



General Certificate of Secondary Education

**Additional Science 4463 /
Biology 4411**

BLY2F Unit Biology 2

Report on the Examination

2012 examination – June series

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Additional Science / Biology
Foundation Tier BLY2F**General**

As usual a small number of students may have been better served by being entered for the Higher Tier examination. Around 500 such students achieved at least 40 of the 45 available marks. Schools are encouraged to take great care when entering students for a particular tier, to ensure that they are not disadvantaged by the entry policy. At the other end of the scale a smaller number of students scored very low marks and it might have been appropriate to consider the type of assessment they were entered for.

The vast majority of students made good attempts at the questions in the paper. Examiners report there being fewer blank spaces left than in previous examination sessions and there appeared to be a slight improvement in the legibility of handwriting. Despite this, some students insist on writing with pens that appear to be on the verge of running out of ink, so that writing is either very pale or has gaps within each word. Students who at the best of times have writing that is so poor as to make it virtually illegible would be helped where possible, by the use of a scribe.

The lack of a calculator meant that some students were disadvantaged in some questions, although the mathematical demand of the questions is not high, once the relevant calculation is chosen.

Students are reminded that in normal circumstances there should be plenty of space to write an answer on the printed lines. However, if they need to extend an answer significantly then they should use additional pages. Additions of up to a line can be added just below the final printed line of the answer space. Students who write answers in spare 'white space' on the same or facing page take the chance of these additions not being marked unless there is a clear indication of that continuation, in the normal answer space. This is because on-line markers only see a little more than the printed answer space for each question and only escalate responses to supervising examiners if there is an indication of such continuation.

Students appear to be much better at choosing one answer, when instructed, rather than two or more. However some students still choose only one when two are required. Examiners suspect that weaker students are inclined to omit reading vital directions such as these.

Question 1 (Low Demand)

- (a) (i)** The majority of students realised that the fungus contains many nuclei. Considering the range of possible answers, shown in the mark scheme, very few students failed to identify a common feature of the plant cells and the fungus.
- (a) (ii)** It appeared that many students had chosen their answer from part **(a)(i)**, based on the number who gave 'a cell membrane and a cell wall', when only one of these would have sufficed. The presence of 'a nucleus' or of 'many nuclei' was not awarded as this would not represent a common feature. Only the weakest students referred to the presence or absence of 'chloroplasts'.
- (b) (i)** Over half of the students selected the two conditions necessary to speed up decay, some though, only ticked one of the boxes, presumably through not reading the emboldened "two" in the question twice, or the mark allocation for the question part. A not uncommon combination of ticks from weaker students included opposites; thus 'warm' and 'cold' or 'dry' and 'moist' were selected, displaying either poor understanding of the terms or on the chance that one of these was likely to be correct.

- (b) (ii)** Many students appeared to answer a different question than had been asked. Had the question asked “what process do fungi carry out during decay” then at least as many students would have achieved the mark as gave the correct response. However, the question referred not to the decomposers themselves, but to the dead organisms, which ‘are digested’. Thus performance on this part was poor with only about one third of the responses being correct.

Question 2 (*Low Demand*)

- (a) (i)** Even those students who had forgotten to bring a calculator with them were able to calculate the total mass of carbon dioxide as almost all students gave the correct answer ‘129’.
- (a) (ii)** Proved to be a little more demanding, some students choosing to add the 120 to their answer in **(a)(i)**, while others having showed the necessary calculation, ‘129 – 120’, failed to get it right. Unfortunately the calculation was considered to be so straightforward that no marks were available for this. Those students who had arrived at the wrong answer in **(a)(i)** were not disadvantaged as examiners credited the correct answer to the relevant deduction.
- (b)** Students were asked for environmental advantages. Those who chose to go down different routes were not credited. Thus those who discussed ‘cost’, the ‘use of less water’ or the ‘re-using of water from the machine’, along with ideas that the ‘cooler temperature would not destroy enzymes’, were not rewarded. Good answers focused on the ‘reduced demand for energy’, which could be expressed in a number of ways, and the consequent ‘reduction in pollution’. Examiners accepted examples of suitable pollutants such as carbon dioxide and greenhouse gases and their immediate effect of global warming, however secondary consequences, such as the ‘melting of ice-caps’ were considered to be too far removed from the focus of the question and were not credited.
- (c) (i)** A good proportion of students gained both marks, with relatively few gaining no marks.
- (c) (ii)** Three-quarters selected the correct term, the most common incorrect answer was ‘killed’.

