Examiners' Report

Principal Examiner Feedback

January 2017

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

Pearson Edexcel Certificate in
Biology (KBI0) Paper 1B
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Examiner's Report International GCSE Biology 4BI0 1B

The examiners were impressed by the knowledge and understanding demonstrated by many of the candidates on the papers. Candidates were also able to apply this knowledge and understanding, analysis and evaluation to some unfamiliar experiments or situations. Centres have worked hard to prepare candidates for the examination and this was evident in the responses of many candidates. Few candidates failed to attempt questions. There was little evidence of candidates running out of time.

Question 1 required candidates to interpret a food web from a forest and then answer questions on it. In part (a), they had to determine the number of food chains, the number of primary consumers and the number of organisms that belong to more than one trophic level. Almost all candidates scored at least one mark with most gaining two marks and the best candidates scoring all three marks. The last item on belonging to more than one trophic level proved the most difficult. In part (b) candidates had to suggest why having bacteria in their gut that digest cellulose is an advantage. This item discriminated well between candidates with only the best responses scoring two marks for suggesting that digestion of cellulose would lead to more glucose production for respiration. In part (c) Candidates had to name the effector when a deer runs away. Some candidates did not know the term effector, even though it is clearly stated in the specification, so suggested eyes. Candidates did better at explaining how the hormone helps the deer to run away, with most scoring at least two marks usually for naming the hormone as adrenaline and describing how it increases heart rate. The best candidates described the effect on blood flow or how adrenaline changes breathing. Part (d) asked candidates to identify parts form a diagram showing an owl's eye. In (i) most could correctly name the retina and the optic nerve. In part, (ii) candidates did less well in describing the role of the retina with many answers describing the function as focussing light or forming an image. In part (iii) candidates did better with many describing the role of the optic nerve as carrying nerve impulse to the brain.

Question 2 part (a) showed a chicken with normal feathers and asked candidates to explain how a chicken with no feathers can be produced by selective breeding. Most candidates were able to score marks on this item with many gaining full credit for explaining how birds with few feathers could be selected as parents and the process repeated with their offspring and this continuing for many generations. A few candidates described cloning. In part (b) candidates were given a graph showing how age affects the number of eggs produced by two group of chickens. Most candidates could describe how egg production declined with age but only the best candidates noted that in the group bred for egg production the decline was greater. In part (c) candidates were told that chickens in factory farms are kept in cages inside buildings rather than being kept outdoors. They were asked to suggest how factory farming can affect egg production. Many thought that egg production would decline and did not use the information from the stem. The best

candidates wrote about the birds moving less, so less energy being for used for movement and more energy available for egg production. Other good responses wrote about less heat loss indoors.

Question 3 (a) gave candidates data from patients undergoing chemotherapy and their haemoglobin levels response to injections of EPO. Over half of the candidates were able to plot a line graph for this data gaining full credit. Those who failed to score full marks usually omitted units from one axis or may have tried to draw a single line of best fit. In part (b) most candidates could name the dependent variable but few could explain how the scientists made sure their results were reliable. Some wrote about the experiment being repeated but failed to state on different patients and others wrote about being repeated each month. Some responses showed that some candidates are still unsure as to what abiotic factor is, correct responses included age, gender or type of cancer. In part (c) candidates had to explain how EPO helps to reduce tiredness in these patients. Almost all responses scored some credit with the best responses describing how EPO increases haemoglobin in the red blood cells leading to increased oxygen transport and thus more aerobic respiration and more energy released. Part (d) asked candidates to explain which type of blood vessel they should use to obtain the blood samples. Most responses correctly identified a vein and could then explain the choice such as less blood pressure, nearer the surface and with a thinner wall and wider lumen.

Question 4 gave candidates a series of diagrams showing 6 genetic crosses. They had to in (a) identify which crosses produced offspring in which 50% are heterozygous, show a phenotype ratio of 1:1 and have a genotype ratio of 1:1. Many found this item quite a challenge with about a third of responses failing to score. In part (b) (i) candidates were asked to suggest how sunlight and manure help the growth of the fish in a fish farm. Most candidates were able to gain some credit and the best responses clearly explained that plants would photosynthesize and grow providing food and releasing oxygen for the fish to respire. Further credit worthy points included bacteria decomposing the manure to release mineral ions such as nitrates that could be absorbed by the plants and used for amino acids and protein synthesis. In (ii) candidates had to explain why some the water in the ponds is changed every day. Only the best responses gained two marks, for removal of fish waste, such as faeces and to maintain the oxygen levels in the ponds. Part (c) required a calculation of the total mass of fish produced in a farm of 6000 fish after 32 weeks. Most candidates were able to carry out this simple calculation, a few failed to convert g to kg but scored 1 mark for their partial calculation.

Question 5 (a) asked candidates to explain what happens to a plant cell if it is put into a concentrated salt solution. Most candidates gained 2 or 3 marks. If candidates failed to gain full credit it is because they were unable to clearly describe the gradient required for osmosis to occur. The clearest explanations described the movement of water out of the plant cell by osmosis from a dilute solution to a more concentrated one. Candidates who attempted to describe the concentration of water often ended up confused. In part (b), the experiment design item, most candidates scored well. About one third of responses gained full marks. The candidates who gained no credit often had not described an investigation but gave a description of the effect of salt on plant growth.

