Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel International GCSE in Biology (4BI0) Paper 2B

Pearson Edexcel Certificate GCSE Biology (KBI0) Paper 2B

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Q1 This series, the comprehension was based on the topic of omega-3.

Part (a) examined understanding of how excess dietary lipids increase the risk of heart disease. The better candidates were able to explain that narrowing of arteries reduces the supply of oxygen to heart cells which affects their respiration. Marks were lost if candidates stated that capillaries or veins can be blocked by lipid, or that the decreased supply of oxygen was to the body rather than the heart itself. It was pleasing to see good understanding of aerobic and anaerobic respiration.

In part (b), most were able to name two small, soluble molecules needed in a balance diet. As understanding of size and solubility were being tested, no credit was given for large insoluble molecules or water. Candidates needed to name vitamins or minerals to gain credit. In questions like this candidates are encouraged to avoid generic terms such as carbohydrates or sugar.

A total of 86% of candidates appreciated that lipid is a useful source of energy and that it has a function in insulation and protection. Some candidates went beyond the scope of the specification, but still gained credit, by commenting on cell membrane structure and the myelin sheath. A total of 80% of candidates recalled that glycerol forms the other component of a lipid.

Part (d) demanded the drawing of a food chain that included anchovies. A pleasing number of candidates appreciated that the anchovies fed on plankton and in turn were fed on by salmon. The mark scheme allowed microscopic plants or *Camelina* as alternative named producers, and bigger fish as an alternative name for the secondary consumer. Correct food chains that began with the Sun, or ended with humans, could still gain full credit. A small number of candidates lost credit by placing their arrows incorrectly. It is not necessary to draw the organisms in the food chain, but many delightful sketches did make the examiners smile.

Part (e) challenged most students and discriminated very well with only about half gaining both marks. The better candidates appreciated that overfishing reduces wild fish stocks and that the wild fish are caught in large numbers to feed the human population or to feed fish on fish farms. Credit was also given if candidates commented on the fact that immature fish are often caught resulting in less reproduction to replace those caught. Answers that simply stated there are more fish farms were not credited as this could imply that more fish are available.

Part (f) tested understanding of energy transfer in an unusual context. Candidates that were familiar with the concept of a pyramid of biomass were able to state that energy is lost at each stage and gave rewardable reasons for this energy loss such as respiration, egestion, excretion and the inedible nature of some foods. Candidates lost credit for confusing these reasons. For example, stating that energy is lost by excreting faeces would not gain both marks.

Weaker candidates wrote irrelevant information about the small size of anchovies and the larger size of salmon.

Part (g)(i) required an explanation of how enzymes are involved in genetic modification. To gain the marks candidates had to name restriction and ligase as the enzymes and then to make it clear that the former cuts DNA and the latter joins DNA. Examiners did not give credit if the names of the enzymes were incorrectly spelt, restrictive and lipase being the common culprits. In part (g)(ii), candidates needed to name a vector and then describe its role. The most common correct names were plasmid and virus. Examiners only gave a second mark if it was clear that the vector transferred DNA into a cell or into an organism.

Q2 This question tested understanding of eye structure and experimental design.

In part (a)(i), credit was given for explaining that the circular muscles in the iris would contract to decrease the diameter of the pupil. Weaker candidates struggled to name the iris, and confused radial and circular muscles. Part (a)(ii) was answered well with most appreciating that the optic nerve sends impulses to the brain. The examiners did not credit the idea of sending information, signals or messages.

Part (b)(i) rewarded candidates who appreciated that less light would stimulate the cells in the retina. Weaker candidates simply stated that vision would be blurry but offered no explanation. These candidates would benefit from being helped to understand the meaning of the command word ‘explain’. The calculation in part (b)(ii) was well answered and had a generous list of acceptable versions of the calculation. If an incorrect answer was given, examiners were allowed to award one mark for a range of acceptable ideas such as multiplying by 0.47 or by 0.172.

Part (c) examined ideas of experimental design based on an investigation using the drug lanosterol. In Part (c)(i), many gained credit for appreciating that the empirical evidence showed that cataracts were cured and the better candidates quantified their answer. Credit was also given for appreciating that both rats and humans have similar eyes. In part (c)(ii), credit was given for appreciating that the investigation did not have a control, was not carried out on humans, that only a small number of rats had been used and that not all of these rats were cured.

Q3 This question tested understanding of plant seeds.

About 27% struggled to name the anther as the structure containing pollen. No credit was given if several names were offered in a list. The only exception to this ruling was stamens and anther. Part (a)(ii) challenged students to explain how a seed that is underground manages to grow until its shoot appears above ground. Only the best candidates were able to name a large insoluble food molecule found in a seed that would be digested by enzymes to release a

respiratory substrate. Most answers lacked detail often only referring to a food store. Additional credit was given to students who recognised that water or mineral ions would be absorbed from the soil to help the seedling on its tortuous journey.

In part (b)(i), most were able to describe that a root or a shoot would be seen if a seed had germinated, or that the seed coat would be split. Part (b)(ii) discriminated well. Most identified group B as the set of seeds likely to geminate first. Thereafter, credit was only given if an explanation of the role of each abiotic factor was forthcoming. Again, candidates need to be aware of the meaning of the command word 'explain'.

Q4 This question tested knowledge and understanding of blood components.

Part (a) was well answered by most candidates. Weaker students struggled to provide an acceptable function of platelets, or to name the plasma as the medium in which vitamins and minerals are transported. Part (b) was much more challenging and only the better candidates scored full marks. These students recalled that memory cells are involved in the secondary immune response where they recognise the pathogenic antigen and enable a quicker release of a large quantity of antibodies.

Q5 This question tested understanding of the role of the skin in the control of body temperature.

In part (a), most recalled that homeostasis is the process that maintains a constant internal environment.

In part (b)(i), credit was given for understanding that the sweat produced would evaporate allowing cooling to take place. Weaker candidates failed to appreciate that the sweat gland was labelled in the diagram, and some thought it was a follicle. Part (b)(ii) was more challenging and discriminating. The examiners rewarded those who named the blood vessel as an arteriole, or a small artery, and explained how vasodilation would allow more blood to the skin surface where heat loss by radiation or convection would take place. Many candidates incorrectly think that capillaries vasodilate and that they physically move closer to the skin surface.

In part (c), most were able to name osmoregulation as the process that controls the water content of the blood and the kidney as the organ that is involved.

Q6 This question tested understanding of transgenic animals.

Many struggled to provide an acceptable definition in part (a). The examiners gave credit for the idea that a transgenic organism contains DNA from a different species. Stating that they contain DNA from a different organism only gained one mark.

Part (b)(i) provided an array of entertaining answers and showed that only the better candidates were aware of the potential use of transgenic animals. The examiners accepted ideas based on the production of organs, human proteins or other useful products such as spider silk form goat milk. Many lost credit by giving an example that involved bacteria rather than an animal. Weaker candidates gave examples from selective breeding or genetically modified plants.

Part (b)(ii) asked candidates to explain the benefits of cloning a transgenic animal. The examiners concentrated their marking on two main ideas: that of producing genetically identical animals and saving the need to carry out the process of genetic modification to obtain the valued characteristic.

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