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Examiners' Report

Principal Examiner Feedback

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In Biology (1BI0) Paper 2H

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Question 1b – This was generally answered well with candidates able to identify that micro-organisms or organisms in the polluted water would use up oxygen during respiration. Alternatively, candidates referred to the death of plants thus reducing oxygen concentration in the water due to a reduction in photosynthesis.

Question 1ci – many candidates were able to identify the build up of nitrates in the environment as eutrophication although some just restated a build up of nitrates which is in the question.

Question 1ci – the majority of candidates identified that the river was flowing and therefore there was less of a build up of nitrates although a common misconception was that a river was larger than a lake which often not correct.

Question 2a – Candidates generally understood the role of stomata in gas exchange and were able to state that this was a reason for the stomata being on the upper surface. There was some confusion linking stomata to being the main site for photosynthesis and therefore needed to be on the top of the leaf in order to photosynthesise, although it is true that the guard cells of stomata have some chloroplasts this is not the role of the stomata.

Question 2biii – It was pleasing to note that many candidates were able to correctly name the phloem and the process of translocation in the movement of sucrose around the plant and may were able to identify that the process of active transport was involved although this was not necessary in order to gain full marks. There were a few instances where candidates confused translocation with transpiration.

Question 2c- Candidates found this concept a little more difficult mainly because they had to apply knowledge to a new situation, they are unlikely to have come in contact with. Most candidates recognised that the plant reproduced or grew quickly but only a few could link this idea to the fact that they outcompeted the indigenous species for limited resources.

Question 3a – A calculation of the mean number of starch grains was generally well answered with most candidates able to calculate a mean as is expected at GCSE level. Where there were errors this was mainly due to miscounting the starch grains.

Question 3bi – This calculation proved to be a little trickier for candidates although most were able to gain the first mark for taking 30 away from 50. Alternative methods of calculating the final mark of -40% were credited.

Question 3bii – Where candidates understood the practical task they were able to give correct variables such as the mass of the potato or the temperature but several referred to making sure the starch grains were all the same size at the start which is not a very practical suggestion.

Question 3biii – This question was well answered and possible answers included both respiration or release of energy. As always we do not credit incorrect science so to produce energy was not credited.

Question 3biv – The majority of candidates could recognise that the starch was broken down by an enzyme but few were able to link this to the breaking of bonds between the glucose molecules or that this occurred at the active site of the enzyme. Named enzymes were accepted as long as they were carbohydrases.

Question 4a – This question required the candidates to read the graph for 2015 with a mark of 7 million and then to complete the calculation of the number of people who were malnourished. Many candidates accessed full marks and almost all could accurately interpret the graphical information.

Question 4b – As food testing is a biology only topic and one which is linked to a core practical this is a commonly asked question. Several candidates could correctly identify using biuret reagent to test for protein and some were able to give the individual parts rather than biuret. There was a little confusion regarding the colour change between biuret and Benedict's or even iodine. This is a core practical and candidates need to show a clear understanding of the food tests practical.

Question 4c – This question required candidates to calculate a rate increase, many correctly interpolated the overall increase of 59 million but unfortunately did not divide by the number of years thus missing the final mark.

Question 4di – In this question candidates were given an energy pyramid and asked to explain why the area labelled cattle is significantly smaller than the area labelled plants. Although some candidates were able to identify that not all the energy is transferred through each trophic level many were confused and talked about cattle having less mass than plants. As this was an explain question they were then expected to explain why there was less energy passed on either due to not being able to digest all of the organism or because energy left the system in one of the life processes.

Question 4dii – This question was based on the idea of food security and how food security would be impacted if more meat was produced and eaten. The expected responses included the fact that if more land was used for grazing less land would be used for raising crops resulting in less food available for the human population or the idea that less healthy or nutritious food would be available for the human population. Many candidates unfortunately only talked about the fact that less meat would be available in the future if we ate it today which does not really answer the question.

Question 5aii – This question revolved around the use of enzymes and why mashing a foodstuff before adding the enzyme would be an advantage. Many candidates recognised that this would increase the surface area of the food so the trypsin could break down more of it or to allow a faster rate of reaction. Common errors here were the reference to it being small enough for the baby to eat as this was about the use of trypsin in baby food. Please note that we do not control the temperature by using a thermometer we merely measure the temperature with the thermometer which is not the same thing and was not awarded the mark.

Question 5bi and 5bii – These questions were linked and included a valid variable that needs to be controlled during the experiment as well as how this could be controlled. The most common valid variable that was seen was temperature which could be controlled by using a water bath, but other methods of temperature control were also awarded the marks.

Question 5ci – This question was a data analysis question and the candidate was asked to describe the trends in the data, they did not need to give a response as to why this happened as this was a describe question. There were two major trends in the data, as the pH increased from pH1 to pH4 the time taken to digest the food decreased, after pH 4 the time taken to digest the food increased. A tip for candidates to use here is always to quote from the headings of the table when answering the question, quoting the independent variable first which is always on the left-hand side of the table.

Question 5cii – This was a rate calculation requiring the candidate to calculate how fast or slow the reaction took place at pH1. Many candidates managed the calculation but missed out the instruction of giving the answer to 1 significant figure. There was also some confusion as to rounding figures which is an essential maths skill for science.

Question 5ciii – This question asked candidates to explain the data they were given and therefore we needed some understanding of the biological processes going on in the experiment. Candidates could answer this in one of two ways, by stating that at pH1 the reaction was at its lowest because enzymes were becoming denatured and this was the most common correct response. Alternatively they could have identified that pH4 was the optimum pH as there is where the most enzyme/substrate complexes were formed or most active sites of enzymes were filled.

