Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

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Pearson Edexcel International GCSE

In Biology (4SS0) Paper 1B

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Q1 This question tested knowledge and understanding of the human respiratory system and the mechanism of breathing.

Part (a) was a multiple-choice question asking candidates to identify what the diaphragm is made of. Those candidates who did not choose the correct answer, muscle, generally opted for elastic.

Part (b) examined understanding of breathing and gas exchange. The examiners gave credit to candidates who described muscular contraction leading to movements of the diaphragm and rib cage, together with the associated increase in volume and decrease in pressure in the thorax. Most candidates made reference to the intercostal muscles and diaphragm, and the majority could do this correctly, but only the better candidates extended their answer to describe volume and pressure changes and thus gain full marks.

Part (c) was a multiple-choice question which resulted in a pleasing number of candidates showing their understanding of standard form.

In part (d), most candidates were able to gain one mark for expressing a relationship between total surface area of alveoli and respiration rate, however weaker candidates merely quoted data without providing a relationship. The question asked for an explanation of the relationship, but only a few candidates went on to make reference to the large surface area providing for more diffusion of oxygen and thus gain a second mark.

Q2 This question tested application of candidates' knowledge and understanding of feeding relationships and floral structure.

Part (a) was a table completion question asking candidates to enumerate primary consumers, carnivores and food chains in a food web. Only the better candidates provided the correct answers of 2,2,6. Many gave the sequence 2,2,5 instead, which scored only two of the three available marks.

In part (b), candidates needed to give two features they would expect to find in a flower that produces nectar. Many candidates scored both marks by listing bright, large or coloured petals and then a description of the stigma being enclosed or sticky. Weaker candidates often gave two different features of the petals thus only gaining one mark.

Calculating the greatest rate of decrease in mean mass of nectar in part (c)(i) posed few problems for many candidates once they had decided that the section of the graph nearest the y-axis had the steeper gradient. Candidates needed to read the correct values of 1.3 and 0.7 from the graph, to lead to a correct answer of 0.6. Whilst correct answers were awarded two marks, evidence of reading both values correctly from the graph scored one mark if the final answer was incorrect. The one mark award benefitted a significant number of candidates who could choose the correct section of the graph and

read the scale, but did not know how to do the calculation. Weaker candidates struggled to use the scale to read off 0.7 correctly.

Most candidates were able to gain the mark in part (c)(ii) by stating that the nectar had been taken or consumed in some way. Examiners accepted answers that made reference to nectar evaporating, but this was seldom seen. Weaker candidates stated that there was bright sunlight in the morning but did not develop that idea or related it to photosynthesis rather than nectar.

Part (d) was poorly answered with many candidates describing what would happen to ants when they ate the plant, rather than the advantages to the plant, which was what was being asked. Only the most able candidates showed an understanding that the ants might otherwise eat the flowers, their pollen or the pollinators, or that without ants, more nectar would be left and so pollination was still likely to occur. A combination of any two of these five suggestions would have scored the full two marks but were seldom seen clearly expressed.

Q3 This question tested knowledge and understanding of cell structure and the respiration of yeast in an investigative context.

In part (a), examiners noted some very good answers gaining both marks for stating two ways in which the structure of a yeast cell differed from a plant cell.

Part (b)(i) was poorly answered, with many candidates unable to give an explanation, but instead focussing on describing the results or just quoting data. Some candidates made a simple reference to respiration but could not link it to the results. Only the most able candidates gave an explanation that linked the availability of oxygen to the yeast being able to respire aerobically and therefore have more energy available, which scored two marks. Alternatively, examiners credited the idea that the yeast with nitrogen would respire anaerobically to produce alcohol which would kill yeast cells, for two marks.

In part (b)(ii) many candidates appreciated that other micro-organisms would have a negative effect on the growth of the yeast but were unable to suggest why. Many answers made reference to competition or contamination, but often just stated the term with little else. Some candidates showed little understanding that one beaker was given nitrogen, suggesting that competition for oxygen was taking place in both beakers. However, the most able candidates realised that competition for glucose would affect growth of the yeast or that entry of pathogens might kill the yeast or reduce its growth. Both of these answers were awarded two marks.