Question 3 (*Low Demand*)

- (a)** The examiners were disappointed that only slightly more than half of the students could suggest an appropriate source of water for the body. Students who suggested ‘drinks’ or gave examples of drinks, had clearly not read the stem of the question as this was specifically excluded from possible answers. The majority of students who gained the mark here gave ‘food’ or named an appropriate food, such as ‘fruit’. ‘Respiration’ was a much less common correct answer, however ‘breathing’ was not accepted as inhalation does not provide water and exhalation removes it from the body. A clear misconception surfaced here, with a number of students believing that water would be taken in through the skin while taking a bath or shower or just by ‘going out in the rain’. Weaker students offered ‘osmosis’ possibly recognising that this had something to do with water, or speculated with ‘sweat’ or ‘saliva’. ‘Hospital drips’ was not accepted here, as examiners considered these to be an extraordinary situation.

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- (b) (i)** The relationship between body mass and recommended water intake was described in many acceptable ways. A trend was required for this mark and so unqualified figures were ignored. 'Bigger', without further qualification, was not considered to be equivalent to a greater or heavier body mass, since bigger could simply mean taller. References to hot and cold days were ignored and did not disqualify answers which also gave the required relationship. A few confused students thought that the greater volume of water caused the women to have a greater body mass.
- (b) (ii)** Many correct graph readings and calculations were seen. Credit was also given in **(b)(iii)** for students who correctly subtracted 1800 from an incorrect answer to **(b)(ii)**. The most common error here was to use data from the bar for the hot day throughout, which lost all three of the marks. Most students demonstrated a basic understanding that there would be an increase in sweat production on the hot day and so gained one mark
- (b) (iii)** See above.
- (c)** Fewer however, could extend this idea to explain that the additional water intake would be necessary to replace the extra loss. Thus a high proportion of students gained the first mark but only half of these gained the second one. A common misconception was that the extra water drunk on the hot day would result in greater urine production, although losses due to 'urine', 'faeces' and 'breathing' were ignored in this question.
- (d)** Less than half of the students could identify the 'kidney' as the organ that produces urine. The most common incorrect suggestion being the 'bladder', although a wide variety of other suggestions were offered, including several that are not organs, such as 'urea'.

Question 4 (Low Demand)

Most students were able to select the correct words from the given list, for each of parts **(a)**, **(b)** and **(c)**. Students are reminded that they should carefully read through the sentences with their chosen word to check that they at least make sense in terms of language. If the sentence does not make sense, then it is likely that the incorrect word has been selected. Completion of part **(c)** was more commonly correct than the other two parts.

Question 5 (Low Demand)

- (a) (i)** Students could gain one mark for pointing out that electricity is produced from the cows' waste. To obtain the second mark, value needed to be added to the statements given in the question. Thus 'more milk is produced' or a comparison of the amounts was needed. A simple statement that a cow produced 50 litres of milk was not enough as this alone does not explain why the cattle factory could be a good idea. Similarly 'more cows' needed to be linked to the cows being kept in a particular area / space to gain the mark. A high proportion of students gained one mark but much fewer gained both marks. A few students appeared to believe that the ease of spread of disease would be an advantage of the cattle factory.
- (a) (ii)** With one fairly straightforward marking point, 'the use of waste as fertiliser' whilst the other points needed some idea of comparison. Students needed to develop their other answer rather than, for example simply re-stating that the cows spend most of their time in the fields. A statement about the cows being able to move around *more*, being *less* stressed or there being *less* cruelty was required. Similarly a statement that diseases were *less* likely to be passed on was needed, requiring students to have developed the idea from the information about the cattle factory. Students should be reminded that full marks cannot be gained by simply copying information
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and that they should attempt to make clear comparisons between the alternative methods described.