Question 6ai – It was pleasing to note that many candidates were able to draw a graph using a linear scale and that they could accurately plot the points on the scale. The marks least likely to be awarded were the drawing of the graph where candidates lost marks by using multiple lines or extrapolating incorrectly. A common error was to start with a line from the origin, there was not 0,0 data so this should not have been drawn.

Question 6aii – This question asked for precautions to be used when handling blood samples, most candidates attained the marks available for using gloves or washing hand. Use of goggles or lab coats were not awarded marks as these are standard lab procedures and not specific to blood samples.

Question 6biii – For this question most candidates were able to identify blood clotting as either preventing blood loss or to prevent the entry of micro-organisms.

Question 6c – Candidates were asked for one structure in a vein that helps the blood to return to the heart. The majority of candidates stated that valves prevented the backflow of blood, but some were also able to refer the fact that veins have a large lumen to maximise blood flow.

Question 7ai – This is another practically based question where candidates were expected to identify a variable to control in an experiment involving weedkillers. The majority of candidates referred to either temperature or other conditions or the volume of weedkiller added. As in previous series amount of weedkiller was not awarded the mark, we expect scientific units to be used such as mass and volume where appropriate.

Question 7aii – In this question candidates needed to state a conclusion and explain that conclusion and it is an area that candidates find quite difficult. Most candidates were able to state a correct conclusion based on the data such as 80 % of weedkiller was the best concentration to use but were unable to explain why this was the case. Answers awarded marks included it killed the maximum number of weeds or killed all the weeds because it contained the most weedkiller. Marks were also awarded for at lower concentrations fewer weeds were killed.

Question 7b – This question referred to using hormones in weedkillers. Generally this was less well answered although some candidates were able to correctly identify auxins and explain that they cause overgrowth of broad leaf plants for all the marks.

Question 7c – An explanation of how phototropism was controlled in plant shoots was well answered by many candidates where they referred to auxins moving to the shaded part of the shoot causing the shoot to bend towards the light. Although elongation was often mentioned it was often in the incorrect context either referring to the auxins elongating or the whole shoot elongating rather than those cells on the shaded part of the shoot.

Question 8a – Those candidates who attained the best marks on this question are those who describe the different stages that occurred in the graph. This was a comparison question to candidates needed to give a comparative for each stage in the graph. At rest person B had a higher heart rate than person A, person B's heart rate increased faster than person A's at the start of the exercise, during exercise person A's heart rate kept rising but person B's remained level and Person A's heart rate returned to their resting heart rate faster than person B's. In addition to this a mark was awarded for a calculation of comparative data such as at rest person A's heart rate was 20bpm higher than person B's.

Question 8b – This question required the use of the cardiac output formula. Unfortunately, many candidates could not correctly recall the formula although it is on the spec. Those that could recall the formula applied it correctly but did not always remember to complete the conversion into litres per minute.

Question 8c – This question was aimed at the grade 8-9 candidates and as such it was not accessible to all. Those candidates who managed to score marks mainly did so for stating that person A must have had a lower stroke volume than person B so needed a higher heartbeat to gain the same cardiac output. Some candidates gained a mark for stating they needed to have a higher heart rate in order to get enough oxygen/glucose to the muscles.

Question 9ai – This was an interpretive question. Candidates were supposed to look at the images and interpret that the thyroid gland had enlarged, and this is where the majority of marks were awarded. Marks were also awarded for the idea that thyroxine production was increased.

Question 9b – Again this question was aimed at the higher-grade candidates and it was pleasing to note the number of candidates who could explain the negative feedback relationship that controls the metabolic rate. There were some outstanding responses to this question. Candidates with a less thorough understanding of this topic were able to gain a mark for the idea that the thyroid gland produces thyroxine.

Question 9c – This question was wide ranging and candidates scored across the mark range. The knowledge put candidates into the correct level so for level 1 candidates needed to link at least one hormone to either the endocrine gland it was released from or its role in the menstrual cycle. In order to go to the top of level 1 and thus attain 2 marks there must be a correct connection and a coherent flow to the answer. For level 2 at least 2 hormones linked to their role or the endocrine gland they are released from, in order to go to the top of the level and attain 4 marks this had to be in a logical order although the candidate could start at any point in the menstrual cycle. For level three at least three hormones linked to their role and the endocrine gland they were released from. To attain all 6 marks this needed to be ordered logically and coherently.

Question 10a – this question was very applied, and candidates had to recognise that they would need to test for both starch and glucose using the correct biological food tests. Many candidates were very clear about the test for starch but several were unable to correctly give an explanation of how to carry out the test for reducing sugars using Benedict's reagent.

Question 10aii – This question asked candidates how the experiment modelled dialysis treatment. We were looking for the idea of the movement of substances by diffusion from high to low concentrations or the idea that the dialysis membrane acts as a cell membrane allowing smaller molecules to move across it. Many candidates referred to the idea of ultrafiltration which was not evidenced in this model.

Question 10b – Although candidates scored across the range of marks for this question the profile of marks was lower than for the other 6 mark question. Candidates were specifically asked to refer to named structures of the nephron in the question when answering the question and many candidates did not score as they could not name the structures or the processes. For level 1, one structure of the nephron needed to be given and for the top of the band this must be linked to its role within the nephron. For level 2, two structures needed to be named and linked to their function, in order to gain the marks for the top of level 2 the structures and functions needed to be correctly linked in the correct order of filtrate flow through the kidney. For level 3, at least 3 structures linked to their roles must be stated and in order to achieve maximum marks they must refer to two of ultrafiltration, active transport or urine formation correctly.