



# **Examiners' Report**

## **Principal Examiner Feedback**

**Summer 2017**

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



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## Examiner's Report International GCSE Human Biology 4HB0 01

There were encouraging signs that advice given in previous reports has been noted and acted upon by many Centres. This was particularly true in the case of the use of water potential rather than concentration in any explanations or descriptions concerning the movement of water. This has meant that where candidates have incorporated this term in their answers they have scored much more freely than those who have not, and have consequently struggled to provide rational explanations.

One other area that Centres should note for the future is the use of the word 'amount'. This term is commonly used by candidates when they should be referring to, mass, volume or concentration. The term is usually far too vague to secure a mark and candidates should be encouraged to use appropriate measurements rather than simply mention amount.

### Question 1

Overall, the multiple choice questions were accessible to the majority of candidates. Two questions did cause problems for a significant number of candidates namely, (b) where many thought, incorrectly, that 'testes' was the answer rather than 'pituitary gland' and (i), where many thought that 'a base deletion' was an example of a mutagen.

### Question 2

Many of the diagrams that were drawn in answer to part (a) were very poor. Candidates should always have access to a sharp pencil and a ruler and make use of them both. Many candidates failed to show the two long tubes below the surface of the indicator and very many failed to place the bungs securely in the tops of the two tubes thereby presenting apparatus that could not possibly have yielded any meaningful results.

The named indicator was usually, limewater, though many did choose to use bicarbonate/hydrogen carbonate indicator instead. Most correctly used a measuring cylinder to measure the volume of the indicator though a pipette or burette could have been used. Many of those candidates who used bicarbonate indicator had little idea of the colour change in response to the presence of carbon dioxide, with few ending up with yellow as the end point.

Many candidates experienced problems in describing the changes observed when using the apparatus. Whilst most (of those using limewater as the indicator) secured a mark for colour change, fewer made reference to the increased concentration in expired air as the cause and even fewer recognised that there is carbon dioxide present in inspired air so that there would be a colour change in the other tube occurring more slowly.

The last part of this question asks for an explanation and many candidates failed to do this and simply stated 'amount of indicator'. An explanation requires reference to increase/decrease in the volume of indicator resulting in a changed time for a colour change to occur.

### Question 3

Most candidates correctly identified chicken nuggets as having more energy than hamburgers but most failed to tell us how much more, in many cases simply writing down the figures from the table rather than doing the simple calculation to determine the difference.

Very few candidates scored full marks for part (a)(ii). The vast majority correctly identified chips as the offending food and often made reference to their fat content. Some made reference to fat/cholesterol being deposited in arteries which was not relevant to this question. There needed to be a reference to deposition beneath the skin or around body organs to secure a mark. Only the best candidates recognised that the real issue was one of a greater calorific intake than consumption by the metabolic processes of the body.

Most candidates understood that calcium was required in the diet for the development of the foetal bones but omitted to make reference to the need of the mother to ensure sufficient calcium for her own bones.

Most candidates identified either the amnion or the placenta as the protective structures. Only a very tiny minority identified the cervical plug. Many incorrectly (in the context of this question) identified the amniotic fluid.

The advantages of breast milk were well known by the majority of candidates, though 'contains no cholesterol' and contains no fat' were ticked on a number of occasions.

### Question 4

Only a small number of candidates could not read the thermometers correctly. Many could not identify 'time' as the variable to be measured, though many did refer to using a stopwatch without any reference to time. Often, candidates failed to make any reference to what was being timed and where they did they often gave an incorrect colour change.

Explanation of the changes proved to be quite challenging for many candidates who simply described the colour change observed. Of those who recognised that starch was being broken down/digested, there were many who failed to say what it was being broken down into. Of those who did make that final statement it was encouraging to note that many quoted 'maltose' rather than 'glucose' or 'sugar', again, an example of Centres taking note of previous reports.

Many candidates recognised that pH2 was not the optimum pH for this reaction and commented on the effects of this low pH on the active site of the enzyme.

Somewhat bizarrely, a significant number of candidates made reference to this not being the 'optimum temperature' for the enzyme.

The factor to be controlled was often referred to as the 'amount' of starch/enzyme rather than the volume or concentration.

#### Question 5

Most candidates coped adequately with the simple calculation but a number made incorrect readings from the graph.

Many candidates experienced difficulties in describing the overall differences between male and female death rates. Many simply quoted figures from the graphs at various points but made no reference to overall variations. Whilst many recognised that at all points male deaths were greater than female deaths, far fewer identified the steeper increase in male deaths or the fact that they decreased significantly after 1990 whereas female deaths remained constant after 1990. Some sought to explain the reasons behind the variations which was irrelevant.

The carcinogenic substance in tobacco was known by the vast majority of candidates.

Part (b)(ii) was poorly answered. Few failed to grasp the need to compare smokers with non-smokers and even fewer established the need to investigate large numbers of people over a long time period. Many candidates wrongly discussed the need to know which substances were present in cigarettes and which substances specifically caused the cancer.

The presence of carbon monoxide in tobacco smoke was well known and that was often tied into its preferential combination with haemoglobin. Fewer candidates developed a further coherent argument that this resulted in less oxygen passing to the foetus resulting in lower growth through less respiration. Some candidates discussed the passage of substances across the placenta without giving relevant details.

The issues surrounding emphysema were well known, particularly with the breakdown of the alveolar walls resulting in less surface area for gaseous exchange. Some candidates referred to changes to the surface area of the lungs rather than the surface area of the alveoli.

#### Question 6

The commonest mistake was to confuse the pupil with the iris. There were a significant number of candidates who thought that the pupil/iris was responsible for focussing the light on the retina rather than the cornea.

