Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel International GCSE

In Biology (4BI0) Paper 1BR

Pearson Edexcel International GCSE
In Science (Double Award) (4SC0) Paper 1BR

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Q1 This question tested understanding of food chains and plant productivity.

Part (a)(i) was a gentle introduction to the paper with most appreciating that there are three consumers shown in the food chain. Part (a)(ii) was a little more challenging with only 68% giving tertiary consumer as the correct technical term. A few candidates gave vague terms such as predator and top consumer or stated both quaternary and tertiary consumer.

Part (b)(i) required students to recall that the light energy absorbed by chloroplasts is converted to chemical energy in the process of photosynthesis. Additional credit was available to those who mentioned stomatal opening allowing carbon dioxide diffusion to take place. Most candidates performed well in this part, occasionally losing credit for stating that food or sugar is made by photosynthesis. Candidates are encouraged to use correct technical terms in their answers, such as starch or glucose. Few candidates referred to the role of chloroplasts in absorbing light, only a handful correctly discussed the effect of light on stomatal opening. Part (b)(ii) was a challenging calculation but may candidates appreciated that the expected average daily increase in mass for the UK would be 31.2 as opposed to the actual value of 17. The answer 31 was also credited. Examiners allowed one mark for those students who got the wrong answer if they had divided by 2000 somewhere in their working. A significant number of candidates failed to show any working. Part (b)(iii) was well answered with most able to name temperature, carbon dioxide, water and mineral ions as acceptable responses. Examiners did not credit heat or warmth, again illustrating the need to use correct technical terms.

Part (c) expected candidates to recall what happens to energy as it is transferred along a food chain. There were many excellent answers demonstrating understanding of the role of respiration, egestion, excretion and uneaten organisms in this process. A few candidates mixed up the terms of excretion and egestion, suggesting that undigested food is excreted. Candidates are encouraged to use precise language.

Q2 This question tested understanding of digestion.

Part (a) tested knowledge of the locations where large insoluble food molecules are digested in the human digestive system. The better candidates did well but weaker candidates tended to struggle. Any empty box lost credit as did any attempt to draw a 'hybrid cross tick'. A surprising number thought that all enzymes were present in the stomach although the majority correctly recognised that amylase is present in the mouth and no enzymes are present in the rectum.

The examiners were disappointed at the quality of the drawings produced in part (b)(i). Credit was given for labelling and identifying the location of the microvilli, capillaries and lacteal that exist in each villus. Answers to part (b)(ii) were more encouraging. Most appreciated that growth would be impeded because of less surface area to absorb molecules that are essential for growth. Many lost credit by simply referring to the absorption of digested food or erroneously referring to the diffusion of protein and starch.

Q3 This question tested understanding of a beer making experiment.

Part (a) demanded recall of the structure of a yeast cell and it was pleasing to note that 85% of candidates were aware that the cell wall of fungi is made of chitin. However, only 39% appreciated that the large insoluble storage molecule glycogen would be found in the cytoplasm.

Credit was given, in part (b)(i), to the names of substances that should be expected in this laboratory based experiment such as glucose and water, but credit was also given for other beer making ingredients such as starch, malt and barley. Water and ethanol also were awarded. The use of the general term 'sugar' was not credited. Many also referred to the presence of oxygen and carbon dioxide. A few, unfortunately gave the same substance twice, for example starch and barley. The calculation in (b)(ii) challenged many candidates and only the better students gave the correct answer of 7 mm per minute. If an incorrect answer was given, one mark could still be credited if the number 13, 18 or 21 could be seen in the working. Many wrong answers simply deducted 39 from 71. Only the very best discerned that the question required the answer in terms of "per minute" rather than "per three minutes" so that a large number gave 21 as their answer.

Part (c)(i) expected candidates to correctly read from the graph the optimum temperature of 39^{O}C, a task that most managed successfully. Candidates should be careful to always include units where appropriate as a significant number correctly identified the temperature but failed to add units. Part (b)(ii) anticipated answers that demonstrated an understanding of molecular movement being slow at low temperatures because of the low kinetic energy, and that the consequence of this is fewer collisions. Many students were aware of the latter but only the better candidates linked both ideas. Many candidates made reference to optimal temperatures and vague references to speeding up reactions but did not explain why. Finally, part (b)(iii) challenged students to suggest how the apparatus could be modified to vary the temperature. The examiners rewarded those who appreciated that a water bath to vary the temperatures should be used and that a thermometer should be used to ensure the accuracy of these temperatures. Credit was given to other sensible methods such as heating with a Bunsen or adding ice or hot water.

