



Examiners' Report Principal Examiner Feedback

Summer 2019

Pearson Edexcel International GCSE
in Human Biology (4HB1) Paper 01R

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International GCSE Human Biology Summer 2019 Paper 01R Report

1 The most common incorrect answers were responses that were unable to identify which blood component contained a nucleus. Several answers included platelets and others indicated that only one type of blood component, mostly lymphocytes, were the only blood component containing this structure.

2a This item scored well with most students understanding the major components of a balanced diet. The few candidates that did not achieve the full two marks for their response often gave names of carbohydrates or listed various minerals such as calcium or iron which often covered the same marking point.

2b Students generally performed well on this item with many scoring full marks for understanding the role of vitamin C in 'sticking cells together' and 'preventing scurvy'. Candidates that failed to score any marks gave information such as 'helps to absorb calcium' or 'strengthens bones' or 'helps in blood clotting'. Other incorrect responses included information such as 'lack of vitamin C causes rickets' or 'blindness' where it was clear that candidates were muddled on their understanding of the specific causes of deficiency diseases. Few students gave information on other deficiency diseases or were vague in answers such as 'needed for healthy skin/gums' which were not awarded. Responses gaining one mark often mentioned scurvy rather than the function of vitamin C in maintaining cell linings and it appeared that these students were unaware of the mark allocation for the question.

2ci It was clear from responses that several candidates were unfamiliar with this practical, despite it being a core practical in the specification, and gave details for a method that included groups of people (or rats) and monitoring which group developed scurvy. Other candidates just gave a list of control variables rather than a method indicating a misunderstanding of practical terminology or a limited or lack of access to developing practical skills. Some students were unsure of the indicator used to detect vitamin C and mentioned the use of litmus paper or universal indicator paper to find out the acidity of each of the juices used. A significant number of the available marks were lost with a method described as adding a fixed volume of DCPIP to the two juices and then timing a colour change – this detail was seen often in responses. Other answers that failed to gain full marks were those that gave vague or incorrect details about the colour change. Some responses stated that the DCPIP would turn blue in the presence of vitamin C adding that the more drops the more quickly the fruit juice would change to blue. Many responses simply stated that the solution would 'change colour' without giving further details about this change.

2cii The most popular answer here for one mark was 'volume of juice' although students tended to state 'amount' more often which is not the preferred term to use but was awarded a mark. Those gaining a second mark most frequently stated 'temperature'. Concentration of DCPIP was mentioned although infrequently.

Candidates lost marks by giving 'volume/amount of DCPIP' or 'concentration of vitamin C' or 'juice'.

3b This question did not score particularly well for candidates with the main reason being that an alarming number of students thought that Ebola was just a food bug that could be avoided with simple food safety measures or a sexually transmitted disease that could equally easily be avoided. Several students gave a long list of precautions that exceeded the amount stated in the question. In many of these cases marks that were allocated were negated due to incorrect statements being included. Responses gave clear indication that far too many candidates were unaware of how Ebola was transmitted and very few three mark responses were awarded. Most commonly, students understood that direct contact with infected people should be avoided for one mark although a vast number of candidates had difficulty in expressing this with clarity. This unfortunately led to less marks being awarded. For example, 'stay away from infected people' or 'stay away from bats' or 'avoid contact with infected people' (as opposed to direct contact) were frequently seen. Marking point 4 was also often seen in responses. The large number of students who appeared under the impression that Ebola was a sexually transmitted disease included the use of 'condoms' or just 'barrier methods' in their answer whereas a significant number of others implied that the virus was transmitted through food and/or water. These responses included precautions such as 'store/cook food carefully' or 'don't touch/eat infected food' or 'don't drink contaminated water'. In fact there was an emphasis on extensive and detailed food hygiene instructions and washing hands frequently in many responses. Other incorrect responses described how the spread of Ebola could be contained by killing mosquitoes or by not sharing needles.

3c Most candidates recognised that a time value was involved in some way although too many students linked this to the spread of the virus around the body. Instead of stating that time was needed for multiplication or to build up enough in number to cause symptoms candidates stated that the virus needed 'time to spread' or just that 'it takes time to infect the body'. These responses failed to gain marks. Other incorrect answers referred to a bacterium or a protozoa and went on to discuss how these divided either by binary fission or mitosis. Very few responses included details about the number of pathogens entering the body at infection. The 'incubation period' was seen frequently in answers and the majority of candidates understood this term well by describing the events occurring in cells during this period.

