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Examiners' Report
Principal Examiner Feedback

January 2017

Pearson Edexcel International GCSE
in Human Biology (4HB0) Paper 01

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January 2017
Publications Code 4HB0_02_1701_ER

4HBO 02 Examiner Report

Overview

There were some excellent answers from students across all of the items seen where many candidates provided far more detail, with some being beyond the scope of the specification, than was necessary to gain full marks. Although this did not gain students further credit these answers showed a deep understanding of a range of topics covering the Human Biology specification. There were also the usual misconceptions that arose which are highlighted in this report in order to draw attention to topic areas that challenge students or to reinforce aspects of examination technique that have limited the credit given to students responses.

Question 1

This multiple choice question was intended to be accessible to students across the ability range and this proved to be the case. Although many candidates were able score full marks for linking a process to its correct description there were equally as many that failed to obtain this most commonly for linking the removal of faeces with excretion and the conversion of glucose to glycogen in the liver with digestion. In several cases it was clear that candidates guessed the correct linkage for each process although very few failed to score at least two marks, with less able candidates gaining this mainly for either linking the removal of water to sweating, the passage of insulin into the blood to secretion or the conversion of proteins into polypeptides to digestion.
Some linkages were particularly difficult to interpret; in some instances where indecision was evident, lines were crossed out and redrawn although the re-linkage in many of these cases was unclear which consequently limited the marks obtained. Students should be strongly encouraged to use a ruler to draw linkage lines rather than draw wavy lines; the latter made some answers ambiguous.

Question 2

2a – Although most candidates were able to correctly identify the optic nerve as the structure carrying impulses to the brain, a large number of pupils gave incorrect parts of the eye for the descriptions given in the table. The parts named alongside each description varied significantly with most errors occurring in the first three responses. For example, the lens was often given as an answer for marking point 3 and for marking point 1, the cornea was given several times.

2biii – it was unfortunate that a fair number of candidates chose to use the term ‘sound waves’ rather than ‘vibrations’. These responses were limited to two marks in many cases where an error carried forward was considered and applied, where appropriate, to answers that used this term. On the contrary, there were a vast number of clear, concise responses that translated good understanding of the function of ossicles with marking points 4 and 5 often being awarded. Some students failed to state clearly that vibrations were ‘transferred’ from the eardrum to cochlea but instead discussed how the bones B, C and D vibrated due to vibrations of the eardrum. Very few candidates mentioned that vibrations were transferred across the ‘middle ear’ for marking point 3 although the other marking points given in the mark scheme were present to varying degrees in many responses.

2c –Many candidates scored at least one mark for showing some understanding that hearing was reduced when Tube A became blocked. The first marking point was also seen in many responses although few students recognised that absorption of oxygen caused a drop in pressure, preferring to detail a difference in pressure either side of the ear drum. Similar errors in use of terminology to

those given in the previous question were often encountered again here where candidates described 'impulses or sound' being sent through Eustachian tube to the brain. Very few students were able to apply their understanding in a logical, coherent manner and failed to gain a mark for recognising that the eardrum curved inwards; some responses gave the opposite 'the eardrum would curve outwards' due to pressure change and other mistakes in responses were linked to pressure changes in the ear at places other than either side of the eardrum.

Question 3

3ai – This question presented challenge to many candidates who either did not understand what was being asked of them or who were genuinely unable to formulate a viable method for measuring the distance travelled by a nerve impulse. A large number of candidates attempted to describe how distance was measured using a stopclock whereas other candidates gave answers that included the use of speed calculations. These answers failed to incorporate details of measurements related to the passage of a nerve impulse from receptor to effector and, consequently, many answers were limited to one mark at best. Some students were able to describe how the length of one arm needed to be measured although many of these omitted measurements across the head. Most commonly, students mentioned how the distance from one 'outstretched arm' to the next should be measured which implied a lack of understanding of the nerve pathway taken from when the stimulus was detected to the response (squeezing the hand of the next student). Candidates scoring one mark generally gained this for including the use of a measuring tape although in several cases this was very poorly expressed with terms such as 'metre tape' to just 'tape' being used often to describe the instrument used to measure a distance.