Q4 This question examined a variety of topics including the roles of adrenaline, ADH and the effect of exercise on immunity.

Candidate knowledge about the role of adrenaline was impressive with many recalling its effect of increasing heart rate to enable oxygen and glucose delivery to muscles for respiration. Many also noted the diversion of blood from the intestines. A few candidates mixed up anaerobic and aerobic respiration and there were some candidates who thought that adrenaline release was a result of increased heart rate. Equally pleasing were responses to part (b)(ii), where many candidates recalled the increased permeability of the collecting duct allowing water reabsorption into the blood so that less water would be lost in the urine. Candidates are encouraged to be more detailed in their responses. So, those who wrote about the kidney or the nephrons becoming more permeable lost credit as did those who wrote about water being reabsorbed into the kidney or into the

body. Some candidates did not read the question carefully and focused their answer on the events leading up to the release of ADH with scant consideration of how ADH acts. There was some confusion about how permeability of the collecting duct changes and which area of the nephron is affected.

Part (b)(i) was well answered, but part (b)(ii) posed more of a challenge. Many candidates made no mention of the specific white blood cells involved in immunity and many wrongly claimed that phagocytes produced antibodies and lymphocytes engulfed pathogens. Some excellent answers were seen that gave good explanations of the roles of lymphocytes and phagocytes. However, most simply referred to white blood cells and their destruction of pathogens.

Q5 This question examined understanding of plant reproduction.

Part (a) required students to complete a passage by writing a suitable word in each blank space. There were many students who scored highly. Common errors were to name stamens rather than anthers as the part where pollen grains are produced; to name mitosis as the process of cell division and to confuse the ovule with the ovary. The only accepted response for pollen tube entry through the micropyle was the ovule. Part (b)(i) required students to comment on the structural differences between an insect-pollinated and a wind-pollinated flower. The question was well answered but candidates need to be made aware that colour, scent and nectar are features and not structures. In part (b)(ii), examiners rewarded candidates who commented on the small size and larger quantity of pollen from a wind-pollinated flower as the reason why hay fever is more likely. A minority of candidates gained two marks although many gained one, usually for the idea of pollen being light. Many gave vague references to how pollen is just blowing in the wind from wind pollinated plants.

Q6 This question examined experimental design concepts relating to a photosynthesis investigation.

In part (a), credit was given for an X anywhere on the graph where the line was rising. This was well answered with most gaining the mark. Part (b) was also well answered, though weaker candidates wrote the word equation for respiration. Though not desirable, examiners were allowed to credit correct chemical equations. Part (c) was well answered with most candidates fully aware of the dependent variable, variables that needed to be controlled and that repeated results showing similar values would constitute reliable data. Where there was confusion, it was typically for thinking that the independent variable was the rate of photosynthesis and that carbon dioxide should be controlled.

Q7 This question examined aspects of genetic modification and the process of selective breeding.

Most candidates were able to offer an acceptable definition of the term genetically modified in part (a). The graph in part (b)(i) was also well done by most. Most credit was lost with the S and L marks where candidates failed to ensure that the y axis was linear and had extrapolated their lines to the origin. Candidates should be encouraged to place the independent variable on the x axis. The description of the changes in use of GM crops posed few problems with most appreciating that

both increased and offering an acceptable distinction between the pattern shown for soybean and that of corn. A few only made reference to one of the plants.

Q8 This question examined understanding of kidney function.

Part (a) required students to use information from a table to deduce which urine sample was from a person with high blood pressure and which sample was from a person with diabetes. A pleasing number correctly identified sample C as the one from someone with high blood pressure. Weaker candidates knew that protein should not be in urine but only the better candidates explained that, in spite of its large molecular size, it had been forced though the glomerular capillaries into the Bowman's capsule. An equally pleasing number identified sample C being from a diabetic. Credit was given for stating that glucose was present in the urine and then offering an acceptable reason for this fact. The lack of insulin was most often seen as an acceptable reason, but many also mentioned very high blood glucose levels making it difficult to reabsorb glucose in the filtrate. Many excellent answers were seen although candidates should be encouraged to use technical terms such as Bowman's capsule and glomerulus.

