

Examiners' Report/
Principal Examiner Feedback

Summer 2016

Pearson Edexcel International GCSE
in Human Biology (4HB0) Paper 02

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- 1 The most common error that candidates made was to confuse the links for urea and urine. Many candidates also linked glucose to 'produced during respiration'. Few students gained less than 5 marks for their response with most knowing that the lungs excreted carbon dioxide, that glucose gave a positive Benedict's test and that faeces was formed in the large intestine. The vast majority of candidates were also aware that DNA was found in the nucleus and forms genes. Many students only used 6 lines despite the question having 7 marks.
- 2aii Most candidates scored a mark here, even if their answer differed from that shown in the mark scheme. This was due to an error carried forward where several students failed to read the times from the clocks correctly in the previous question, but were awarded a mark based on a correct answer from a calculation using the times that they had given as their previous answer.
- 2aiii very few candidates gave an explanation of the differences in the amount of carbon dioxide in each experiment and most tended to focus on the different lengths of tubing. Many candidates gave responses that were incorrect, stating that because tube A extended into the indicator it took less time for the carbon dioxide to reach it and that from tube B that was not in contact with the indicator. Some candidates gained one mark, most often from stating that exhaled air contained more carbon dioxide and the few that gained two marks also understood that the increase in carbon dioxide concentration was due to respiration. Even less candidates stated that the carbon dioxide was removed from the body by the lungs.
- A fair quantity of candidates discussed the length of the tubes, stating that one reached into the limewater and therefore the change would be quicker whereas the other went into 'empty space' meaning that it would take longer for the carbon dioxide to reach the limewater. These responses failed to gain any marks.
- 2aiv Most candidates scored a mark here for their suggested safety precaution. The most common response made reference to sucking up the liquid although answers that lacked clarity included 'don't suck too hard' or 'don't breathe in through the tube' failed to score. Other incorrect answers were infrequent but included suggestions such as 'wear a lab coat' or 'wear safety goggles' or 'wear gloves'.
- 2av Candidates scoring one mark generally mentioned that the colour change was much easier to detect when using indicator although they expressed this in a variety of ways. Few mentioned that the bicarbonate indicator was more sensitive to carbon dioxide or that timing of the colour change would be easier or more accurate. Student responses that did touch along the lines of the latter generally just stated that using bicarbonate indicator was more accurate although they were given the benefit of the doubt for their answer in this case and awarded a mark. Non-creditworthy responses were often related to time/speed at which the indicators worked. A significant number of responses mentioned the idea that limewater became clear again

with excess carbon dioxide. On a few occasions the students stated the colour change to be from yellow to red.

- 2bii This question was answered well by the vast majority of candidates who were able to explain clearly that more carbon dioxide was exhaled due to an increase in the rate of aerobic respiration. Students that gained just two of the three available marks tended to omit key details from the third marking point, stating that experiment 1 'took a shorter time' rather than the colour change being faster – possibly repeat of what they had indicated in the previous question. Many responses tried to explain results with the idea of oxygen debt. Some students misunderstood the question and tried to explain why the experiment was carried out.
- 3 The majority of candidates describe the life cycle of *Schistosoma* well and gained at least 5 marks for their answer. Many students were able to achieve all 8 marks through detailed accounts that mapped directly to the marking points. High level responses included the names of the individual larval stages. Only a small percentage of students failed to provide a response to this question but a range of totally unrelated answers were seen. This included students describing schizophrenia, AIDS/HIV, Malaria, TB. Misconceptions mainly revolved around students thinking that the snails themselves were the parasite and entered the human body. The most common error was to mix up where the eggs and or larvae hatched/developed with some candidates stating in snails or in humans with others stating in water. This sometimes confused the response and, consequently, some students lost marks. Not many candidates were able to recall that the larvae fed on red blood cells and references to larvae maturing into adult worms were often vague with a fair number of students failing to gain a mark for stating that the 'larvae grow'. Some candidates wasted valuable time discussing treatments for schistosomiasis or how to reduce the risk of becoming infected in the first place.
- 4bi Very few students recalled the role of FSH in fertility treatment with most gaining marks for correctly describing that FSH stimulated follicle or egg maturation. Some candidates lost marks for incorrectly stating that FSH was involved in 'egg production' or 'egg release from the ovary' or quite simply 'the menstrual cycle'. Higher ability students generally covered marking points 1 and 2 in their responses.
- 4bii Candidates giving long lists of functions of oestrogen had marks cancelled for incorrect answers. Most were able to state that oestrogen played a role in the repair of the uterus lining although some candidates referred to the uterus lining as the 'wall' which was ignored and failed to gain a mark. A large number of students correctly stated that oestrogen was the hormone involved in causing the secondary sexual characteristics in females although, generally, this was all that was mentioned that restricted the number of marks that the students obtained. It appeared, in this case, that a good number of candidates failed to register the mark allocation for their answer to this question as most tended to give just one role of oestrogen. Students gaining two marks most often covered marking points 1 and 5 in their answer. Very few, if any, responses included details related to contraception or LH production.