Part (b)(iii) was better answered than the earlier parts of (b). Most candidates were able to list at least one or two variables that should be controlled, with temperature being the most common correct response. A few candidates did not appreciate that the type of gas was the independent variable or that use of the same microscope was only relevant if the magnification chosen was constant.

Part (b)(iv) challenged candidates to evaluate the reliability of the data. Many were reluctant to commit to either a decision or a reason in answers such as 'it is quite reliable' with no further support. Examiners rewarded those candidates who commented that the data could be seen as reliable because the values were quite similar or that the data could be considered unreliable as only a few repeats had been done. Some candidates demonstrated that they did not have a clear understanding that it is not the number of repeats alone that is relevant; concordant data from the repeat trials is also needed to establish the extent of reliability.

Q4 This question tested knowledge and understanding of experimental design.

Candidates took a variety of approaches to finding out if salt affects the ability of amylase to digest starch. Those that used an in vitro approach were generally more successful than those who chose methods involving volunteers chewing the food as these generally used vague sources of starch such as 'a piece of bread' and asked the subject's opinion for the results. Candidates who used the in vitro approach were generally able to describe a more quantitative, standardised method.

A range of marks between 0 and 6 was noted by the examiners. Candidates were credited (C) for the idea that a range of salt concentrations was required or that a salty and a non-salty food should be tested. The (O) mark was awarded for using the same source of amylase throughout and the (R) mark was available for repeating the whole investigation. The (S1) mark was awarded to candidates who used the same concentration or same volume of amylase or who used the same starting concentration or volume of starch. However, a significant number of candidates continue to refer to 'same amount' of these. As this was an investigation using an enzyme, examiners were looking for the control of temperature for the (S2) mark, but reference to control of pH was also credited here. Most candidates who described a clear investigation scored several or all of these five marks. Fewer candidates were able to score the (M1) and (M2) marks because they appeared unclear how to obtain a result. Many glossed over this by saying that they would use iodine solution; this was credited as the (M2) mark providing that it was not incorrectly described as a test for maltose. The most able candidates scored both (M1) and (M2) by use of, for example, spotting tiles containing drops of iodine solution into which they put samples of the starch/amylase at stated time intervals. Clear descriptions of other methods of obtaining results were also credited.

Q5 This question tested knowledge and understanding of inheritance.

Part (a)(i) was a multiple-choice question asking candidates to identify how many people in the family tree shown have the recessive genetic condition described. A common

incorrect answer was four, suggesting that these candidates had also counted carriers in addition to the one affected person.

In part (a)(ii), nine people in the family being homozygous was the correct answer to this multiple choice question. Some candidates appeared only to have counted the people who were homozygous dominant and did not include the homozygous recessive male; this gave them an incorrect answer of eight.

In part (a)(iii), the third of this group of multiple choice questions, candidates were asked for the probability of two stated parents having a child who is a carrier, the correct answer being 0.5.

Part (a)(iv) required candidates to give the probability of two carrier parents having a female child with alkaptonuria. Many candidates thought the answer was 0.5, presumably because this was the probability of a female child without taking into account the probability (0.25) of it being homozygous recessive. Multiplying these two probabilities together gave the correct answer of 0.125. Examiners also awarded the mark if this was correctly expressed as a fraction or a percentage.

Calculating the percentage of people in the UK with alkaptonuria in part (b) posed few problems for most candidates. The correct answer of 0.013 or 0.0128 was awarded two marks. Candidates who showed 13 or 128 in their working but gave an incorrect final answer, often losing or gaining a power of ten in their calculation, still achieved one mark as did those who showed 64/500 000 x 100 in their working but then miscalculated their final answer. The most common route to scoring 0 marks here was by inverting the calculation completely thus showing both incorrect working and an incorrect final answer.

