



Examiners' Report
Principal Examiner Feedback
Summer 2022

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

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Introduction

Candidates were yet again in a unique position for this examination series having had access to the topics to be tested following dissemination of the Advanced Information to centres. There were several topics that arose in this paper that were clearly taught well to help prepare students and this was fully reflected in many responses, particularly in the first half of the paper. Calculations were carried out well with students demonstrating understanding in various mathematical techniques where few marks were lost. There was some evidence of misunderstanding of key scientific terminology and, as is usually the case, confusion of the expectation of some command words. Devising or even recalling practical procedures in some cases was an area of uncertainty across the ability range.

- 1ai Overall the responses to this question gained full marks with the most common incorrect answer being 'plasma' as an alternative for cytoplasm. Many candidates preferred to state nuclear envelope rather than nucleus which was perfectly acceptable and awarded the mark.
- 1aii It was rare to see an incorrect response to this question although there were a few candidates that gave cell wall as an answer. The most common correct answer was mitochondria.
- 1aiii There were a number of responses that lacked clarity which meant that candidates were unable to gain access to the full number of marks available for the responses that they gave. For example, students generally failed to state or imply that *similar* cells work together to form tissues and that *different* tissues work together to form organs. The lack of these terms often cost marks.
- 1b Candidates were familiar with the methods of transport across cell membranes and the vast majority of responses connected the terms correctly to their definitions. There was minor confusion between osmosis and diffusion where students working at lower grades were, on occasion, confused between the two and several candidates indicated that osmosis was the movement of water from a low to a high water potential but on the whole this item was well answered.
- 1ci There were mixed responses to this item. Candidates mostly recognised that tissue B illustrated ciliated epithelium (although many students simply stated 'cilia' which was not preferred but was given the benefit of doubt). Most issues arose when trying to identify tissue A and many candidates lost a mark here by giving answers that were obviously incorrect, such as muscle or cheek cells, or that were too non-descriptive e.g. smooth epithelium.

- 1cii There were occasions where candidates displayed their working out to this magnification calculation in a confusing manner which sometimes restricted marks. Similarly, there were several responses that included a multiplication in converting units from mm to μm rather than a division. However, most gave a correct final answer demonstrating not only a good understanding of how to work through magnification calculations but also in converting units.
- 2ai The most common error that candidates made when identifying the labelled organs was for the structure labelled X where trachea rather than oesophagus was regularly seen in answers.
- 2bi It was made clear that many candidates were unsure of where the enzyme, amylase, is found rather than produced as the predominant answer for this question was 'mouth' which failed to gain any credit.
- 2bii There were few responses that gave 'intestine' as an answer without specifying either large or small and there were others that just stated 'alimentary canal' but, overall, candidates demonstrated a good understanding of this model representing the final stages of digestion.
- 2biii Most candidates were able to recognise that sugar (glucose and less frequently maltose) diffused or moved out of the Visking tubing into the water. It was less clear in responses that the starch was digested/broken down *to sugar* and this often cost candidates a mark. Some candidates included details that referred to a sugar solution moving or that sugar moved by osmosis. These were not credited.
- 2biv The majority of candidates are clearly familiar with the procedure for carrying out a test for a reducing sugar with most responses including both marking points for full marks. There were a few responses where Benedict's was spelt incorrectly which gave room for doubt and, in a minority of cases, Biuret reagent was given as the indicator which was not credited.
- 2bv This was generally well answered with responses including details linked to a correct colour change and a reason for this – that starch was still present in the tubing. There were fewer answers that mentioned that the starch molecule was too large to pass into the water through the Visking tubing.
- 3aai Very well answered by the majority of candidates that were able to convert the figure given to standard form. In rare cases, students gave the correct (6.00239) in their working but gave an incorrect power e.g. 10^{-5} or 10^6 but overall most were able to arrive at the correct answer for full marks.
- 3bi/ii This was another well answered question with all responses seen obtaining the mark for part bii. Very infrequently students attempted to round figures up or down and gave an answer that was incorrect.

