Examiners' Report/
Principal Examiner Feedback

Summer 2012

International GCSE

Biology (4BI0) Paper 1B
Science Double Award (4SC0) Paper 1B

Edexcel Level 1/Level 2 Certificate

Biology (KBI0) Paper 1B
Science (Double Award) (KSC0) Paper 1B

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4BI0/KBI0 & 4SC0/KSC0 (1B) Examiners' Report – Summer 2012

The examiners were impressed by the knowledge and understanding shown by the candidates on the papers. Candidates were also able to demonstrate application of knowledge and understanding, analysis and evaluation and investigative skills. Many centres have worked hard to carefully prepare candidates for the examination and this was evident in the biological knowledge and understanding shown by the candidates. The better candidates had little difficulty in applying their knowledge to new situations and novel contexts. The papers gave a balance of question types and topics and the proportion of marks for each Assessment Objective matched those published in the specification.

Question 1

The first question required candidates to recognise features of plants and animals and many were able to gain full marks. The second part of this question asked for two groups of organisms that include pathogens and most could give these. Some candidates gave an example of a pathogen and thus were not credited.

Question 2 provided data on the lumen and vessel wall thickness of three blood vessels. Almost all candidates could recognise the capillary as the smallest lumen and thinnest walls but often failed to match the aorta and vena cava. Most could identify the aorta as carrying blood with most oxygen and the vena cava as carrying blood with the least pressure. Almost all could identify the capillary as the vessel most suited to gas exchange but not all could explain the reason in terms of thin walls, short diffusion distance. A disturbing number of candidates described the capillary as having cell walls.

Question 3 described an experiment to investigate anaerobic respiration in yeast. Only the best candidates were able to explain the function of the oil layer. Many responses suggested keeping out air, gases or other impurities. The best answers described how the oil prevents oxygen from entering the solution and ensures that anaerobic respiration occurs. In (b) most could sketch the shape showing an increase in respiration rate and some levelling off and the best showing a reduction. In (c) the better candidates could identify the dependent and independent variables and name two variables that should be controlled in the experiment. Less able candidates wrote about amount of yeast or glucose rather than the mass, volume or concentration. In part (d) almost all responses suggested how to increase the reliability. In (e) most candidates could suggest that collecting the gas produced in a syringe or inverted measuring cylinder would enable a more accurate determination of volume per unit time. The best responses gained full marks for a word equation showing how glucose is converted to ethanol and carbon dioxide. Some responses included oxygen and water.

Question 4 gave candidates a table of structures that provide a large surface area for diffusion. Almost all could identify the organs correctly. In part (b) most could describe diffusion as the movement of particles down a concentration gradient but less able candidates wrote about substances moving rather than ions, particles or molecules. In (c) the best responses included the movement of molecules from the glomerulus into the Bowman's capsule under pressure.

Question 5 (a) asked candidates to explain how yield of a crop plant can be improved by increasing the temperature and supplying fertiliser. Some discussed how increasing the temperature would reduce the yield. The best answers described how increasing the temperature increases the kinetic energy of substrate molecules and leads to a faster rate of photosynthesis. This leads to production of more glucose and thus enables faster respiration. Most were able to describe how fertilisers provide mineral ions such as nitrate that are used to synthesise amino acids and proteins or magnesium for chlorophyll. In part (b) the better responses described a named example of a biological control agent such as ladybirds to control aphids or parasitic wasps to control whitefly. Less able candidates wrote about birds killing insects. In part (c) the best responses described how biological control is specific how it does not need reapplying and that it doesn't accumulate in food chains. A number of candidates think that chemical pesticides will harm the crop plant or be toxic to humans.

Question 6 presented some novel information to candidates on ash borers. In (a) most were able to suggest that feeding on carbohydrates would give the maggots energy from respiration. Some were able to name active transport and describe how it enables absorption of ions against a concentration gradient. Most could also describe how magnesium ions are used for chlorophyll molecules required in photosynthesis. In part (b) candidates needed to explain how ash borers had evolved to look like wasps. Quite a number of candidates thought that the ash borer could mate with the wasp to acquire similar characteristics. The best answers described a mutation that caused the ash borer to inherit an allele that conferred a similarity to the wasp. This allele would mean a wasp like phenotype would be less likely to be attacked by predators. This advantage meant that these ash borers would be more likely to survive and mate. The allele for wasp features would then be passed on to their offspring. Over many generations the ash borer would evolve to look like a wasp.