Part (b) required the recall of a simple food test. Many recalled that Benedict's reagent needed to be used but then forgot to mention that it needed to be heated. A variety of colours were given for a positive test result but the examiners only credited green, yellow, orange or red. Weaker candidates wrote about the starch test of gave blue black as the result for the Benedict's test.

Answers to part (c) were only credited if they expressed biological ideas. As such, the examiners credited the idea that the urine may be contaminated with microorganisms that could spread disease. Many referred to the smell of urine and that the teacher would be able to control the composition. These ideas were not credited.

Q9 This question examined understanding of female reproduction.

Many were aware that fertilisation occurs in the oviduct and most recalled the names of parts A, B, and C as the oviduct, ovary and uterus respectively. Most were able to offer at least one function of the vagina. The examiners rewarded ideas linked to intercourse and birth. Oestrogen as the hormone that affects development at puberty was known by 79% of candidates and many were aware that this hormone is involved in the menstrual cycle, the development of mammary glands, the growth of body hair and the widening of hips. A large number did not answer part (a)(i) failing to place a cross on the diagram. Candidates should be encouraged to read questions thoroughly.

Q10 This question examined understanding of global warming.

The vast majority identified water vapour as the gas which contributes most to the greenhouse effect, but a surprising number struggled to name a greenhouse gas not included in the table. Sulphur dioxide, carbon monoxide and ozone were the most common incorrect responses. In part (b)(i), a pleasing number gained at least one mark for noting that methane is less abundant or that it doesn't remain long in the atmosphere. Part (b)(ii) was more challenging to candidates. The examiners rewarded those who made reference to the idea that carbon dioxide

levels are increasing or that human activity is responsible for carbon dioxide release. Part (b)(iii) was well answered with many aware that carbon dioxide release can be limited by reduction in the use of fossil fuels, the use of renewable energy, the reduction of deforestation and a move towards public transport.

Part (c) was also well answered demonstrating excellent knowledge of the consequences of global warming on the habitat of living organisms. The most common response was that ice caps would melt with the ensuing flooding.

Q11 This question examined aspects of the circulatory system.

In part (a)(i) most candidates offered a suggestion that noted the different densities of the components in the blood sample. Many lost credit by simply stating that the components had different densities but then failing to provide any detail about the relative densities of each component. Part (a)(ii) was well answered with most candidates appreciating that a blood sample from someone with anaemia would have fewer red blood cells and more plasma with no difference in the white blood cells and platelets. There were some very good explanations of symptoms of anaemia showing good understanding of the role of red blood cells in transporting oxygen to cells for the process of respiration. Answers to part (a)(iv) showed a lack of understanding about the link between menstruation and the loss of red blood cells. Many of the answers were so biased toward the male of the species it would be inappropriate to comment further. A few thought that the diet of males and females would be different and or that pregnancy would increase the demand for iron in females.

Part (b) showed that most were aware of a food molecule that is transported in the plasma. Credit was not given for carbohydrate, fat or protein. Similarly, most recalled a non-protein molecule transported in plasma. The full range of substances on the mark scheme were seen for both parts.

Q12 This question examined ability to devise an investigation.

The best responses noted that C had to be a range of stated temperatures, that O should be the use of the same biological washing powder, that R should be repeating the experiment at each chosen temperature, that M1 should be measuring the change in the quantity of stain and that M2 should be carrying out this measurement after a stated period of time. They also appreciated that it is important to standardise the quantity of stain and to standardise the material used as well as the volume of water used to contain the washing powder.
There were many outstanding answers to this question with candidates fully understanding the need for reliable, controlled plans. It was pleasing to see that many candidates were giving genuine practical guidelines. Rather than just stating “change the temperature” many would give a method for changing the temperature in different beakers. Many explained how they would keep the level of staining constant or gave precise descriptions of how the washing powder was kept constant such as “use 5 g in each beaker”. A few thought that they had to predict what would happen to the washing at different temperatures and gave a theoretical explanation of how enzymes are affected by increasing temperature. Candidates are gaining more marks by writing in complete sentences rather than bullet point lists which is pleasing to note. This question discriminated well with only 51% gaining full marks.

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