In part (c), many candidates were able to score one mark for indicating that a person whose heart valves were not working properly might have a reduced ability to exercise, or a description of this. Only the more able candidates were able to put together a coherent explanation relating reduced oxygenated blood flow to the body, to the muscles or from the lungs to a reduction in aerobic respiration, less energy, more anaerobic respiration or a build-up of lactic acid. Instead many candidates wrote about breathing difficulties or the likelihood and consequences of a heart attack.

Q6 This question tested interpretation of data and evaluation of a claim made as a result of an investigation into the effect of a drug on the activity of phagocytes.

The weakest candidates did not score marks here as they used much of the answer space to quote raw data from the bar graph without further comment. Many improved on this, and gained one or two marks, by stating that there were fewer bacteria in the sample with the drug and then suggesting that this might show that phagocytes were more active when the drug was used. Many candidates knew the role of phagocytes, so were able to score a third mark for stating this.

However, only the more able candidates scored the full four marks by going on to make a more sceptical comment about the data, and thus the claim, arguing that the drug may be killing bacteria directly, the reduction could be due to action of lymphocytes or that the bacteria tested may not have been pathogenic. A few candidates stated that more species of bacteria should be tested before such a general claim could be made and that no information was provided about control of variables for the reader to be confident that these were valid data. Each one of these comments could have scored a fourth mark.

Q7 The first part of this question tested knowledge and understanding of various aspects of carbohydrates, proteins and fats. The question then went on to test understanding of the digestion of plant material and ended with a section about growing grass indoors.

In part (a)(i), a surprising number of candidates were unable to name a carbohydrate that could be found in faeces, with many suggesting bread or rice. Examiners awarded one mark for any named carbohydrate, with starch or glucose being those most commonly seen.

Whilst the majority of candidates comfortably scored one mark for knowing that ethanol was required for testing a sample of faeces for fat in part (a)(ii), fewer were able to describe the procedure or the result with accuracy for a second mark.

Part (a)(iii) was answered well by the more able candidates but others incorrectly substituted phosphorus or potassium for sulphur. A significant number of candidates had not read the question carefully enough to see that *elements* were asked for, instead listing protein associated words such as polypeptide, peptide, amino acid and then adding two less relevant terms to make up five.

Part (b) showed two diagrams of a grass cell. The first diagram showed the original cell, complete with organelles. The second showed how the grass cell appeared in the faeces of an animal.
Although candidates were asked to explain the difference in appearance of the two grass cells, most of the weaker candidates either labelled the diagram to name the organelles or listed their names in the answer space. Candidates who understood that an explanation was needed were able to say that (only) the cell wall was present in the second diagram for one mark and then often linked this to gaining a second mark by saying that the organelles, or a named organelle, had been digested or broken down. More able candidates also went on to score a third mark by stating that the cell contents were digested by enzymes or that the cell wall was made of cellulose or that the cell wall required cellulase in order to be broken down.

In part (c), candidates were presented with an annotated diagram and further written information about a building being used to grow grass indoors. The output of 1000kg of grass per day was being used to feed animals instead of putting them to graze in fields. Candidates were asked to discuss this decision.

Examiners saw a very wide range of competency here, where the most able candidates clearly understood the issues and presented a concise, coherent argument for each point they made, often scoring five or six marks. The weakest candidates rephrased, or even copied, sections of the information provided and added little or no discussion of their own. The majority of answers scored between two and five marks. This was often achieved by scoring marks for stating that the farmer could provide controlled or optimum conditions for growth of the grass in the building and for following this up, for a second mark, with the idea that a greater yield could be achieved.

Other common mark scoring points seen by examiners included the idea that indoors the grass was less likely to be eaten by pests and the idea that the land not used for grazing could be used for other crops. Further mark scoring points included the availability of fresh grass all year round or during inclement weather. Many candidates also commented on the start up expense of the building together with the fuel cost for heating and lighting; both of these points scored marks. Less commonly seen, but equally creditworthy, were points such as the indoor grass method requiring less movement of animals and thus more growth in body mass and also the impact that this source of grass might have on the animals that were now unable to graze freely in open fields.

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