

Examiners' Report/  
Principal Examiner Feedback

Summer 2014

Pearson Edexcel International GCSE  
in Biology (4BI0) Paper 1BR

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## **Principal Examiner's Report June 2014 International GCSE Biology – 4BIO 1BR**

### **Question 1**

Part 1(a) was a gentle introduction to the paper and most candidates appreciated that the cytoplasm and the vacuole are the parts in a cell where most water is found. Some candidates misread the question and mentioned the roots or xylem. Candidates struggled to draw acceptable root hair cells that were correctly labelled. Many drew whole plants, labelling where the root hair cells would be found. One mark was given for a correct shape and the other three marks were available for any correctly labelled components. One mark was deducted if a chloroplast was drawn and labelled. Many cells had a single line as the outermost part and marks were not given if this line was labelled cell membrane or cell wall. Many appreciated that the hair-like extension provides a large surface area for absorption of water by osmosis through the permeable membrane.

In part (c) (i), many candidates were aware that magnesium ions are essential for chlorophyll production. Chloroplast production was also accepted. In (c) (ii) the majority discussed the manufacture of amino acids and proteins for growth.

### **Question 2**

This question examined some of the principles involved with fish farming. Part (a) (i) was well-answered with most candidates appreciating that the presence of fish would be an attractive stimulus for bird predators. Most discussed the use of nets as a deterrent, though the use of scarecrows and the shooting of birds were also seen quite often. In part (a) (ii), many candidates appreciated that fish egestion and excretion, or the decomposition of any uneaten food would increase the mineral ion content to the extent that eutrophication would occur. Answers that discussed the leaching of fertilisers were also credited. Worthy solutions to these problems were seen in abundance. In Part (a) (ii), the examiners were looking for answers that showed an appreciation that overcrowding increased the likelihood of bacteria spreading or that the fish lack the genes needed to make them resistant. Again, valid solutions to these causes were often noted.

Part (b) was more challenging with those who gained both marks often commenting on the ability to select the species of fish and the ability to harvest fish at all times. It was pleasing to note that many candidates were also aware that fish farming has the potential to reduce overfishing at sea.

### Question 3

This question examined basic understanding of the digestive system and diet. Part (a) discriminated between candidates who had a good grasp of events within the digestive system and those who were less assured. In part (a) (i) candidates needed to use both letters A and G only to gain the mark. One letter was not sufficient. In (a) (ii) only the solitary letter of D was rewarded, and in part (a) (iii), the letters B and F only needed to be seen to gain the mark.

There were many excellent responses in part (b) showing that candidates have a good understanding of how the structure of the small intestine is adapted for absorbing digested food. Many candidates wasted valuable time by discussing irrelevant events that take place throughout the digestive system. It was pleasing to note in part (c) (i) that many candidates appreciated the importance of vitamin C in the diet and that fibre is important in peristalsis. It was equally pleasing to note that many answers in part (c) (ii) showed that candidates are aware of the health issues that may arise from a diet containing too much fat. Some candidates lose credit by being too imprecise with their answers. For example, stating that blood vessels are blocked gained no credit, but stating that arteries are blocked was rewarded.

#### Question 4

This question examined understanding of photosynthesis using a described practical. Most candidates failed to appreciate that the plastic bag would prevent the release of carbon dioxide produced by microbial respiration into the glass containers. Whilst it is also true that they also prevent evaporation of water from the soil, a common response, this idea was not credited bearing in mind the context of the described practical. Answers to part (a) (ii) showed that many candidates have an excellent understanding of the need for a control to enable a valid comparison to be made. Weaker candidates made reference to the idea of a fair test or reliability, clearly not understanding these concepts. Light and temperature were the most common correct responses to part (a) (iii). Plant species and time were not credited as they appear in the stem of the question.

Part (b) (i) exposed those candidates who had little knowledge of how to test leaves for the presence of starch. That said, many recalled the need to boil in ethanol to remove chlorophyll (some failed to state that the ethanol needs to be hot) and that iodine is needed to test for starch.

Many candidates were aware in part (b) (ii) that the enzyme that digests starch would be denatured when boiling the leaf in water. Sadly, there are still many who incorrectly make reference to enzymes being killed. The simple request to define the term 'diffusion' seemed accessible to most though there are a surprising number of candidates who struggle to express their knowledge succinctly. A range of colours were offered as answers to part (b) (iv) and the examiners were instructed to accept yellow, brown, orange or combinations of these colours as the expected result for the leaf from container A and blue, black or blue black for the expected result for the leaf from container B.

#### Question 5

This question examined the ability to interpret a family pedigree and how sex is inherited. Part (a) proved to discriminate between candidates with many answers reflecting the number of shaded and non-shaded symbols as opposed to understanding the meaning of the genetic terms listed in the table. Most candidates were able to identify that there are two females with Huntington's disease in the family pedigree and that there are four heterozygous individuals. However, many found it difficult to appreciate that eleven individuals are homozygous recessive and no individuals are homozygous dominant.

Only the better candidates gained full marks in part (b) by giving clear explanations using clear diagrams. The examiners needed to see stated evidence that parent A was XY and parent B was XX, a clear indication of the correct gametes and that the offspring genotypes were half XY and half XX. Candidates also needed to show that XY denotes a male and that XX denotes a female. Weaker candidates failed to use the correct symbols for sex inheritance and were restricted to a maximum of one mark providing it was clear that the gametes and the offspring were correct for the parental cross they had chosen.