- 3ci Most candidates were able to score at least one mark for recognising that as the BMI of an individual increases then so does the risk of diabetes. Some students were less able to structure their responses with clarity or detail to gain a second mark and tended to just pull out individual figures from the graph to give information such as 'at a BMI of 35 the risk of diabetes is the highest' rather than indicate that there was a greater risk between a correct BMI range. There were some candidates that appeared confused on scientific terminology and included the term 'rate' in responses, something that perhaps needs clarification.
- 3cii In many cases students failed to read the question carefully and responses often gave advice other than dietary. 'Take more exercise' was seen in a good number of responses which failed to gain any credit as the question clearly indicated that advice linked to diet was the expectation.
- 4ai Candidates often got confused on the order in which ethanol and water should be added to the food sample and many lost a mark for this. Marking point 2 was often not awarded and there were other responses that gave details of other chemical tests most often using Biuret reagent with a positive result showing a lilac colour. For this question, a good number of students gained at least one mark for recognising that the final mixture would have a milky appearance to indicate the presence of lipids.
- 4aiii The most common error in student responses for this question was some candidates gave fatty acids or glycerol rather than both. This limited a few answers to one mark. Occasionally it was clear that some candidates were obviously unaware of the products of lipid digestion and it seemed that random guesses were given which included answers such as glucose, protein, water and cholesterol.
- 4bi Responses giving 8.7 as an estimated pH value for lipid solution were seen most frequently. Some candidates gave a pH range rather than just stated a single value and these were often incorrect as the range exceeded that given in the markscheme. For example, 8.5 to 8.8 was the most common error. Overall, this question was answered well.
- 4bii A very well answered question with the occasional error occurring when candidates confused the independent with the dependent variable.
- 4biii There were a fair number of descriptions rather than explanations for this question and this cost marks. Some students had the idea that when the pH stopped decreasing the enzyme had denatured irrespective of the temperature. Although many candidates were generally aware that the higher temperature did lead to denaturation there were also many that included details that related to an increase in kinetic energy leading to an increased rate of reaction.

- 5 There were some candidates that spent valuable time giving irrelevant details on how sterilisation in both males and females was performed. Marks were lost in responses that failed to state that surgery (for sterilisation) carried a risk or that condoms were only temporary rather than could only be used once. However, many candidates were aware that sterilisation was a permanent solution in preventing pregnancy and that condoms were effective in preventing sexually transmitted diseases, although, interestingly, the latter was seen less frequently. There were also a good number of responses that compared the effectiveness of each contraceptive method although in some cases students just pulled individual figures from the table without extending details to state that one was more effective than the other. Marks were lost where candidates failed to pay enough attention to the wording of the question and responses often explained the two methods rather than giving an evaluation.
- 6 It was not often that candidates scored full marks for their responses to this question. Information was often muddled where students gave incorrect information about the shape of the lens when the ciliary muscles contracted or relaxed. For example, there were responses that indicated confusion such as 'when the ciliary muscles relax the lens gets fatter/more rounded' and this information was further confused to state that this went alongside trying to focus on a nearby or distant object. This is clearly a weak area of understanding amongst candidates. There were few responses that stated the optic nerve contained sensory neurones although many gained a mark for stating that the optic nerve carried electrical impulses to the brain. Students clearly preferred to use the term 'rods and cones' rather than 'receptor cells' for marking point five and this was perfectly fine to obtain this mark. It was very pleasing to see that the majority of candidates used the term 'impulses' rather than 'messages' or 'signals', the latter being allowed although not preferred.
- 7b It was unfortunate that many candidates gave a list of ways in which disease can be transmitted which often negated any marks that could have been awarded. For example, responses frequently included details such as 'cholera is spread through direct contact and bodily fluids or from drinking water containing the bacteria'. It seemed apparent that these candidates, and others that were able to score just one mark, were mostly unaware that it was *contaminated faeces* in food or water that caused transmission. Candidates that were able to gain one mark (which appeared to be more commonly awarded than two marks) generally stated that cholera was transmitted through (contaminated) water or food. There were several responses that preferred to use 'human waste' or just 'waste' rather than faeces which was too vague to award a first or even a second mark.