Question 7 (a) required candidates to show the parents, gametes and possible offspring genotypes and phenotypes of a cross between parents with achondroplasia. Most were able to do this with some losing credit by failing to identify the phenotype of the offspring. Some seemed to think a sex linked allele was involved. In part (b) most could see that the probability of a second child being of average height is unaffected by the phenotype of the first child. Some candidates tried to express a probability as a ratio rather than a decimal or a fraction or percentage. In part (c) (i) the best candidates could explain a dominant allele as one that if present in the genotype is always expressed in the phenotype. Poorer responses used terms like stronger or more powerful and some candidates described a dominant allele as being more likely to be passed on. Part (c) (ii) candidates were asked to suggest why the number of people with achondroplasia is low, even though it is a dominant condition. We were expecting responses to refer to the allele having selective disadvantage and less achondroplasics reproducing leading to a low allele frequency.

Question 8 presented data on global temperature change over 300years. Most students were able to accurately plot this data. However, some students drew the line extrapolating back to the origin when no data was available. Others chose a scale that made plotting difficult. Many candidates were able, in (b), to identify the two periods between which the greatest change in temperature took place. Those candidates that examined the data carefully gained credit. Those

that just assumed the greatest change would be in recent years failed to earn the mark. In (c) most could name a greenhouse gas and many could explain that a greenhouse gas is one that contributes to global warming. Most could also suggest how human activities could have contributed to the temperature change between 1970 and 1995.

Question 9 was about reproduction in plants and humans. In (a), a large number of candidates could not give an example of how a plant reproduces asexually. Many described cuttings or even self-pollination. In (b) most could identify the male gamete in animals but many could not name the site of fertilisation in animals or in plants. Uterus and ovary were the most common answers. In part (c) the best candidates observed that human male gametes are much smaller and more numerous than female gametes and explain why.

Question 10 (a) required a description of how the leaf is adapted to absorb carbon dioxide. Many candidates gained full credit for writing about the presence of a large surfaces area and many stomata. The thinness of the leaf provides a short diffusion distance and the moist surfaces of the spongy mesophyll cells. In (b) candidates had to write a balanced chemical equation for photosynthesis. Although many gained full marks some confused respiration, others gave wrong formulae. In part (c) students needed to remember the practical experiment used to show that light is required for photosynthesis. This is straight from the specification and we were disappointed by how many candidates did not know how to destarch a leaf or test one for starch.

Question 11 described the effect of thermal pollution on oxygen content of water and effects on a fish farm. In (a) many candidates could calculate the percentage change in oxygen as the water temperature increased. Some failed to notice it was a decrease so the 5 would be negative. Most were able to explain the consequences of siting a fish farm near a power station in terms of less oxygen being available for respiration. In part (b) candidates had to describe how the methods used to improve yield on a fish farm increased fish production. Most could do this for antibiotics and nets but failed to explain that frequent feeding reduces wastage and growth of bacteria. In part (c) those candidates that had learned what happens to protein in digestion easily gained full marks.

In **Question 12** candidates needed to recall where ADH is produced. Most candidates stated the pituitary glands and some the hypothalamus. On this occasion at International GCSE we were prepared to accept the site of release and the site of production. In part (a) (ii) candidates had to describe the effects of ADH on the body. The best responses described how ADH increases the permeability of the collecting duct wall. This leads to more water being reabsorbed into the blood by osmosis resulting in a smaller volume of more concentrated urine being released. Some candidates tried to describe the effect of less ADH and generally confused themselves.
In part (b) most could recall two differences between nervous and hormonal communication. In part (c) candidates had to predict the outcome of an experiment on coleoptiles and light. Almost all could draw the correct response for the light from all around and most for unidirectional light few gained the mark for coleoptile in darkness. In (d) most candidates could describe the response of roots as positively geotropic and helping the plant by absorbing water and mineral ions. Fewer mentioned the role of the roots in anchoring the plant.

Finally **Question 13** on experimental design also produced some very good answers. Many centres have encouraged candidates to use the CORMS prompt. This has led to improved answers. However, merely writing down C and inside / outside or S and mass of food, will earn no credit. We still expect candidates to explain their method and they can use CORMS only as a prompt. They must explain clearly how to carry out the investigation.

Grade Boundaries

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