Question 6 required students in part (a) to give the balanced symbol equation for photosynthesis. Most were able to do this with those who failed to score giving the equation for respiration or incorrect formulae. Those who gave the correct formulae but not balanced scored one mark. In part (b) candidates had to explain how the (i) palisade mesophyll, (ii) spongy mesophyll and (iii) guard cells are adapted for photosynthesis. In part (i) most responses gained credit with the best ones explaining that this tissue contains many chloroplasts to absorb sunlight and that the cells are densely packed and just below the top surface of the leaf. In part (ii) only the best candidates gained two marks for explaining how the air spaces enable diffusion of carbon dioxide into the cells. In part (iii) some candidates did not specify that the guard cells open and close the stomata to allow carbon dioxide in and oxygen or water out. Part (c) described the stages used in testing a leaf for starch. In part (i) candidates needed to explain the purpose of putting the plant in a dark cupboard for 24 hours in step 1. Most candidates earned at least one mark usually for explaining that no photosynthesis can occur. The best responses explained how starch is used up in the dark for respiration. In part (ii) students needed to describe how to boil the leaf in ethanol safely. Many students wrote generic statements about wearing eye protection or lab coats. Candidates from centres that had carried out this practical could write about using a water bath to heat the flammable ethanol without exposing it to a flame. In part (iii) almost all candidates could correctly give the colour of the leaf after the addition of iodine solution. In part (iv) most candidates failed to suggest that keeping a leaf in the dark or masking part of the leaf would be a suitable control. In (d) candidates had to give the molecule plants produce using magnesium and a mineral ion required for protein production. Most candidates were able to name one or both of these.

Question 7 (a) gave a diagram of a reflex arc and in part (i) candidates needed to identify 4 labelled parts. Almost all candidates gained some credit with many scoring all 4 marks. In part (ii) they were asked to explain how this reflex protects the body. Most scored one mark with the best responses earning two marks for explaining how the reflex is automatic and quick removal of the hand prevents further damage. In part (b) (i) candidates were asked to give two similarities in the mechanisms of a reflex arc and phototropism in plants. Candidates found this difficult with only the very best scoring two marks for noting that both involve chemicals and both have a receptor and an effector. In part (ii) they were better at identifying differences in the mechanisms of the two responses with most scoring at least one mark. Correct answers mentioned the animal reflex involves impulses while the plant used auxins, the animal response is faster and that the animal response involves muscle contraction while the plant involves growth.

Question 8 required candidates to identify processes from the carbon cycle. In part (a) most could identify photosynthesis as removing carbon dioxide from the atmosphere and correctly identify those processes that remove carbon dioxide from the atmosphere. In part (b) (i) candidates could usually suggest two actions that could be taken to reduce the amount of carbon dioxide being released into the atmosphere. In (b) (ii) candidates needed to describe the consequences of an increase in carbon dioxide for the world's ecosystems. This item produced the whole range of marks from 0 to 6. The best candidates could clearly describe the consequences including increased greenhouse effect, global warming, melting of ice caps, climate change, habitat destruction, migration and extinction.

Question 9 described an experiment to investigate the effect of different concentrations of a food dye on diffusion. In part (a) most responses could correctly describe what is meant by diffusion. In part (b) (i) almost all candidates could correctly calculate the mean rate of diffusion. However in part (ii) although most responses earned one mark, for describing an increase in rate of diffusion with increasing concentration of dye, only the very best could gain the second mark for noting that the rate of increase slows as concentration increases. In part (iii) only the best candidates seemed to appreciate the difference between an explanation of an effect and its description. Thus, many candidates merely repeated their answer to (ii) only the best explained the increase in diffusion in terms of more molecules and a steeper diffusion gradient. It is worth centres spending time with students looking at command words and what they mean. In part (c) most candidates could state at least one variable that the student should control in this experiment to ensure that the results are valid.

Question 10 was a passage about sexual reproduction and students needed to complete the passage by writing a suitable word or words in each blank space. Almost all students scored some marks with the whole range from 0 to 10 being seen. Common errors were mitosis, zygote, embryo and the last two points. The number of chromosomes in the fertilised female gamete is 'twice' the number found in the unfertilised gamete and is known as the 'diploid' number.

Question 11 described the production of mycoprotein using a fermenter. In part (a) (i) a minority of candidates could identify glycogen as the storage carbohydrate but candidates did better on (ii) and could name hyphae as the thread-like structures that make up the mycelium of a fungus. In part (b) most candidates could give at least one benefit of mycoprotein containing low levels of fats and being high in protein. In part (c) most candidates did not recognise the enzymes that can be used to genetically modify plants. Only about a third of candidates gained credit but those that did tended to score both marks for explaining the role of restriction enzymes to cut out a section of DNA and ligase enzyme to join the cut ends of the DNA.

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