

Examiners' Report/  
Principal Examiner Feedback

January 2013

International GCSE  
Biology (4BI0) Paper 2B

Edexcel Level 1/Level 2 Certificate  
Biology (KBI0) Paper 2B

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## International GCSE Biology paper 4BIO 2B

### Question 1

(a) The concept of a gene being a section of DNA that codes for a protein was known by the more able candidates. The idea that genes determine characteristics was also credited as an alternative to coding for a protein. Many answers simply discussed the fact that they are inherited or made loose references to chromosomes or nuclei.

(b) The examiners were looking for answers that expressed the idea that superovulation would result in a greater quantity of eggs than normal. Many appreciated this and gained the mark. However, there were an abundance of answers that showed that the word 'super' was not understood and nor was the process of 'ovulation'. Poor answers simply reiterated information from the comprehension.

(c) Most candidates recalled that the uterus is the place where embryos would implant in the surrogate mother, though a variety of other named female organs were named in the poorer answers. The non-technical term 'womb' was credited.

(d) Most candidates were aware of the link between smoking and emphysema. Weaker answers showed no understanding of emphysema and tended to describe general aspects of human behaviour or make reference to AAT.

(e) The correct answer of 50% was seen in most scripts.

(f) (i) There were some very good answers that were able to make a link between what might happen in the gut of a person which would not assist the clotting of blood. The passage stated that 'human proteins could be made in other mammals and extracted from their milk' so the examiners were looking for a comment that made it clear that the blood clotting factors (protein) would not be able to enter the bloodstream because they would be digested. Many candidates got close to being credited by making it clear that the blood clotting factors would not be able to get into the blood but then failed to say why. Many candidates simply repeated the wording of the question stating that blood clotting factors have to be extracted before being used, and many simply noted that blood clotting factors are needed to clot blood.

(ii) Candidates described the role of cellulose as roughage to help peristalsis in the gut. This suggests that candidates should be encouraged to read questions carefully. The question required an appreciation that cellulose is made from glucose which is used in respiration and could help to increase cattle growth or milk and meat production. A surprising number of candidates seem to think that cellulose has a role in immunity.

(g) Many candidates appreciated that producing transgenic hearts would increase availability for transplantation which would save lives, and also that the transgenic hearts are less likely to be rejected by the host. This

question discriminated well with the better candidates making reference to at least three of these points and the weaker candidates only referring to one or none.

## Question 2

(a) Many candidates failed to attempt this question. An answer within the range of 120 to 136 was awarded both marks. Candidates gained one mark for providing an answer within the range of 60 to 68, but to get the second mark they needed to multiply by 2 to take into account the fact that the leaf has two surfaces. Any indication of a wrong number being multiplied by 2 in the working was credited with one mark.

(b) Very few candidates calculated the correct answer of 0.00138. Most candidates scored one mark for the answer 0.03. These candidates had divided 0.2 by 6 but then failed to divide by 24.

(c) The examiners were looking for some indication of surface of leaf covered, or the place where the jelly had been applied. Answers that simply stated the amount of jelly were not credited. Many candidates are aware of what a variable is, but they are not able to recognise which is the independent. Dependent and controlled variables were named in abundance.

(d) The examiners credited the word mass or weight as being indicative of the dependent variable. A variety of wrong answers were noted with the most common being 'time'.

(e) Students tended to do better on this question. Temperature was the most popular correct answer, closely followed by light or species of leaf. Surface area, leaf size and mass loss were the most frequently stated incorrect answers.

(f) (i) The correct sequence of A, C, B and D was seldom seen indicating that candidates struggled to interpret the information they were given. Examiners were allowed to award one mark if the wrong order appeared in the table providing A was written before D or C was written before B.

(ii) A full explanation required candidates to make reference to stomata and the fact that they are not equally distributed on the upper and lower surfaces of the leaves. They were then expected to link this to how coverage by the jelly, effectively blocking stomata, would affect the loss in mass. Candidates struggled to gain full marks and many weak answers linked mass of jelly to mass loss.

## Question 3

(a) The vast majority of candidates were able to make sensible comments about the role of the temperature recorder and the cooling water jacket in order to gain full marks.

(b) Many excellent answers expressed the need to maintain an optimum temperature in order not to denature enzymes which would kill the microorganisms. Effectively this allows for maximum growth. There was no credit available for answers that wrote about what happens if the

temperature falls below the optimum but many candidates who did this went on to gain credit by writing about the consequences of raising the temperature above the optimum.

(c) Many gained two marks by making reference to the role of paddles in mixing oxygen, nutrients, microorganisms and heat. The biological benefit of this mixing was not often seen and when it was, it was poorly expressed.

