



Examiners' Report

Principal Examiner Feedback

Summer 2018

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

**Pearson Edexcel International GCSE
in Science Double Award (4SC0) Paper 1BR**

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Examiner Report International GCSE Biology 4BI0 1BR

Q1 This question tested knowledge and understanding of an African food web.

Defining the term ecosystem posed difficulty with many giving the definition of a population or a community and failing to mention interaction with physical factors in the environment. The better candidates appreciated that an ecosystem involves the interaction between living organisms and physical environmental factors. Most were able to identify the three producers in the food web and to note that the lion occupies the secondary consumer trophic level. Some misread the question and simply wrote the number 3 as their answer. Many were also able to name either the baboon or the leopard as an organism that occurs at two different trophic levels. Part (a)(v) challenged candidates. Marks were only credited if the food chain contained the baboon. Two marks were given to the food chain that had four organisms, contained the baboon and began with grass as the producer. The examiners were allowed to give one mark for a food chain with five or six organisms as long as the food chain began with grass and contained the baboon.

It was pleasing to note that in part (b) many candidates appreciated that not all energy is transferred in food chains, and many candidates gave reasons for this such as respiration, movement, uneaten, undigested and excretion.

A common error was for candidates to state that faeces is excreted – candidates should remember that egestion and excretion are very different processes. In part (b), a significant number of candidates misinterpreted the question and described how the number of organisms and requirements for energy would differ at each trophic level.

Q2 This question tested knowledge and understanding of blood vessels.

Part (a) was well answered. The most common errors were to name the heart being supplied by the pulmonary artery and the intestine being supplied by the hepatic portal vein.

Part (b)(i) was more challenging, but many candidates appreciated that it would take more mass to break an artery when compared to a vein. Marks were awarded for appreciating that the reason for this is that arteries have thicker walls which contain muscle and elastic tissue. In part (b)(ii), candidates who understood the meaning of the term 'reliable' understood that the investigation needed to be repeated. In part (b)(iii), candidates who understood the meaning of the term 'accurate' understood that the modification needed was to use smaller increments of mass. Many candidates confused parts (ii) and (iii).

Some candidates did not refer to the artery or vein in part (b)(i), so that it was not clear which type of blood vessel had a thicker or thinner wall. A few candidates thought that arteries had a wider lumen than veins.

Q3 This question tested knowledge and understanding of protein digestion, plant cell organelles and surface area to volume ratio.

Most candidates were able to gain several marks for part (a). Examiners rewarded answers that indicated that protein is digested by lipase into amino acids and that hydrochloric acid helps to provide the optimum pH. Some candidates believe amylase and lipase have a role in protein digestion. Only the better candidates made reference to the role of hydrochloric acid providing the optimum pH for pepsin.

Part (b) was well answered, though some struggled to recognise that C was starch, despite a big clue in the stem of the question.

Many candidates were able to give the correct surface area, volume and surface area to volume ratio of chip C. Examiners allowed the correct calculation of surface area to volume ratio from incorrect values for surface area and volume. So, a candidate who wrote 12 for surface area and 6 for volume could gain one mark if they calculated the ratio as 2:1. A candidate who wrote 48 for surface area and 8 for volume could gain two marks if the calculation of the ratio was 6:1.

In part (c)(ii), many deduced that chip C would be the healthiest to eat as it has the smallest surface area and therefore less lipid on its surface. Those who chose the wrong chip could still gain credit for Mps 2 and 3.

A few candidates confused this question with the role of bile in fat digestion and suggested that chip A would be most healthy as its higher surface area: volume ratio would lead to faster digestion of lipids.

Q4 This question tested knowledge and understanding photosynthesis and bacteria.

In part (a), credit was given to those candidates who appreciated that photosynthesis is affected by the colour of light and that the process produces oxygen. To gain marks it had to be clear that photosynthesis was involved. As such, answers that mentioned bacteria being attracted to blue light, or growing less in green light, or reproducing more in blue light gained no credit.

A surprising number suggested that photosynthesis would be faster in green light, some suggested that the bacteria were attracted by different light colours and did not make the link to oxygen production.

In part (b), credit was given for appreciating that bacteria move and respire. Credit was also given for stating the technical terms respond or sensitivity, not just a description. Most candidates linked the idea in the stem of the question that bacteria need oxygen to survive to the idea of respiration. Many interpreted the information in the diagram to suggest that bacteria reproduce, a response that was not credited.