- 7c Candidate responses often mentioned drinking lots of water as a treatment for cholera without stating that this formed part of oral rehydration therapy and therefore missed out on one mark here. Other responses included details of vaccinations and production of antibodies or gave details on personal hygiene and other methods of disease prevention which gained no marks. A few candidates focussed on the role of ADH (Antidiuretic hormone) as they described the symptoms of cholera.
- 8 Most candidates were able to identify both advantages and disadvantages of each method of treatment although often the information given was limited and therefore failed to gain full marks. Several responses explained the procedures involved in dialysis and this often led to information that could not be awarded.
- 9a Candidates often referred to just two people in their responses rather than groups of people and this was not awarded. There were several descriptions of one group of people taking statins and measuring heart rate or blood pressure in a certain amount of time with no mention of two groups of people, one taking statins and the other not. There were several candidates, however, that were aware only one person or only one group of people were to take statins whilst the other person or group didn't and if these details were included in the response, then it was often the case that candidates scored good marks. Overall, it was more likely that candidates scored 2 out of the 3 marks available for this question. The reason for this was that many students did not state 'measure cholesterol levels' for marking point 3.
- 9b The majority of candidates failed to mention the insertion of a catheter for marking point 1 in their answers although most were fairly familiar with the procedures involved in the use of stents to treat heart disease. Although few students were able to gain full marks, responses indicated a fair understanding in this topic area with answers including details that most often spanned across marking points 2 to 5. Marks were lost where candidates failed to provide information that clearly suggested blood flowing more easily or more oxygen transported to muscle tissue and there was little mention of more aerobic respiration in the responses seen. In several cases, students answered the question in the context of the artery being completely blocked which was not shown in the diagram which led to responses stating that opening the artery just 'allowed blood to flow' rather than flow more easily or freely.

- 10a Many students were able to obtain at least two marks for their response which included information about bones breaking more easily (this was the most commonly awarded mark for candidates that gained just one mark for their answer), pain and/or details that implied difficulty in walking or exercising. There were answers that referred to patients with osteoarthritis not being able to support their body weight rather than indicating that height was lost over time, and this was insufficient for marking point two. Marks were lost where some students focussed more on explanations of osteoporosis rather than a description of its symptoms.
- 10b A fair number of responses did not clearly state how antagonistic muscles work together and marks were lost here. For example, it was quite common to see information such as 'voluntary muscles contract and relax' as this was generally the only detail given regarding muscles. More able candidates were able to state that when one muscle contracts the other relaxes and often referred correctly to named muscles. In some of these cases however this information was linked to the incorrect direction of movement of the bone. There was little reference to bone being 'pulled' with most responses referring to 'moving' the bone and again this lost students marks.

Summary

This paper encouraged a good range of very worthy responses although there were certain themes running through answers that drew attention and these cost some candidates marks.

There is still confusion over the expectation of command words. Students often muddle between describe and explain or just cannot distinguish between the two. When asked to make a comparison, responses quite often gave statements. This could be easily rectified by focussing on just one or two command words over a fortnight and basing informal assessment activities on these. It would be useful for candidates to each have a copy of the meaning of command words.

There were several cases that implied candidates were just not reading the question carefully or perhaps skim-reading it. Information was missed and consequently answers, at times, gave incorrect or irrelevant details. It is important to take the time to consider all aspects of the question including introductions to questions, as well as reading axes labels carefully to thoroughly understand what graphs show. All information given for a question is important.

Candidates should have access to all practical's detailed within the specification, whether this is a hands-on experience, demonstrated by their teacher or shown as a video. There are many excellent short videos on the internet that help students to visualise the skills needed to carry out practical work safely and alongside these good discussions can be held around the limits of the activities, the risks involved and how improvements could be made.

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