Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel International GCSE
Biology (4BI0) Paper 1B
Science Double Award (4SC0) Paper 1B

Pearson Edexcel Level 1/Level 2
Certificate Biology (KBI0) Paper 1B
Science Double Award (KSC0) Paper 1B

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The examiners were, once again, impressed by the knowledge and understanding shown by candidates on this summer's papers. Candidates were able to apply the knowledge and understanding they had developed during the course. They were able to analyse and evaluate information including some unfamiliar experiments and new contexts. Centres have worked hard to prepare students for the examination and this was evident in the responses of candidates. Few candidates failed to attempt all questions. There is no evidence of candidates being short of time on this paper.

Question 1 provided a gentle introduction to the paper and in part (a) (i) almost all candidates were able to correctly identify the trachea, bronchus and bronchioles. In part (ii) most responses correctly referred to the branching of the bronchial tree. Those candidates who had learnt the mechanisms of ventilation had no difficulty in earning full marks for part (b) but a minority of candidates seemed not to understand ventilation and wrote about gas exchange. In part (c) (i) we required candidates to apply their knowledge of the effects of smoking to suggest why smoking is banned in many buildings. The examiners were impressed by many of the responses that showed clear understanding of the biological effects of smoking and applied this to 'passive smoking or breathing in smoke'. In part (c) (ii) candidates had to suggest why children are particularly at risk from breathing in smoke from other people's cigarettes. The better responses suggested that children were still growing or that their growth would be affected by breathing smoke.

Question 2 described the movement of substances from the gut into the blood using a model. In part (a) (i) candidates had to work out which combination of contents would lead to starch and glucose being present in the water outside of the visking tubing bag. This item discriminated well between the candidates with only the best candidates recognising that only glucose and not starch could diffuse out of the bag. In part (ii) most candidates were able to gain full marks for explaining that water would enter the bag down an osmotic gradient and the bag would increase in volume. Some weaker candidates suggested starch would diffuse out of the bag. Almost all candidates were able to describe, in (iii), the test for glucose. Item 2 (b) was more difficult for many candidates and required them to explain how you could use this apparatus to investigate the effect of bile on the digestion of lipid. Most candidates were able to gain at least one mark usually for explaining that bile should be added to lipid. The better candidates described how bile and lipid and lipase could be set up in one bag and lipid and lipase in another. Digestion could be judged by testing the water for fatty acids and glycerol using a pH meter or suitable indicator. The ability to apply understanding of movement across a membrane with digestion of lipid showed how the most able candidates can make links between different parts of the specification.

Question 3 gave candidates a genetic pedigree. In (a) (i) almost all were able to state how many individuals in the family pedigree have an X and a Y chromosome in each of their body cells. In (a) (ii) most could state how many individuals would be homozygous recessive. In (iii) most could correctly give the genotype of individual 1 as heterozygous and give the probability of the child from 8 and 9 having galactosaemia. In (b) (i) most candidate responses could correctly explain what is meant by a mutation and in (ii) most could give an example of a beneficial mutation often giving antibiotic resistance in bacteria. In (c) candidates had to explain what would happen to the allele controlling a potentially fatal condition if no treatment were available. The best responses described how these individuals would not survive to reproduce and pass on their alleles to the next generation.

Question 4 (a) required candidates to explain why the statement 'the father determines the sex of a baby' is true. The best candidates were able to clearly explain that male gametes or sperm carry an X or Y chromosome and female gametes or eggs only carry an X chromosome. Weaker candidates gained credit for stating that male are XY and female are XX. In (b) candidates were given a diagram showing sperm cells, viewed using a microscope, from two different men. They were asked to give two reasons why man A is more fertile than man B. Most scored at least one mark for noting more sperm in man A sample and the better responses also noted that the sperm from man B had two tails or two heads. In part (c) (i) candidates had to calculate the number of moving sperm in 1 cm^3 of semen from the non-smokers, almost all students could do this. In (c) (ii) most candidates gained credit with the best ones explaining how the graph shows fewer moving sperm which reduce the chance of a sperm reaching and fertilising an egg. Weaker candidates failed to refer to the graph or tried to use information from the diagram earlier in the question.

Question 5 contained data about people's views on cloning and how they change with age. In part (a) the majority of candidates scored full marks for a suitable bar graph. Centres have encouraged students to choose a sensible scale which makes errors in plotting less likely and this improvement is reflected in the scores for this item. In (b) most candidates correctly described the relationship between increasing age and being more likely to be positive about cloning. In part (c) most candidates were able to calculate the total number of people surveyed in the 45 to 54 age group. In the final part of this question candidates had to describe the process of cloning an adult animal using a named example. The whole range of scores was attained in this item with the best describing in detail the use of a body cell to extract a diploid nucleus which is then inserted into a previously enucleated egg cell. Some candidates confused the role of each cell and the surrogate mother.