(d) pH, oxygen and asepsis were the answers that gained credit for a named condition that needs to be kept controlled. Many gained credit for naming one of these conditions but then struggled to state why they needed to be controlled.

(e) The examiners were looking for the names of products that could be produced in 'this' type of fermenter such as insulin, penicillin or any named genetically modified product. Answers such as beer, cheese and yogurt were not credited.

#### **Question 4**

(a) (i) The correct answer of B was seen on many scripts with A being the most common incorrect response.

(ii) The correct answer of A was seen on many scripts with C being the most common incorrect response.

(iii) The correct answer of C was seen on many scripts with A being the most common incorrect response.

(b) (i) Zygote was the correct answer and was seen on many scripts. Common incorrect answers were embryo and fetus. There were also weak answers that simply described the process of fertilisation.

(ii) Mitosis was the correct answer and was seen on many scripts. The term meiosis was the most common incorrect term seen. Candidates need to be careful when spelling biological terms as the examiners are not allowed to credit words spelt incorrectly, for example, meitosis.

(iii) This question was surprisingly challenging for students. The correct answer required a tick in the box beside 'diploid with 46 chromosomes'. This was in evidence, but many candidates ticked this box and one other, or ticked a wrong box. This suggests that the terms haploid and diploid are not understood or that candidates cannot recall the number of chromosomes in a body cell.

(c) Many candidates were aware that diffusion of nutrients from the mother's blood takes place at the placenta. Further credit was given for a valid description of how the structure of the placenta is adapted to its function. Credit was also given if the umbilical cord was mentioned. The question discriminated very well with the better answers giving excellent descriptions and the weaker answers expressing confusion, often making general references to human reproduction.

## Question 5

(a) This proved to a challenging question and many candidates struggled to gain full marks. Common errors were to label the nucleiod as a nucleus, and to label the nucleiod or the plasmids as being made from RNA. Many of the components of eukaryotic cells were drawn and labelled but gained no credit.

(b) (i) This question required candidates to make a link between pH and the process of decomposition. Many appreciated that pH can affect the activity of enzymes and that these molecules are likely to be denatured if they are not at the optimum pH. The better answers were able to make this link, but the weaker answers described the process of decomposition, or discussed the effect of temperature, or stated that low pH would affect the rate and that high pH would affect the rate, offering no explanation. The examiners sensed that many candidates did not understand what pH is.

(ii) The better candidates fully appreciated that nitrate ions are essential for making amino acids and that amino acids are essential for making proteins. Weaker candidates made bland statements such as, 'nitrates provide plants with nutrients which help plants to grow'.

(iii) Weaker answers described events in the nitrogen cycle that add nitrates to the soil and also about what happens to nitrates after they get into the root cells of plants. A surprising number of answers stated that nitrates 'contain' amino acids and proteins. Candidates need to read questions carefully so that they answer what is actually asked. In this case, the examiners rewarded candidates who appreciated that active transport, an energy requiring process, is used to move nitrate ions against a concentration gradient into the root hair cells that have a large surface area to facilitate the uptake.

(c) (i) The correct answer, a cross on the coordinates of 100 kg per hectare and 8000 kg per hectare, was frequently seen, but there were many who put their cross elsewhere and therefore gained no credit. Those who drew a line to the correct coordinate were given a mark. About 20% of the candidates did not attempt to put a cross on the graph suggesting that they either did not read the question at all or that they did not understand the phrase 'limiting factor'.

(ii) The correct answer of 11.1% was seldom seen. One mark was available for noting the number 8000, 7200 or 800 in the working and this is where most candidates gained some credit. Clearly, candidates are able to select the right values but do not understand how to use them to calculate a percentage. Candidates who answer incorrectly and do not show their working fail to give themselves an opportunity to gain a mark.

(iii) The best answers noted that there is a source of nitrates already in soil that helps plants to grow. Weaker answers suggested that candidates had failed to read the question carefully and made general comments about what plants need to be able to grow or carry out photosynthesis, such as light and water. Many ignored commenting about nitrate ions and made reference to other ions being in the soil.

## Question 6

(a) This was a challenging question and only the best candidates scored full marks. The examiners rewarded candidates who appreciated that a larger volume of water would create a smaller surface area to volume ratio which would mean that any heat energy transferred to the water would be less likely to be lost. A smaller volume of water is more at risk of boiling and any additional energy transferred to boiling water is not going to be measured, thus leading to an inaccurate measurement. Those candidates who understood the question found it difficult to express their answers with clarity.

(b) Many answers were credited with both marks with the most common response making reference to insulating the apparatus to prevent heat loss.

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