3d Incorrect answers included details of how ORT strengthens the immune system, how it caused antibodies to be produced or how ORT acts as a form of drug used to kill or weaken the Ebola virus. Candidates gaining one mark often mentioned water loss with two mark responses adding further details on how ORT helps to treat the symptoms. Marking point 1 was the most often missed in answers although a good number of candidates were able to obtain full marks by providing details that reflected a good understanding of this topic.

3e Many candidates were able to suggest the meaning of the term 'reservoir' in the context of the fruit bat but few candidates gained full details as they failed to state that the bat did not suffer from the disease itself. Some candidates used unfortunate wording such as 'carriers of the disease' and few used the term 'vector' in their responses. There were a few responses that described reservoir as 'holding water' which was out of the context of the question and failed to gain any marks.

4aiii This question was answered well by the majority of candidates who were clear in their understanding of how untreated diabetes would affect the amount of glucose in urine. However, many answers referred to 'more' or 'higher' glucose content in urine implying that a non-diabetic would also have some glucose in urine. Despite this responses were well explained in most instances with information on how a lack of insulin would cause high blood sugar levels leading to the excess being excreted in urine. The most commonly missed mark was that which expected students to mention there would be less reabsorption of glucose due to the concentration gradient. There were few mentions of ADH in responses which provided irrelevant detail and the few candidates that failed to score often gave details of the role of the liver or insulin rather than focus their thoughts on the effect of high blood glucose levels on the removal of glucose by the kidney.

4aiv Clear working out using the correct figures and calculations were shown by the majority of candidates and most of these arrived at the correct answer for full marks. It was evident that a fair number of students were unaware of how to calculate percentages and used random figures and calculations in their response. There were very few responses that failed to show any working out at all and in these cases an incorrect answer was given.

4b Some good answers gave most students at least 3 or 4 marks with details given for advantages including no need for frequent hospital visits and better quality of life being the most common. Less students stated that the transplant is a permanent solution and preferred to state that it was a long term solution with some candidates giving an actual life span although these were not appropriate in most cases. Students scored better for giving disadvantages and all marking points were generally covered in answers. Candidates lost marks by stating, for example, that patients needed to take immunosuppressant drugs but failed to justify this by adding that there would be a greater risk of rejection following surgery. Other incorrect responses included information such as 'it is less comfortable than dialysis' and there were a significant number of answers that included a comparison of cost.

5ab Many candidates drew excellent graphs showing all the details that were expected for full marks. However, a fair number of responses failed to include all detail in the axes labels such as the units or labelled the axes the wrong way round and this lost them marks. Other candidates did not use an appropriate scale for their graph meaning that the actual plot was too small, taking up less than half the space of the graph paper. This meant the graphs were, in many cases, very difficult to read. Another

omission that was commonly seen in responses was the labelling of the lines of the graph. Some students provided separate keys and others did clearly label but this was one marking point that many candidates were unable to achieve. One common mistake made was where candidates started the x axis from the origin (0) but then did not scale proportionally between 0 and 20, for example. The second part of the question expected students to read from their graph to obtain a difference in the amount of sweat produced at 25°C. This was carried out well with the vast majority of students gaining the full two marks taking into account any error carried forward from an incorrectly drawn graph.

5c Although a good understanding of this topic was shown in many responses, the terminology used by many candidates lost them marks. A vast number of students stated that 'heat (and/or) energy was produced' rather than released which tended to restrict their total number of marks to two. Despite this, a good number of candidates understood that heat was released during the process of aerobic respiration. There were a fair number of students that described rather than explained the difference in sweat production when active and sitting – these failed to gain any marks. There were also many incomplete answers – 'sweat is released' without extending this to state that it had a cooling effect on the body.

6a This was a two mark question where many candidates only managed to achieve one. This was most often for stating that it contained DNA/chromosomes although several responses committed to just 'protects the nucleus' which did not gain any credit. Other candidates associated this question, not incorrectly but also not necessary, with the diagram given in the question and gave details that referred to the movement of genetic material out of the nucleus. On many occasions these were awarded a mark but candidates that were not specific in which type of genetic material they had in mind or those that gave DNA instead of RNA failed to score.