3aii/aiii – most candidates were able to score full marks here with many answers showing clear calculations arriving at the correct answers. The most common incorrect answer for 3aii was 190, where few candidates appeared to mistakenly understand that the question expected them to calculate a mean value. This had a knock-on effect to answers given for 3aiii where the most frequent incorrect response given was 76 rather than 760 although an error carried forward was applied in most cases so that students were not penalised twice for the single error they had made in the previous question. Candidates that showed working out, regardless of the calculation they gave, often were awarded at least one mark for using 1900 and 2.5 in their working although there were some completely random figures used in calculations and for final answers that failed to gain any credit.

3aiv – Few students were able to gain full marks for the details they gave in their response, with many describing how student reaction times varied or how some students may have had some 'illness' that prevented them from reacting in the same way as others. Other candidates decided that gender differences would cause inaccuracies in results or that impulses travelled at different speeds through each student. These responses were unsuccessful but appeared often enough to limit most of the marks awarded for this question to 1. The most common correct answers tended to cover marking points 2, 3 or 4 with more successful students frequently including correct details on incorrect distance measurements and words to the effect that students anticipated or delayed a response. There were a significant few candidates who were able to state that the accuracy of results might be due to a delay caused by transmission across the synapse.

3b – Nearly as many students gained one mark for their answer to this question as those that gained two marks. Candidates were clear in their description on how alcohol slowed nerve impulses and, for those gaining two marks, how alcohol increased reaction time. Several candidates were able to recall that alcohol was an example of a depressant, although some labelled it as a suppressant which did not gain a mark.

Question 4

This question discriminated well between several levels of ability with more able candidates scoring at least 7 marks for their answer. Most marking points were seen in responses although many candidates had difficulty in describing the effect of smoking on alveoli in scientific terms preferring on many occasions to just state that the alveoli were 'damaged'. Candidates working at the top grades were clear in describing how the elasticity of the alveoli wall was lost or that the alveoli became enlarged but these details were seen rarely. Less able candidates often spoke of a reduced oxygen supply in the 'body' which failed to gain credit and others gave lengthy descriptions of the effect of smoking on the circulatory system rather than focussing their answer on what the question actually asked them to do. Other incorrect or non-creditworthy answers included information on the quality of life of people with emphysema and how they coped with this disorder e.g. they have to use oxygen tanks. Simple statements such as 'smoking causes cancer' without linking this to the respiratory system i.e. lung cancer were also not credited and, similarly, answers such as 'smokers get more infections' were too vague to be awarded marks.

Question 5

5ai – candidates that lost marks for their response to this part of the question either incorrectly named the parts of the cell e.g. cell wall instead of cell membrane, or gave the wrong function for one or more of the parts. Most candidates recognised the role of the nucleus as either containing DNA/chromosomes or controlling the cell although the details given for the role of the cell membrane and/or cytoplasm were sometimes incorrect. It was interesting that several candidates incorrectly gave the function of the cytoplasm as a site for aerobic respiration and the role of the cell membrane was often linked to providing support for the cell, possibly confusing this with a cell wall in plants. These details were not credited. Candidates working at D grade and above were mostly able to provide a correct function for a named part but in some cases students seemingly misinterpreted the diagram and, although they named the correct parts, they were given in the wrong order in the table which negated any marks available.

5aii – a fair number of candidates provided the name of a plant cell component in their list of structures, mostly vacuole, without taking into account that the question was linked to the animal cells shown in the diagram. Other candidates gave structures such as chromosomes and DNA together in their list of three and although one mark was available for either of these, a second mark was not awarded for covering the same marking point. Some student answers were completely detached from the question; names of other cells were seen such as white and red blood cells or sub-atomic particles were listed; protons, neutrons and electrons came up at times. However, the majority of candidates were able to correctly list three structures other than the nucleus in their list, with most of these giving ribosomes, endoplasmic reticulum and mitochondria and it was pleasing that most candidates took note of the instructions given by the question and limited their list to three structures rather than risk adding further incorrect options.

