opportunities or financial and economic benefits. The disadvantages included habitat destruction, extinction of species, soil erosion, reduced transpiration and increase in carbon dioxide levels. Some candidates chose to write in detail about global warming and polar ice caps melting.

Question 6 presented candidates with a scale diagram of two rhino species. They were given the magnification and had to calculate the shoulder height of the extinct (large) rhino. About half of the responses earned credit, with most of these gaining 2 marks. Common errors included failing to measure the correct rhino, measuring incorrectly or dividing by the wrong factor. These errors could often be avoided if the candidates considered whether 50m or 0.5m would be sensible answers for a giant rhino. In part (b) candidates were asked to suggest how global warming could have made it difficult for the large rhino to maintain a constant body temperature. Only the best candidates gained full marks for responses that explained how a large rhino would have a low surface area to volume ratio and therefore would lose heat at a slower rate. Few candidates described that as the earth temperature increased heat loss would be slower as the temperature difference would be reduced. In part (c) candidates were asked to suggest two factors, other than global warming, that may have caused the large rhino to become extinct. Most could give at least one factor with about a third of candidates gaining both marks. It was disappointing that some students thought a rhino was a predator.

Question 7 (a) asked candidates to describe the role of an enzyme in cells and most gained full marks for speeding up the rate of chemical reactions. In part (b) candidates needed to complete a table listing some enzymes, where they are produced and their function. Almost all responses gained credit with many gaining full marks. Common errors included lack of detail such as giving the function of amylase as 'converting' rather than digesting starch to glucose or as digesting 'carbohydrate' rather than starch. In (c) candidates need to explain how changes in temperature affect the activity of an enzyme. Most scored with the best responses describing how low temperatures mean that the enzyme and substrate molecules have low kinetic energy so there are few collisions. That as temperature increases more enzyme substrate complexes are formed. Further increases in temperature causes the enzyme to denature. This leads to changes in the shape of the active site so that the substrate molecule can longer fit or bind to the enzyme. Some weaker candidates still describe the enzyme as being killed.

Question 8 provided a photograph that shows the cells of a squashed root tip seen using a microscope. In part (a) almost all candidates could state the number of cells in this diagram that are dividing by mitosis. In (b) (i) candidates had to calculate the mitotic index for a root tip given the formula and the number of cells dividing. Most scored full marks. In part (b) (ii) very few candidates were able to fully explain why it is difficult to obtain the data to calculate the mitotic index. Some could gain 1 mark for referring to the difficulty in accurately counting a large number of cells. Only the very best also described the chromosomes as being very difficult to see or problems in squashing the cells. In part (c) candidates were given data on the effect of plant hormone on mitotic index. In (c) (i) many candidates found it difficult to describe the results. About half of responses scored at least 1 mark with 30% scoring both marks. The best candidates described the results as showing that most mitosis occurs at a hormone concentration of 0.005ppm and as the hormone concentration increases above this the mitotic index decreases with least mitosis at 0.5ppm. In part (c) (ii) most students could name some abiotic (non-living) factors that the student should control in her investigation.

Question 9 described an investigation carried out by NASA into how to grow plants on space stations. In part (a) candidates were asked to explain why the scientists expected a link between rate of photosynthesis and biomass produced. Only the best candidates were able to score full marks for explaining that the glucose produced by photosynthesis would be used in respiration to enable growth. In part (b) (i) candidates plotted a bar chart to show the biomass produced for each type of lamp. More than half of the responses gained full credit. Those responses that did not score full marks may have chosen a difficult scale leading to errors or even

plotted a line graph or a scatter graph. A number of responses failed to take note of the instructions and plotted both sets of data. In part (ii) only the very top candidates were able to score full marks for suggesting why the rate of photosynthesis and the biomass produced do not follow a similar pattern. These candidates noted that not all carbohydrate produced in photosynthesis is used for new biomass as some may be used in respiration and for active transport. In part (c) most candidates could suggest that the LED 690 lamp would be best for a spinach grower to use in his glasshouse as it produces the most biomass. In part (d) most candidates could also give the three factors that affect photosynthesis. Finally in part (e) most responses could suggest why NASA would be interested in investigating how to grow plants in space stations.

Question 10 gave students a diagram of the human nephron and in (a) most could correctly name 2 or 3 of the collecting duct, loop of Henle, glomerulus and Bowman's capsule. In part (b) candidates could write fluently about how changes in the composition of this liquid are brought about when a person is dehydrated (short of water). Many scored 5 or 6 marks for detailed and accurate accounts using appropriate and precise terminology.

Question 11 (a) gave candidates a diagram of a cross-section through human lung tissue. They were then asked to explain, with reference to features shown in the diagram, how lung tissue enables efficient gas exchange. The examiners required each feature shown to be explained in terms of how it enables efficient gas exchange. Many students merely gave the features but did not link each feature to how it enables efficient gas exchange. The very best candidates gained full marks for explaining that many alveoli provide a large surface area for diffusion, that the alveolar wall and capillary wall are very thin so provide a short diffusion distance, that the blood flow in the capillaries maintains a high concentration gradient and that a moist lining allows the gases to dissolve. Candidates did slightly better in part (b) when explaining how the structure of a leaf is adapted for efficient gas exchange. Some weaker candidates gave the adaptations for light absorption.

Question 12 required candidates to design an investigation to determine which variety of yeast is best for producing low alcohol beer. As usual this discriminated well across the grade range with most responses gaining at least 3 marks. Many centres have suggested the use of a prompt such as CORMS but candidates need to be apply this to the specific context of the question in order to gain good marks. Only the very weakest responses wrote about brewing but did not suggest an experiment.

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