Part (c) was generally very well answered with many correct structures suggested but a surprising number of candidates believe that bacteria contain a nucleus.

Q5 This question tested knowledge and understanding of the male reproductive system.

Most were able to identify T as the bladder and U as the sperm duct. Similarly, most named urine and semen as the liquids transported in the urethra. Many lost credit by naming sperm as a liquid. In part (c), most gained at least one mark for noting that the testis produces sperm. Better candidates also noted the production of testosterone and the development of male secondary sexual characteristics.

A few suggested gall bladder for structure T and others stated that urea is the liquid passed along the urethra.

Q6 This question tested knowledge and understanding of reproduction and genetics.

Part (a) was done well by most candidates. Common errors were to name progesterone as the hormone that stimulates repair of the uterus lining and to name meiosis as the cell division that produces the embryo.

Part (b)(i) was well answered with most correctly identifying the genotype of the parents and then drawing the correct phenotypes of the possible offspring. Those who failed to draw the phenotypes could still gain credit if they wrote a description of the phenotypes. Incorrect parent genotypes resulted in no marks. Most candidates gave the correct possible genotypes in part (b)(ii) and also the correct probability in (b)(iii).

Q7 This question tested knowledge and understanding of farming practices on the yield of wheat.

Part (a) required candidates to plot a graph from a table of data. Some candidates found this to be quite a challenge and struggled to produce graphs that made any sense. The examiners credited S as being linear and that the scale used would mean that any bars subsequently drawn would exceed half the grid. This posed difficulty for many. The L mark was given for bars that had been drawn neatly. This mark was available even if the wrong data had been plotted. Candidates are encouraged to avoid drawing lines freehand and to use a ruler. The A mark was given if an axis had been labelled 'yield of wheat'. The weaker candidates tended to hedge their bets and label the same axis twice with different instructions. There were two marks available for K this series. K1 was for any indication of the mass of nitrate using the numbers 0, 30 and 60. K2 was for any indication of seed density using the numbers 200 and 400. Those who

interpreted the table of data correctly tended to gain full marks, but many struggled with the data and their graphs suffered as a consequence.

Part (b) was made more challenging by insisting on the use of numbers that represented the mass of nitrate fertiliser in the description. As such, an answer that stated that an increase in nitrate fertiliser increased the yield and then decreased the yield gained no credit. The examiners rewarded candidates for writing that the increase in yield occurred up to 30 kg, was at its highest at 30 kg and then decreased from 30 to 60 kg. Candidates are encouraged to use detail in their answers. Only very strong candidates obtained all three marks as few noted that peak growth was at 30 kg. A few candidates carried out the wrong comparison, instead comparing the effect of seed number.

Part (c) was well answered. Most candidates appreciated that the greater seed density produced a lower yield and the better candidates explained this was due to competition for a named factor. Weaker candidates tend to use unacceptable terms for the named factor, such as food or nutrients.

Q8 This question tested knowledge and understanding of fish farming and the ability to design an investigation.

Part (a) tested knowledge of the term intraspecific. Many candidates gave excellent, but incorrect, responses that described interspecific predation. The examiners rewarded candidates who appreciated that fish of different size, age or gender need to be separated, or that provision of sufficient food could reduce the problem.

In part (b) the examiners gave credit for two advantages: the prevention of disease or infection and the consequent increase in fish yield. Candidates who use casual language such as keep fish healthy or prevent fish becoming ill gain no credit. Candidates are encouraged to use technical biological terms at all times. The examiners also gave credit for two disadvantages: the development of antibiotic resistance in bacteria and the fact that antibiotic, or antibiotic resistant bacteria, could enter the human body. Many candidates wrongly believe that the fish become antibiotic resistant. Candidates who believe that bacteria become immune rather than resistant lost this Mp.