A common mistake in describing the way in which the eye focuses on a distant object was to refer to the suspensory ligaments as 'contracting'. The clue should

be in the name 'ligaments' which do not contract or relax in the same way that muscles are able. The term to be used is taut or tighten. There were some candidates that had the whole process the wrong way round and many who insisted, irrelevantly, on describing how the eye focuses on a near object as well as a distant object.

The reduction in the transmission of conjunctivitis was not well attempted with many candidates, at best, only scoring one mark. The question is about transmission rather than cure and about practical solutions rather than as many candidates suggested, 'don't mix with people' or 'don't come too close'. Suitable suggestions are listed in the mark scheme.

The roles of the components of the bacterium were generally well known. It should be noted, however, that the role of the cell wall is to maintain shape and prevent lysis rather than the generalised role of 'protection'. This latter role is the prerogative of the capsule. In describing the function of the cell membrane it would be better if candidates could develop the habit of making reference to 'control' of substances entering or leaving a cell rather than simply referring to 'allows'.

Most candidates knew that antibiotics or a named antibiotic are used to treat the condition. Eye drops alone was not good enough to secure the mark though this answer was not seen too often.

### Question 7

The identification of the more concentrated solution did not prove too challenging for the majority of candidates, though the commonest incorrect answer was A. Most candidates were successful in their answers as they referred to water potential and were able to describe the movement of water down a water potential gradient or from high to low water potential. Many mentioned the shrivelled appearance of the blood cell.

Solution C was often correctly identified as the appropriate storage medium but few candidates specifically discussed the point that there would be no net movement of water. Instead, they stated that there would be no movement of water which is clearly incorrect. Many justified their choice, quite correctly by making reference to the unchanged appearance of the blood cell.

Most of the gaps were filled in using the correct words. The commonest errors were to transpose platelets for red blood cells in the first gap and to use the term 'burst' instead of 'agglutinate' in the third space.

### Question 8

Most candidates recognised that there was a decrease in the mass of nitrous oxide released. Only a minority could identify the environmental issues associated with nitrous oxide emissions. Instead of making reference to global

warming and the role of the gas as a greenhouse gas, candidates discussed the formation of acid rain and its associated problems.

Many candidates recognised that an increase in the number of factories built or power stations in operation would lead to an increase in the output of sulphur dioxide, there were a sizeable number who simply said that more of the gas was produced without giving a clue as to how.

Whilst many candidates calculated the total UK emissions correctly there was still a sizeable number who added up the figures incorrectly even though they subsequently performed a correct manipulation of the data.

The formation of acid rain as a result of sulphur dioxide emissions was almost universally understood but many candidates subsequently found it difficult to articulate an environmental outcome associated with the formation of acid rain. Vague reference to 'damage' are not really good enough at this stage and there are a whole range of consequences associated with acid rain which should be familiar to a candidate.

#### Question 9

Very few candidates read the graph correctly to determine the age range for the most rapid growth in humans. The line of the graph clearly passes through the grid at one and a half years so there should have been no difficulty. Whilst many candidates suggested measuring mass or height as a way of determining growth, a significant number of candidates suggested using a tape measure or a metre stick.

The age at which 50% growth had been achieved was not a problem for most candidates.

The increase in the hormonal system proved problematic for the majority of candidates. There were vague references to more hormones being produced but only a minority of candidates suggested that puberty was occurring and of those who did, very few made reference to the production of sex hormones or growth hormone.

The secondary sex characteristics of males were well known though we did have the usual crop of 'public hair'. A number of responses referred to a 'cracked voice', presumably an alternative to broken voice, but not a usual response.

The roles of the two female hormones were reasonably well known though a number of candidates shot themselves in the foot by referring to the 'thickening of the uterus wall' rather than making reference to the lining of the uterus. One of the roles of progesterone is to maintain the thickness of the uterine lining. Unfortunately, many candidates forgot to use the term 'maintain' and just referred to 'thickening' or 'repairs' the lining.

Many candidates referred to the 'production' of eggs rather than stimulating development of the follicle and the egg as a role for FSH. Encouragingly, most candidates knew the site of the hormone's production.

Whilst many candidates described the role of LH in causing the release of an ovum, far fewer made any mention of the site of the release, namely, the ovary.

#### Question 10

Many candidates did not recognise that this condition is caused by two recessive alleles and this caused problems throughout the whole of the question.

Far too many thought that because a family pedigree is shown, that the condition must be sex-linked and so, incorrectly gave the sex chromosomes as part of the genotypes.

Candidates struggled to articulate their reasons for giving their choice of genotype for person 3. They talked about the 'disease'. This is not correct as it is a genetic condition and has no causative organism. Many became confused by believing that it is a sex-linked condition and few realised that as it is a homozygous recessive condition it requires the recessive allele to be passed from both parents.

As many candidates thought that this is a sex-linked condition the genotypes that they selected for the parents of the cross were incorrect. Some candidates insisted on using their own letters to denote the alleles despite clear instructions in the question as to which letters should be used which should also have given a clear hint as to the no sex-linked nature of the condition. Some candidates failed either to state the phenotypes of the offspring of the cross or failed to tie in the genotype with the correct phenotype. These are mistakes that are regularly repeated by candidates.

Many candidates could describe at least one symptom of people who have the condition, though a common mistake was to suggest that a person with the condition would not be able to feel anything clearly confusing the type of neurone that is affected.

Part (c) proved particularly challenging. Of those who mentioned that a mutation had occurred, very few discussed its effect on changing the sequence of bases, though some talked about changing the gene. Very few correctly noted that the mutation had been caused by an insertion of a base.





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