



# **Examiners' Report**

## **Principal Examiner Feedback**

**Summer 2018**

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

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## Examiner Report International GCSE Biology 4BIO 2B

Q1 The comprehension this series tested understanding of desert plant biology.

Part (a) required candidates to explain the adaptation of having few or no leaves helps cacti reduce water loss. The examiners gave credit to candidates who appreciated that a reduced surface area would mean fewer stomata and less transpiration. Most candidates made reference to transpiration and the more able made a link to stomata or surface area. However, it was noted that some candidates wrongly believe that water loss from leaves is due to osmosis.

Part (b) required candidates to link length of root to depth. Answers that only made reference to covering large areas of desert, or that roots absorb water and mineral ions were not credited.

In part (c)(i), the examiners credited candidates who appreciated that there would be less photosynthesis because less light would be absorbed with fewer chloroplasts, and also that less carbon dioxide would be absorbed. Part (c)(ii) was more challenging, but many candidates made reference to the presence of chloroplasts in the stems of desert plants, or the fact that light and temperature are unlikely to be limiting in the desert.

In part (d), only the better candidates were able to make the link between rain and germination. The most common correct responses made reference to the activation of enzymes, or the softening of the seed coat. Those who mentioned enzymes struggled to describe their role in digestion of a named food store and the consequent production of a substrate for respiration. Candidates tended to write answers that lack specificity such as 'water is needed for enzymes' or water 'makes enzymes start working'. Similarly, many wrote that enzymes 'breakdown food stores' rather than the digestion of starch or lipid.

Most were able to recall two conditions needed for germination but some gave water as an answer which was not credited.

To gain credit in part (e), candidates needed to make it clear that the water from rain is only available for a short period of time, which posed difficulty for many. Answers that made reference to the frequency of rain were not credited.

In part (f), most appreciated that bulbs reproduce asexually but only the better candidates discussed the advantage of this type of reproduction in the context of living in a desert. Answers that discussed generic ideas relating to asexual reproduction were not credited. The examiners rewarded those who appreciated that desert plants need to survive periods of drought and that the desert makes pollination problematic. A few named runners as another example of asexual reproduction, but many named organs involved with sexual reproduction or even an organ found in the human body.

Q2 This question tested knowledge and understanding of sewage pollution.

To gain credit in part (a) candidates needed to mention faeces in their answer. Some candidates use inappropriate terms to describe faeces such as 'poo'. These terms do not gain credit and ought to be discouraged. In part (b), credit was given to answers that mentioned respiration by bacteria depleting oxygen to the extent that aquatic organisms die. Many candidates discussed the release of mineral ions causing eutrophication but still gained credit for the same ideas. Credit was not given if death of organisms was linked to poisoning of water or if respiration was by fish.

Q3 This question tested knowledge and understanding of genetic modification and the use of fermenters to grow GM organisms.

In part (a), many appreciated that pesticides kill pests and that this would prevent the plant being eaten which allows the plant to grow. Marks were lost by the use of language not conducive to this level of assessment. For example, 'pesticides make insects leave the plant alone'.

It was pleasing to note, in (b)(i), that many candidates are aware of the role of restriction enzyme, ligase enzyme and plasmids in genetic modification. Some confuse the enzymes and many failed to link restriction enzyme to the cutting of the gene for pyrethrin.

Part (b)(ii) challenged candidates because in order to gain marks they were required to link the names of fermenter components to their roles. Credit was given for mention of an air inlet to provide oxygen for respiration; an air filter to prevent entry of competing microorganisms; the addition of nutrients for growth, and more specifically glucose for respiration; paddles to mix the contents; a cooling jacket to remove heat; the addition of acid or alkali to control pH and the use of steam as a method of sterilisation.

Q4 This question tested knowledge and understanding of energy transfer between trophic levels and a practical to measure energy content in plants.

Most candidates were able to name two carbohydrates in plants that store energy, though some incorrectly opted for glycogen as one of the choices. Similarly, most candidates understood that the name given to the organisms at trophic level 3 is secondary consumers.

The calculation in (c)(i) was well answered. If the answer was incorrect, the examiners gave one mark in the working for  $21 \div 20 = 1.05$ . Candidates are encouraged to express their answers with a sensible number of significant figures, as failure to do so will reduce their score. Part (c)(ii) was well answered with many candidates gaining full marks.

Part (d) discriminated very well. Credit was given for stating the mass or volume of water placed in the boiling tube, holding a weighed burning plant sample beneath the boiling tube of water until complete combustion, measuring the

temperature of the water before and after burning and then quoting an acceptable formula to calculate energy content. Additional credit was available for the idea of repeating and calculating a mean. The examiners sensed that there was differing degrees of familiarity with this method of measuring energy content in a food sample.

A surprising number of candidates used the Bunsen burner to heat the water or placed the burning plant material into the boiling tube. Other common errors were to not state a mass or volume of water and to multiply by the mass of the plant in a formula rather than the mass of the water.

Q5 This question tested knowledge and understanding of a practical investigating the effect of light on photosynthesis.

Most were able to appreciate that tube C represented a control, but only the better students explained that it allows a comparison with the other tubes, or that it allows students to see if the indicator stays the same colour when a leaf is not present.

Part (a)(ii) was challenging. Credit was given to candidates who appreciated that temperature affects the rate of photosynthesis and that there is a need to see if it stays the same during the investigation. Candidates who wrote about the control of temperature lost credit because this is not possible using a thermometer. In part (a)(iii), most candidates recognised light as the independent variable.

Part (b) was well answered with many candidates appreciating that the red colour in tube A was the result of photosynthesis absorbing carbon dioxide, and that the yellow colour in tube B was the result of respiration producing carbon dioxide. However, some candidates are confused about the link between these processes and carbon dioxide levels. The weaker candidates believe that photosynthesis increases carbon dioxide in the air and that respiration decreases carbon dioxide in the air.

Part (c) produced a variety of approaches for which credit was available. The two most common methods involved counting bubbles of oxygen using a method describing how to vary the light intensity, or carrying out a starch test on leaves kept in light and darkness. The control of biotic and abiotic variables was also credited.

Q6 This question tested knowledge and understanding of the role of the skin in temperature regulation.

In part (a), most candidates recognised the sweat gland as A, a capillary or arteriole as B and a hair as C. Naming A as a sweat pore was not credited, nor was naming B as an artery or naming C as a hair cell.

There were many excellent accounts in part (b) demonstrating good understanding of the events that occur when entering a cold environment. Credit

was given for appreciating that there would be a reduction in heat loss because vasoconstriction reduces blood flow near the skin surface and also because contraction of erector muscles causes the hairs to erect and trap air. Many candidates believe that blood vessels move further away from the skin surface and reference to this incorrect biology lost credit.