## Question 6

This question examined methods used to reproduce cattle with desirable characteristics. Part (a) expected candidates to demonstrate how their knowledge of selective breeding could be used to describe how high milk yielding cattle could be produced. Most answers showed excellent understanding of the importance of selecting and breeding cattle that are high yielding to produce high yielding offspring that are then used to continue this process.

In part (b) candidates were introduced to the process of embryo cloning. The fact that the uterus is where embryos develop is known by most candidates. Part (b) (ii) allowed candidates to consider the possible advantages of embryo cloning compared to selective breeding. Most appreciated that embryo cloning would produce genetically identical offspring and could be a faster process to produce large numbers of high yielding cows, with no possibility of producing males. It was pleasing to note that the meaning of the term 'clone' and the name 'mitosis' as the cell division responsible for producing an embryo was known by most candidates.

## Question 7

Part (a) of this question examined understanding of the stages in the carbon cycle, a task that candidates often find challenging. Common errors were to think that stage B or stage C could be decomposition. Candidates who knew what the word 'carbohydrate' meant did well in part (b) (i), but it is clear that weaker candidates have little understanding that carbohydrates found in plants include starch, glucose, sucrose, fructose and cellulose. Only the weaker candidates struggled to name DNA in part (ii).

Answers to part (c) ranged from the sublime to the ridiculous. Many candidates wrote about the ozone layer which is puzzling and weaker candidates discussed the effect of heat on enzymes. The best candidates noted that carbon dioxide is a greenhouse gas which traps heat in the atmosphere resulting in melting of ice caps, habitat destruction, possible species extinction, migration and climate change.

## Question 8

Most candidates excelled in part (a) showing good understanding of levels of organisation. The errors seen were usually when candidates thought that a leaf or a bulb is an organelle, or that a bulb is a system. Part (b) was also well answered. The most common errors were to think red blood cells are bigger than white blood cells or thinking that the liver is smaller than a kidney.

## Question 9

This question examined understanding of osmosis. Most candidates were able to define the term 'osmosis' though care needs to be taken when describing the direction in which water molecules move when passing through a selectively permeable membrane. The graph challenged many candidates to use the grid provided sensibly. A mark was deducted if the scale for the volume of the solution in the cup after 12 hours was not truncated. Marks were also lost if the independent and dependent variables were not on the correct axes or were not correctly labelled. Some candidates draw scruffy lines to join the points and lose credit but most were able to plot the points correctly. The answer of 0.28 in part (ii) was seldom seen. If 0.28 was not written, examiners were instructed to look at the candidate graph and award a different answer if reading from the graph was acceptable. The most common incorrect answer was 0.6. Part (iii) was well-answered with most putting a tick in box 3, 4, 5 and 6.

In part (c) (i), most candidates were able to name 'concentration of glucose' as the independent variable. In part (ii), most were able to name an acceptable controlled variable with reference to the shape of the potato and temperature being the most common correct answers. In part (iii), a pleasing number of candidates appreciated that any water left on the chips or left in the cups would produce an inaccurate measure of the volume. Evaporative water loss and ideas that expressed parallel error were also common correct responses. Part (iv), was correctly answered by most candidates with a measuring cylinder being named most often.

## Question 10

This question examined understanding of plant sexual reproduction. Part (a) challenged most candidates. Though most appreciated that sexual reproduction generates genetic variation, few appreciated the role of meiosis and random fertilisation.

Answers to part (b) demonstrated that candidates have excellent knowledge of the structure of wind-pollinated flowers. Part (c) was more challenging, but the better candidates appreciated that pollen from wind-pollinated flowers is airborne, lighter and more abundant when compared to pollen from insect-pollinated flowers. Most appreciated that pollen is released at certain times of the year and that coincides with symptoms of hay fever. Weaker candidates misinterpreted part (iii) and wrote about protein digestion rather than the role of white blood cells in providing an immune response.

### **Question 11**

Naming consumers in a given food chain posed little difficulty to most candidates and many were able to suggest that having large ears would help in hearing the approach of prey or predators. Heat loss was also credited. To gain credit in (b) (ii) answers had to include reference to the idea of camouflage, and in part (iii) credit was given for answers that gave sensible advantages of being able to stand such as seeing further or climbing trees. To gain both marks in part (c) candidates needed to mention the term 'photosynthesis' in context and to make it clear that there would be an increase in atmospheric carbon dioxide and a decrease in atmospheric oxygen. Answers that stated that carbon dioxide is converted to oxygen were not credited for this marking point.

### **Question 12**

This question examined the ability to design an investigation to find out the effect of statins on blood cholesterol levels. It was clear that this task challenged students, no doubt as the investigation involves an unfamiliar context. There was a variety of acceptable methods described but the most common approach was to select two groups of people of the same phenotype and to administer statins to one group and a placebo to the other group. The blood cholesterol levels were measured before and after drug administration and abiotic factors such as diet and exercise were controlled during the investigation. Those candidates who adopted a laboratory based investigation using blood samples in test tubes to which statins were added or not added were not prevented from gaining full marks as examiners applied the principles of the CORMS method of marking to any novel approach.



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