Question 6 (a) required students to write down the balanced chemical equation for photosynthesis most candidates could do this. In (b) (i) candidates had to suggest why leaves from plants that live in the shade are darker green than

leaves from plants that live in full sunlight. The best responses explained that in the shade more chlorophyll is needed in order to absorb as much light as possible. In b (ii) the candidates were asked to explain why leaves from plants that live in the shade are thinner than leaves from plants that live in full sunlight. Again the best responses described that thin leaves would have a shorter distance for light to penetrate to reach the chloroplasts thus maximising light absorption. Other candidates described how less light would reduce photosynthesis so leaves would grow less. In part (c) candidates were asked to explain the factors that affect the rate of photosynthesis in the early morning and early afternoon. The majority of candidates gained credit with the best explaining how in early morning light and temperature levels are low, stomata will not be fully open so photosynthesis will be slow. Likewise, in the early afternoon light and temperature levels will be higher, stomata will be fully open and so photosynthesis will be faster. The best responses also made reference to the effects of temperature on enzyme action. In part (d) candidates were asked to describe how you could compare the rate of photosynthesis in two different plant species. Candidates scored the whole range of marks with the best describing how rate of photosynthesis can be compared by measuring rate of oxygen production in aquatic plants, controlling for light intensity and temperature. Other candidates wrote about testing leaves for starch or using hydrogen carbonate indicator to detect changes in carbon dioxide concentration.

Question 7 (a) gave candidates the opportunity to use data to describe the growth of plants in a complete solution and a solution without nitrates. Most candidates gained at least one mark for describing the slower growth in the nitrate deficient solution and the better candidates gained a further mark for noting that in the complete solution the plants continued to grow throughout the time period. In part (b) the better candidates earned full marks for explaining that young plants absorb more mineral ions when air is bubbled through the solutions because the oxygen is used for aerobic respiration to provide energy required for active uptake of the ions. In (c) most candidates could describe why the solution was sterilised so as to prevent microbial, especially algal, growth that may absorb the mineral ions. Fewer candidates were able to explain why the jars were surrounded by cardboard during this investigation. In part (d) most candidates could identify the independent variable and give a biotic factor that should be controlled in this investigation.

Question 8 gave a diagram showing the distribution of two plant species in a small area of a field. In part (a) almost all could correctly identify a quadrat as a square metal frame to help count all the plants in the area. In (b) (i) most candidates could determine the number of plants of each species and the average (mean) number of plants per m^2. In (b) (ii) fewer were able to determine the frequency and percentage of the bunchgrass. In (c) candidates had to describe how the student could estimate the population size of plantain in a very large field. Most candidates earned credit with the majority scoring full marks for describing how they would use a random number generator to decide

on coordinates to place quadrats. Count the number of plants in each quadrat and calculate the mean and then multiply this by the area of the field.

Question 9 showed a diagram of a nerve cell in (a) candidates had to identify structures labelled on the diagram. Almost all could correctly name the nucleus and the majority could also name the axon. In part (a) (iii) three quarters of candidates could draw an arrow to show the direction that a nerve impulse would travel in the neurone. In part (b) candidates were asked to describe the role of this neurone in a simple reflex arc. Most scored at least one with many scoring two for giving the role as to transmit nerve impulses and the better candidates described the direction from the CNS to the effector. Some candidates failed to earn credit as they thought the neurone was a sensory one or wrote about messages rather than nerve impulses. In part (c) many gained full marks for stating three ways that nervous communication differs from hormonal communication.

Question 10 provided students with a passage describing how different organisms are classified into groups. Most could fill in the gaps correctly with the circular chromosome or nucleoid being the gap causing most difficulty.

Finally question 11 required candidates to describe how fungi decompose tree logs in part (a) and most responses earned credit with many of these gaining full marks for describing saprotrophic nutrition as digestion by extracellular enzymes breaking down the organic matter of the tree into water and carbon dioxide. In part (b) candidates had to design an investigation to find out which fungicide is best at preventing the decomposition of wooden logs. Those candidates who have practised such responses had no difficulty in gaining good marks on this item. Weaker students tried to measure the mass or area of the fungus while the best responses weighed the logs before and after a suitable time period to measure the rate of decomposition.

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