5bi – many responses given to this question indicated clearly that some candidates did not read the question. A vast variety of diagrams were given, some resembling objects far detached from ciliated cells. The most common mistake made by students was to draw just one cell when the question gave instructions to draw two and this unfortunately meant that these responses either failed to gain any marks, if the diagram was unlabelled, or that the number of marks were limited to just one if correct labels were given. A fair number of diagrams included the nucleus and cell membrane as correct labels but then labelled cilia as 'hair' or 'hair cells' which meant that the labelling mark was lost.

5bii – There were several responses for this item that lacked clarity with the details provided sometimes touching on the second marking point in particular but with some ambiguity. Many candidates referred to mucus being removed from the body rather than from the trachea or throat, with a fair number of responses stating that mucus was moved to the mouth to be spat out. These responses failed to score a mark for the second marking point. Many candidates were aware that the role of cilia was to move the mucus and were able to score a mark for this although the direction in which mucus was moved was not always clear. A significant few students gained the full two marks for mentioning that cilia were response for moving an ovum to the uterus.
Candidates working at C grade were mostly able to score one mark here with only the best students managing the full two marks for responses which related to the respiratory tract.

6ai – marking point 1, mitosis or cell division, was a popular correct response given by a large number of candidates although many failed to identify that during this event, the chromosomes condensed – the only time that they are visible as distinct structures. As a result, most students were only able to obtain one mark for their answer. Incorrect answers varied from chromosomes copying themselves to a repeat of the question where many candidates failed to score a mark for stating that the 'chromosomes can be seen ….' Only the best candidates obtained the full two marks for their responses to this question.

6aii – This was one of the more successfully answered question within this section where many candidates were able to score at least one mark for showing some understanding of why the presence of oxygen was necessary in the solution containing fetal cells. Many candidates were able to apply their understanding of the importance of oxygen in aerobic respiration for one mark and students working at higher levels extended on their answers to state that aerobic respiration provided the energy for cell division.

6aiii – a vast number of candidates were able to state that 'the contents' of the cell, in whatever form, would be seen more clearly but these failed to include that it was the chromosomes rather than numerous other cell components or just 'cells' could be seen more clearly. Consequently, few candidates, apart from the most able, were able to score a mark here.

6bi – A fair number of candidates disregarded the context of the question and failed to analyse the diagram, seemingly relying on learned knowledge of chromosome number in order to answer this question. This led to a significant number of students giving an answer of 46 rather than 47 chromosomes being present in the karyotype of a person with Downs Syndrome shown in the diagram.

6bii – Most candidates recognised that the karyotype shown was that of a female by stating that two X chromosomes were present or, less commonly, that a Y chromosome was not present. Only the least able students were unsuccessful in their response and this was usually for conveying confusion in their understanding of sex determination.

6biii – Very few candidates were able to score the full 2 marks for their response to this question with many just seeming to guess at an answer by providing details on the symptoms and/or quality of life of people with Downs Syndrome. Responses frequently included details related to 'defective reproductive systems' that were unable to produce gametes or a 'reduced life span' where people with Downs Syndrome failed to live to an age where they could reproduce. These responses failed to gain any marks.

Better candidates included some information, albeit limited, on how meiosis could not occur or failed to occur in the correct way (for one mark) and very few candidates extended this to provide information on how haploid cells would not contain the correct number of chromosomes (for a second mark). Generally, students appeared to have difficulty in expressing information that implied there would an unequal distribution of chromosomes in haploid cells and many failed to recognise that chromosomes would not be able pair up for marking point 1. Candidates scoring the full two marks most often included details that could be credited to marking points 2 and although marking point 1 was rarely seen.

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