Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

January 2019

Pearson Edexcel International GCSE

In Biology (4BI0) Paper 1B

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This January series was the last opportunity for candidates to take the existing qualification as it is to be replaced in the June series with the new reformed Edexcel International 9-1 GCSE.

The examining team commented on the knowledge and understanding shown by many of the candidates from home and overseas centres on this January's papers. Candidates were able to apply their knowledge and understanding of biology to analyse and evaluate data and information from unfamiliar contexts and experiments. Centres work hard to prepare students for the examination, and this was once again reflected in the responses of many of the candidates. Only a few candidates failed to attempt all questions. There was no evidence of candidates being short of time on this paper.

Question 1 provided candidates with a diagram showing the eye with some parts labelled. In part (a) (i) most candidates were able to correctly identify the cornea and in part (ii) most could identify the jelly-like fluid. In part (iii) most candidates could give the function of part A (the optic nerve) but some responses failed to gain the mark for writing 'messages' or failing to indicate where the impulses are sent to. In part (b) most responses were able to suggest how a detached retina would lead to loss of vision but only the best responses gained full marks for explaining that loss of vision is due to no impulses reaching optic nerve.

Question 2 gave candidates information about how *Tubifex* feed on bacteria living on dead plant material in river mud. In part (a) most candidates were able to draw a food chain to show the feeding relationships. A few candidates failed to earn full credit as they put the arrows the wrong way so did not show the correct direction of energy flow. In part (b) (i) candidates were asked to explain the relationship shown in a graph of population size of *Tubifex* and the mass of dead plant material. Most responses could describe the relationship as a positive correlation but only the best responses gained both marks for explaining that more dead plant material would provide more bacteria for the *Tubifex* to feed on. In part (ii) candidates were asked to explain why the *Tubifex* population, that contain haemoglobin, increases with more dead plant material whilst the populations of other species decrease. The very best candidates scored full marks for recognising that haemoglobin enables the *Tubifex* to absorb and transport oxygen, that bacteria will decompose the dead plant material reducing oxygen availability and preventing respiration in the other species. In part (c) candidates were asked to suggest how a scientist could measure the mass of organic material in a sample of river mud. The best candidates were able to explain how they would dry the mud and then weigh it to find its dry mass. Then they would burn the mud in the oven to remove the organic material and reweigh the mud sample after burning. They would repeat this procedure with several samples.

Question 3 gave students a diagram of a human sperm cell. In (a) almost all candidates were able to label the nucleus and state what is meant by fertilisation. The weaker responses stated that fertilisation involved meeting of gametes. Many responses gained the mark for stating that fertilisation is the fusing of a sperm and egg nuclei. Part (b) gave information about scientists using a sperm sorter to separate sperm carrying an X chromosome from those carrying a Y chromosome. In part (i) most candidates were able to suggest that dairy farmers would want their cows to have more female offspring as these would go on to provide milk. In part (ii) candidates needed to use their knowledge to suggest how the scientists' method can separate sperm cells containing an X chromosome from those containing a Y chromosome. Only the best responses stated that the sperms carrying an X chromosome would reflect more light and the very best responses linked this to the larger size of the X chromosome. In apart (c) (i) most candidates could correctly calculate the success of producing females as a percentage of the total number of offspring. In (ii) only the best responses identified a suitable control such as using unsorted sperm and also in part (iii) only the best responses suggested that the control would give equal numbers of male and female offspring.

Question 4 showed a photograph of a katydid. These are green insects that look like the leaves that they feed on. In part (a) most candidates were able to gain some credit for explaining how katydids affect the growth of the plants that they feed on. This item discriminated well between candidates with equal numbers scoring from 0 to 4 marks. The best responses included explanations linking the loss of leaf area to less absorption of light and thus less photosynthesis. This would mean less carbohydrate could be synthesised and so reduce growth rate. In part (b) candidates were asked to explain how katydids have evolved to look like leaves. Again, this discriminated well but, in this item, more responses gained full credit. However, as with previous examinations, candidates should ensure they relate their answer to the particular adaptation, in this case, looking like a leaf, and explain how this would lead to natural selection and an increase in the numbers of katydids that are camouflaged.

Question 5 presented information and data about pneumoconiosis a lung disease caused by breathing in coal dust particles. In part (a) candidates were asked to state what is meant by the term tissue. We required a precise statement and only those responses that included similar cells performing a specific function gained credit. In part (b) most candidates were able to offer some explanation as to why pneumoconiosis reduces the ability of a person to exercise. The best candidates described how gas exchange would be reduced as there would be a lower surface area and a greater diffusion distance for absorption of oxygen into the blood. This would lead to lower (aerobic respiration) and higher anaerobic respiration resulting in less ATP production and less energy being available. Part (c) provided a graph showing the number of these deaths caused by breathing in dust particles of asbestos, coal and silica. In part (i) most candidates were

able to calculate the number of deaths in the UK, in 2013, caused by breathing in dust particles other than asbestos, coal or silica. In part (ii) most candidates could offer one conclusion from the data, but few could give a second correct conclusion. Some responses failed to get credit as they described silica as more damaging rather than writing about number of deaths as given in the data.