- 4biii This question was the least successfully answered of all questions involving the female hormones. Many responses were guesswork based on the name of the hormone, for example 'oxidises toxic material' or 'removes toxic waste from oxygen'. A range of incorrect answers were given that would have been better suited as answers to the previous two questions with responses ranging from 'repair of uterus lining' to 'progesterone production' with many other answers too vague such as 'contractions' without any mention of the uterus or birth. However, a fair number of candidates gained at least one mark for their response with a fair proportion of candidates recognising the role of oxytocin in milk production. Of these, many failed to also give the role of oxytocin in the contraction of the uterus wall during labour and this restricted the mark allocation for a large number of answers to one mark. It was clear that some students were not so familiar with this hormone and a range of incorrect answers were seen that often related to providing the foetus with oxygen.
- 5b Many candidates failed to link the role of bile in neutralisation to maintenance of optimum conditions in the small intestine for enzyme activity and consequently missed out on marks. Also, very few candidates went into more depth than 'digestion of food takes place more slowly' and failed to include details of any of the nutrients mentioned in the markscheme. Again, the vagueness of these responses gained no credit. Most students had a good grasp of the two main roles of bile but some failed to answer the question about what would happen with a lack of bile and just wrote all that they knew about its functions. These also failed to gain marks as they did not answer the question. Other candidates misunderstood that bile was released into the stomach and apart from this went on to explain the consequences of a lack of bile. A significant number of students misidentified the bile duct as the pancreatic duct and this was then reflected in their non-creditworthy responses. Weaker responses indicated that food couldn't pass through the duct. Or that the bile couldn't get to the liver. Most credit was given to responses that implied a clear understanding of how fat digestion would be affected by the blocked bile duct and, most commonly these included details on less emulsification, reduced fat digestion (often missing out information on or just a mention of lipase) and the effect on the pH of food moving from the stomach to the small intestine.
- 5c Several candidates stated that people coeliac disease would suffer a deficiency without specifying a named deficiency and lost marks. Most commonly, the effect of coeliac disease, for the third marking point, was the least frequently awarded as candidates came up with a random array of answers such as diabetes or extreme heat loss or just health problems. Some answers focused on the lacteal being reduced for marking point 1 rather than the surface area of the small intestine in general and others unfortunately missed out on a mark by combining marking points 1 and 2 without clearly stating that there would be less absorption of nutrients. Responses quite commonly included details on how digestion of nutrients would be ineffective or reduced or discussed how 'reabsorption' of nutrients would be affected although these were not awarded. Several responses

were seen that incorrectly explained the cause of coeliac disease as being due to bacterial/viral infections.

On the whole, most candidates gained at least one mark for understanding that there would be less absorption of nutrients and those gaining two marks most often stated in addition that the surface area of the villi would be reduced.

