



Examiners' Report/  
Principal Examiner Feedback

Summer 2013

International GCSE  
Biology (4BI0) Paper 2B

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

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## 4BIO 2B report

Q1 this year explored the use of micropropagation in modern day biology. All the questions were attempted by students showing that they were able to access the content of the comprehension. Most were able to name one of the bases found in DNA though the spellings were often rather disappointing. In part (b) many appreciated that sterilising kills bacteria that otherwise might cause disease or have a detrimental effect on the growth of the explants. Most students appreciated that amino acids are fundamental in the manufacture of proteins. There were a lot of answers that gained no credit because they simply rephrased the stem of the question stating that amino acids are needed for growth. Many students know that pathogens are disease causing microorganisms, but many lost credit by being too vague. For example, stating that pathogens are organisms that cause harm or illness is not sufficient. It was pleasing to note that most were able to suggest a meaningful definition of a sustainable energy source, with most using the phrase 'never runs out'. Some students wrote about the ecological benefits of sustainable energy sources but this was not credited. Answers to part (g) were pleasing with most answers making reference to leaching, soil erosion and global warming. Many had failed to read the question carefully and wrote about the consequences of habitat destruction and extinction.

Q2 examined student knowledge of the water cycle and the consequences of sewage pollution. In part (a), most students recalled condensation and precipitation as the correct responses to naming the stages. However, only the better students were able to offer an acceptable description of transpiration. A surprising number believe that transpiration is the runoff into rivers that flow to the sea, or the absorption of water by plant roots. Answers to part (b) were poor in their construction and tested the leniency of markers in awarding credit. Whilst it is clear that students know that sewage pollution kills fish because of oxygen depletion created by bacterial decomposition, the way in which they express this simple idea is often so convoluted that the marking points start to lose credibility. Marks were available to those students who also wrote about eutrophication as a possible consequence of sewage pollution.

Q3(a) examined knowledge of concepts that need to be understood in investigations. Many students appreciated that the independent variable is the one changed by the investigator and many deduced that the dependent variable in this investigation was the volume of water collected. Sadly, some failed to read the question carefully and wrote about the definition of the term 'dependent variable'. The vast majority appreciated that the mass of dry soil was the correct controlled variable in the investigation. The calculation was either done very well or created all sorts of difficulty for students. It is pleasing to note that students tend to show their working as examiners were instructed to look for the number 14 in the working of incorrect answers and if seen to award one mark. In this manner, many students scored one mark for the most common incorrect calculation which involved working out an average of the 7 results by adding together each of the 7 averages (including 100/14) and dividing the total by 7, giving an answer of 8.54.

It was pleasing to note that students are aware of what is meant by the term 'precise' with many appreciating that stop clock A can measure to the nearest  $1/100^{\text{th}}$  of a second. Merely stating that stop clock A was digital was not rewarded because the examiners were told to look for answers that showed an understanding of why being digital made a measuring device more precise. Part (b) of this question discriminated very well. The better students appreciated that sandy soil would hold less water and would also create anchorage problems. They also appreciated that active transport would be affected because waterlogged soil would contain less oxygen for root cell respiration. Weaker students wrote about osmosis, diffusion and concentration gradients in a way that showed little understanding.

Q4 was answered well by most students. Part (a) caused a few difficulties but most appreciated that being homozygous meant that there would be two of the same alleles present in the genotype. Choosing the correct genotypes in parts (a)(ii) and (b)(i) posed little difficulty and the correct answer of zero for the probability in part (b)(ii) was frequently seen. The correct answer of 22.8 million was often seen in (c)(i) but it was clear to examiners that many found this calculation a challenge. Common wrong answers were  $190\,000\,000 \times 12/315 = 7\,238\,095$  or  $12/100 \times 315 = 37.8$ . Again, markers were instructed to award one mark for an incorrect answer providing they could see the numbers 12 or 0.12 somewhere in the working. The final part of this question posed difficulty to many who made reference to the genotype of lactose intolerant people failing to appreciate that the question examined their understanding of how sample size impacts on the confidence that can be had with data.

For Q5 the better students are fully aware that excretion involves the removal of metabolic waste from the human body and gained full marks. Many gave named metabolic waste products and many confused excretion with egestion. Most appreciated that the labelled part A in the diagram of a skin section was a sweat gland. Marks were given for appreciating that released sweat will help the body lose heat when it evaporates. Weaker students struggled to interpret the diagram and wrote about part A as if it were a hair follicle or a receptor. Most recognised part B in the diagram and the best students gained all three marks by discussing the role of vasodilation allowing more blood to reach the skin surface and how this would help in cooling the body. Weaker students believed that the blood vessels move closer to the skin surface. Part (c) examined knowledge about the role of insulin. Students are encouraged to be precise with their language. Marks were given if students stated clearly that insulin reduces blood glucose by converting it to glycogen which is stored in the liver. Correct spelling of glycogen was essential as there were many answers where the term glucagon was used and examiners needed to be confident that the students knew the difference. The role of ADH in osmoregulation is well known by students. Marks were awarded for appreciating that ADH increases the permeability of the collecting duct so water can be reabsorbed into the blood.

Q6 *Lactobacillus* was correctly seen on the majority of scripts as the name of the organism used to make yogurt. The names bacteria and yeast were the most common wrong answers.

In part (b) most students appreciated that heating the milk to such a high temperature is important to kill bacteria to prevent competition or contamination. The need to cool the milk to avoid killing the added *Lactobacillus* was understood by the better students who also appreciated that the cooler 'optimum' temperature would not denature enzymes. Part (c) required students to appreciate that it takes time for bacteria to grow and produce lactic acid, and that a warm place would provide the optimum temperature for the enzymes involved. In part (c) it was clear that students struggle to express their understanding of pH with many writing that the pH would increase and make the yoghurt more acidic. The impact of low pH on the growth of bacteria was understood only by better students.

## Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>

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