Question 6 concerned the use of yeast. In part (a) most candidates were able to name the part of a yeast cell that is made of chitin but fewer could name the carbohydrate stored in the cytoplasm of a yeast cell. Part (b) gave a diagram of apparatus used to investigate the effect of temperature on carbon dioxide production in yeast and a table of the student's results. In (b) (i) most candidates were able to describe how the student could change the temperature of the water during the investigation. Likewise, in (ii) most could describe how the student makes sure that the yeast cells respire anaerobically. In part (iii) most responses could identify the independent variable in this investigation as temperature. Finally, in part (iv) most could give some ways in which the student could improve this investigation. Suitable answers included repeating the investigation more times for each temperature, using a water bath, measuring the water temperature with a thermometer, controlling the concentration and volume of the yeast and glucose solution and using more temperatures between 40 and 52 °C.

Question 7 gave students a table that lists descriptions of what happens in different human organs. They had to complete the table by giving the correct organ for each description. Most candidates were able to identify the lungs, bladder, ovaries and testes. Some errors were suggesting that blood was an organ or that the kidney stored urine. In part (b) candidates were asked to describe the structure of the kidney. Many responses gained full credit for a description of the kidney including the glomerulus, Bowman's capsule, proximal and distal convoluted tubules loop of Henle, collecting duct and ureter. Other responses described the cortex, medulla and renal artery and vein. The answers were divided into those who had revised kidney structure and gained full marks and those who could write nothing of credit and gained no marks with few in-between responses.

Question 8 concerned photosynthesis. In part (a) most candidates were able to give the balanced chemical symbol equation for photosynthesis. The paper then provided data from an investigation that measured the mass of carbon dioxide (CO_2) released globally between 1990 and 2014. In (b) (i) most candidates were able to plot a line graph to show this data. Most graphs earned 4 or 5 marks with the most common error being extrapolating the line to before 1990. Other students failed to use a linear scale or chose a scale that made it difficult to plot the data accurately. In (b) (ii) about half of the responses could calculate the percentage increase in the mass of CO_2 released globally between 1990 and 2014. For part (c) most candidates were able to give some negative

effects of increased levels of CO_2 in the atmosphere. Only the best responses gained all three marks with global warming, ice caps melting and habitat destruction amongst the answers credited. Some answers described acid rain or wrote vaguely about animals dying or even lack of oxygen for respiration. In part (d) almost all responses could explain how plants could limit the increase in concentration of CO_2.

Question 9 gave a diagram showing the human circulatory system, with blood vessels labelled A to N. In part (a) most candidates were able to identify the letter corresponding to the aorta, hepatic vein, pulmonary artery, renal artery and vena cava. In part (b) candidates had to give the letter from the diagram of the blood vessel that contains blood with the highest concentration of oxygen, the blood vessel that carries blood at the highest pressure and the blood vessel that is an artery that carries blood with a high concentration of carbon dioxide. Some candidates did not follow the instruction and gave the name of the blood vessel. In part (c) students had to give two properties that a synthetic material should have so that it can act as a suitable replacement for damaged arteries. Most responses scored at least one mark with the best responses suggesting that the material should be strong, elastic, not breakdown and not cause an immune response.

Question 10 was on how the body controls its internal environment. In part (a) most candidates could give homeostasis as the name for controlling the internal environment, but fewer were able to give osmoregulation as the name for controlling the concentration of the blood. In part (b) candidates were required to explain how the concentration of a person's blood is restored after they have been dehydrated by a warm environment. As with other longer responses candidates either knew the topic and wrote well or had no idea and gained no marks. Over half the responses gained credit and of those most scored full marks. In part (c) candidates were asked to state three differences between communication by nerves and communication by hormones. Most responses earned full credit by referring to faster transmission in nervous communication using impulses travelling along neurones.

Question 11 gave students information about Machado-Joseph disease a rare genetic condition that affects the nervous system. In part (a) (i) many candidates struggled to explain what is meant by the term dominant allele. Most could explain that a dominant allele is always expressed in the phenotype. Fewer explained that an allele is an alternative form of a gene. In part (ii) candidates were asked to suggest why the late development of symptoms makes it difficult to reduce the number of people born with the condition. Some responses were able to explain that by age forty most people would have already reproduced so passing on the allele before they were aware of their condition. In part (b) candidates were told that a man who is heterozygous for this condition has a child with a woman who is homozygous recessive. Candidates had to use

a genetic diagram to show the genotypes of these parents, the gametes they produce and the genotypes and phenotypes of any possible offspring. Many candidates were able to gain full credit but some candidates ignored the scaffolding designed to guide their response and other used different letters for the alleles. The most common omission was not giving the phenotypes of the offspring. Centres should encourage candidates to carefully read the full question and follow any rubrics given. In part (c) most candidates could explain what is meant by the term mutation.

Question 12 required students to complete a passage on carbohydrates in different organisms. Most responses gained at least half of the marks with this item showing good discrimination across the whole range. Examiners were surprised that some candidates were unfamiliar with the iodine test for starch.

Finally question 13 asked candidates to design an investigation to find out if adding more amino acids to the nutrient media increases the growth of the plants in tissue culture. Many candidates used the CORMS prompt and the examiners saw many accurate and detailed accounts. A small minority of response just wrote the letter C ‘amino acids’ and the letter M ‘mass’. The paper clearly states that ‘Your answer should include experimental details and be written in full sentences’.

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