Part (c) required candidates to design an investigation to find out the effect of fish faeces on fish growth. There were many excellent answers showing that candidates can demonstrate an understanding of experimental design. The C mark was only awarded if it was clear that a range of faeces had been used. Candidates who merely stated they would use a clean tank and an unclean tank lost this mark. Most appreciated that the O mark required use of the same species of fish and most gained the R mark by making a sensible reference to the need to repeat their investigation. Weaker candidates lost the M1 mark by simply stating they would measure the size or growth of the fish. The examiners insisted on measuring the mass, weight or length of the fish. M2 was awarded if the candidates had stated a time period before measuring the fish. S1 was given

for controlling the food supply and S2 was given for controlling an abiotic factor that could affect fish growth.

Q9 This question tested knowledge and understanding of leaf structure and function.

Most candidates appreciated that the waxy cuticle prevent loss of water from a leaf, vital for turgidity in leaves. Naming the cells in the leaf section posed few problems for most candidates.

Part (b)(i) was more challenging. Marks were available for the name stomata or stoma, and for explaining that these pores open in the light to allow carbon dioxide to enter the leaf and oxygen to exit the leaf. Credit was also available for appreciating that their closure at night prevented water loss by transpiration. Common errors included failing to link opening or closing with light or dark and stating the direction of carbon dioxide or oxygen diffusion incorrectly.

In part (b)(ii), candidates needed to identify the tissue as xylem. Those who wrote xylem and phloem gained no credit for mp1. Many appreciated that the transport of water and mineral ions occurs in the xylem and that these substances are taken to the leaves. The most common error was reference to the tissue as phloem and then to describe the role of this tissue. Reference to tissue E as phloem negated Mp1 but the other Mps were allowed as independent ideas.

Q10 This question tested knowledge and understanding of the carbon cycle and the ecological consequence of raised atmospheric carbon dioxide levels.

In part (a)(i), the vast majority of candidates identified the carbon cycle. Identifying the processes in (a)(ii) was more challenging, but most deduced that X represented combustion or burning, Y represented respiration and that Z represented photosynthesis. Answers to part (b) demonstrated excellent understanding of the consequences of raising the carbon dioxide levels in the atmosphere and in water. The most common correct responses included rising sea levels, habitat destruction, migration, extinction and climate change. Some candidates also wrote about sulfur dioxide and acid rain but these ideas were not credited.

Unfortunately, some candidates did not appreciate that the question was about the effects of raised carbon dioxide and discussed the effects of carbon monoxide and / or acid rain.

Q11 This question tested knowledge and understanding experiment design relating to the digestion of lipid by lipase.

Most candidates in part (a)(i) correctly identified the independent variable in the investigation as temperature. In part (a)(ii) candidates had to use the term

volume rather than amount or concentration to gain credit. This question required careful reading of the given method, where the answers to this question were evident. To gain credit for (a)(iii), the answer had to show that stirring the contents enabled the lipase to mix with the lipid in the milk. Weaker candidates merely stated that stirring the contents would mix the contents, an answer that was not credited.

The marks available for part (b) required candidates to appreciate that the indicator changes colour because lipid is digested by lipase and that the fatty acids produced lower the pH. Most candidates gained at least two marks but the weaker candidates believed that the colour change was because lipase is alkaline.

Part (c)(i) required candidates to sketch a graph to show the expected results of the investigation. Those who understood, and had carefully looked at the labelling of the axes, gained both marks for a U-shaped sketch. If they drew a line going downwards they gained one mark. Failure to do this meant no marks were credited. In part (c)(ii), four marks were available but one mark had to be for making a correct link between temperature and the time taken for the indicator to change colour. Thereafter, three marks were available for mentioning kinetic energy, frequency of collisions, enzyme denaturation, the active site changing shape and the ability of the substrate to bind.

Part (d) required candidates to refer to the emulsification of lipid to produce small droplets or an increased surface area, as well as providing an optimum pH by neutralising stomach acid. Weaker candidates often believe that bile digests lipid into fatty acids and glycerol.

Q12 This question tested knowledge and understanding of the response of plants and animals to light.

Most candidates appreciated that the type of response shown by plant B is positive phototropism. Similarly most appreciated that this response enables plants to gain light for photosynthesis. Part (c)(iii) produced a variety of methods to ensure that the plants are exposed to unilateral light. The most common method involved the use of a box with a slit on one side to allow light to enter.

Part (b) challenged many candidates. The examiners rewarded the fact that animal responses to light are fast, lasting for a short duration, and involve nerve impulses and the eyes. The mark scheme allowed acceptable converses to these ideas if candidates made reference to plant responses.