6d Transcription was the process named by several students although answers were given that often lacked clarity, detail and organisation. There was some misunderstanding of codons and anticodons and similarly with the role of tRNA where responses sometimes mentioned that this molecule makes amino acids. The type of bond linking amino acids, the peptide bond, was frequently omitted in answers although some candidates gained a mark from understanding that the amino acids were linked or joined together. A large number of responses partially described the process of translation rather than mention the term itself including details such as 'the tRNA reads the codon on mRNA' although there was some confusion about the interaction between mRNA and tRNA where some answers discussed these nucleic acids fusing and becoming amino acids. Evidently, there were many candidates that were confused on how tRNA actually translates the genetic code on mRNA and words such as 'codes for' or 'matches' were often used instead of 'translates' or alternatives. Few answers included the release of the protein at the end of the process.

6e Many candidates appeared not to be able to identify chromosomes as being a sequence of bases and/or made of DNA and were challenged by this question and this meant that mutations were put in the context of a chromosome rather than the DNA. Responses that mixed up amino acid sequences with DNA base sequences were seen often. Several candidates were able to score one mark by stating that a base sequence was changed in some way although failed to mention that this was on DNA for the second mark.

7a This question was, on the whole, answered well by candidates who were able to give details such as volume and concentration of lactose and enzyme solution for full marks. Least seen in responses were details about the type of enzyme used or how to measure the concentration of lactic acid produced. There was liberal use of the term 'amount' rather than volume, something which is seen time and time again in examinations and which should be discouraged.

7bi This was well answered with the vast majority of candidates giving a value within the accepted range.

7bii Most candidates recognised that too few temperature values were tested and gained one mark. In the vast majority of responses, information was given about temperature values tested being too far apart or that 'there were big gaps between temperatures'. There were significantly fewer answers that were able to achieve two marks by recognising that the optimum temperature could lie below or above 25 °C.

7c This was yet another question where candidates were providing a description rather than an explanation. Most answers were based around a comparison of the three different temperatures – which reaction would finish first, second, third without giving any real substance in their explanations and too many responses excluded details that linked the increase in acidity with enzymes denaturing and the consequential decrease in reaction rate. Some candidates failed to gain marks for directly quoting figures from the table without providing an explanation to support their statements.

7d Many students failed to acknowledge the decrease in the gradient of the graph as the percentage concentration of lactose in the solution and this led to a large number of vague and incorrect answers. It appeared that some of these candidates interpreted the Y axis label as lactic acid or pH rather than lactose which led to many responses stating that pH 2 was the most effective. Although answers to previous questions in this section of the paper were more successful, particularly for 7b(ii), students failed to take these into account in their response to 7b. Far too many students came to the conclusion that it was possible to determine the most effective conditions for the conversion of lactose into lactic acid, giving an optimum temperature of 25°C and an optimum pH of either 2 or 8. Some candidates appeared to misunderstand the question and discussed control variables or suggested improvements to the investigation that were not covered in the markscheme or just

described the patterns shown by the graph. Other students just simply misread the key and therefore interpreted the graph lines incorrectly. The use of terminology was also an issue that frequently arose. Candidates stated that 'the range of temperature used was too wide' or 'they needed to use a wider range of temperatures' rather than discuss the number of temperature or pH values tested. Few students were fortunate to gain 3 marks or above for their response to this question although a good number recognised that repeats had not been carried out.

8a Generally a well answered question with some responses showing clear working leading to the correct answers and others not. Candidates failing to show working out but gave random answers did not score although others that showed working out using incorrect figures were mostly able to gain one mark.

8b Very few candidates recognised that the liver received blood from two different vessels and this was a marking point very infrequently awarded. The names of these vessels were rarely mentioned. There were many generalisations about the function of the liver that were too vague to award such as 'it carries out many reactions so needs more oxygen' and a large number of responses focussed only on blood sugar regulation and nothing else. The term 'homeostasis' was very rarely seen. Marks were most often given to answers that referred to information regarding sugar regulation although other marking points were rarely included in responses.

8c A similar issue arose in responses for this question as what arose in 5c. Too many candidates are stating 'energy produced' which implies that there seems to be a fairly widespread misconception on the concept of energy. These were not awarded a mark. There were several answers that gave reasons for a greater flow of blood to the liver and kidneys – in particular to the liver where glycogen would be converted to glucose but again these were not awarded a mark. A good number of candidates were able to associate a greater blood flow to muscles during exercise to the need for more oxygen and/or a higher energy demand. Aerobic respiration was also mentioned in the correct context. Such responses gained at least two of the four marks available.

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