- 6a Few candidates failed to attempt this question or overlooked the question as diagrams remained blank in some cases. Although most candidates obtained a mark for placing the arrows correctly on the artery and the vein some failed to follow instructions and only drew one arrow which were generally too ambiguous to award. Some arrows were so poorly drawn or placed that it was difficult to tell in which direction they were pointing so no mark was awarded. Some candidates put the arrows within the hashed lines for the vein/artery which made them difficult to read when scanned. Of the students that answered most either got the arrows the right way or opposite - occasionally students did put both arrows in the same direction.
- 6bii Many responses compared the dialysis machine to the structure of the kidney frequently giving details such as 'there are many nephrons in the kidney so the tubing has to be long' which failed to answer the question. Others gave a general description of the purpose of dialysis e.g. 'it allows the blood to be filtered' or 'it removes waste products from the blood' where students appeared to overlook the key word 'long' in the question. Too many candidates used the term 'excretion' as an alternative to filtration which negated any marks linked to this marking point. For example 'so that excretion of urea is faster' or 'to make sure that all waste substances are excreted from the blood' were seen frequently in responses. Students were often talking about pressure and also about oxygenated/deoxygenated blood. Diffusion was discussed frequently but many were not making a comparative type statement. Occasional references were made to the tube needing to be long so that the patient could move about/be comfortable. Better candidates were often awarded at least one mark for their understanding that a longer tube gave a greater surface area and some went on to gain a further mark by including details linked to marking point 2 e.g. so that diffusion is faster or more waste substances are filtered.
- 6c Many students made references to the viscosity of the liquid e.g. 'liquid X gets thicker/thinner' or to gases e.g. 'the liquid will contain more carbon dioxide/less oxygen'. Others gave long lists of substances which frequently included urine, water and glucose and although some items in the list were correct marks were deducted once the list rule had been applied. Some candidates discussed the composition of the blood rather than the composition of liquid X as the question asked and failed to gain marks. Students frequently gave vague answers such as 'the concentration of liquid X will increase' along with 'the concentration of liquid Y will decrease'. Urea was the most commonly mentioned waste product which tended to be mentioned first by candidates who scored at least one mark for their response although salts was mentioned far less often. In some cases, candidates failed to state that urea *increased* or that the amount of salt

increased which left the response ambiguous. No marks were awarded for these.

- 6d Some candidates were under the misconception that glucose was added to create a concentration gradient between liquid X and the blood flowing through the tubing thus allowing diffusion of glucose into the blood. Although several of these responses gained one mark for recognising that glucose was essential for respiration this was generally the maximum mark that these students obtained. There was frequent confusion regarding transport mechanisms with many students referring to glucose moving by osmosis. Many students wrote about selective reabsorption in the kidney and therefore the need to add glucose to mimic this and allow glucose to diffuse into the blood. A number of students that gained a mark for making a statement about the importance of glucose in respiration then proceeded to write an account about the biochemistry and roles of respiration having seemingly lost track of the question. Higher level responses tended to be precise and covered all five marking points. There seemed to be considerable confusion/misuse of the term gradient i.e. the gradient is the same each side etc. Other candidates that gained a maximum of one mark described the importance of glucose in the body rather than focus on the concentration gradient between Y and X as the question asked. This mark was awarded for the mention of glucose in respiration. Many answers were clearly expressed with marking points 1, 2 and 5 being awarded frequently.
- 6eii Too many students used RBC as an abbreviation for red blood cells in their answers rather than write the term out in full. Other students failed to link haemoglobin with red blood cells and focussed on details that suggested the role of the detector was to check that no haemoglobin was lost from the blood. This was seen frequently but not awarded. Some candidates related the testing of haemoglobin to the health/oxygen levels of the patient. Candidates scoring the mark correctly suggested that the haemoglobin detector was used to check the level of red blood cells in order to determine whether any had been lost during dialysis.

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