- (b)** A number of students ignored the choices of ‘more’, ‘less’ or ‘the same’ given in the box and chose instead to quote figures. These were not accepted even when they indicated a shift in the right direction, as the rubric of the question had been contravened. It is somewhat surprising that more students did not recognise that the cattle factory would allow a greater energy transfer for growth and milk and that this would, in turn, cause a reduction in energy transfer via respiration.

Question 6 (*Low Demand*)

- (a)** A majority of students recognised the “strands” as ‘chromosomes’, although ‘genes’ proved to be a powerful distractor.
- (b) (i)** Many students referred to ‘all the chromosomes being Xs’, probably interpreting the shape of each chromosome as an X chromosome, thus answers such as ‘there are more X chromosomes than Y chromosomes’, despite identifying the presence of Y were not credited, as the student was clearly misinterpreting the diagram. Other incorrect suggestions included the idea that the chromosomes were ‘in pairs’ or ‘in size order’. Correct responses indicated that males ‘have XY’ or that males ‘have a Y’, although some, perhaps omitting the last chromosomes on the diagram, decided that maleness was caused by two X chromosomes. Incorrect qualification of the chromosome name, by for example ‘gene’, ‘cell’ or ‘allele’ was ignored here, as this knowledge had been tested in part **(a)**.
- (b) (ii)** The majority of students knew that the evidence for the strands coming from a body cell was the strands being in pairs, in part **(b)(ii)**. However, a significant number of students were drawn to the incorrect answer that ‘gametes are made in the testes and ovaries’, perhaps recognising this as a correct statement.
- (b) (iii)** The examiners had hoped that a higher proportion would know the location of DNA in a cell, in part **(b)(iii)** and although many did, incorrect responses were roughly equally divided between the two distractors.

Question 7 (*Standard Demand*)

It is reasonable to expect that most students will have been familiar with measuring the rate of photosynthesis, perhaps in a practical way, in a simulation or at least theoretically. So it was surprising that only just over half the students could identify ‘photosynthesis’

- (a)** A small, but significant minority offered no response, with common incorrect suggestions covering a wide range of processes and plant parts, with ‘respiration’ figuring highly. It is not wholly unexpected that so many students continue to believe that the process of respiration in plants is different from that in animals.
- (b) (i)** There was a wide range of variables that students could choose. The majority of students scored two marks, most often for the ‘size of the pondweed’ and the ‘amount of water’, both of which could be described in a variety of ways. ‘Temperature’, ‘carbon dioxide (concentration)’ and ‘pH’ were less frequently seen. A third idea proved elusive for most students, many of whom resorted either to variables that had already been shown as controlled, such as ‘time’ or ‘size of tube’ or to other ideas such as ‘repeating the investigation’ or having ‘the same person to count the bubbles’ which indicated a weak understanding of “valid”. A variety of acceptable answers was seen for choosing the pondweed.

- (b) (ii)** Ideas such as the ‘amount of oxygen it gave off’, ‘its appearance’, ‘size or growth rate of the pondweed’, ‘how long the weed lived’, or whether it was ‘harmful to fish’. Answers needed to relate to the pondweed in order to gain credit and so ideas such as the ‘size of the pond’, the ‘amount of light the pond got’ or the ‘number of fish in the pond’ needed further qualification to gain credit.

Question 8 (Standard Demand)

- (a) (i)** Less than half of the students identified ‘insulin’ as the hormone that controls blood glucose concentration. A range of alternative hormones such as ‘oestrogen’ was suggested, along with a number of substances that were neither hormone nor even chemical. A surprisingly high proportion of students left this question unanswered.
- (a) (ii)** Following **(a)(i)**, it might have been expected that even more would struggle with **(a)(ii)**, but this was not the case as here more than half the students gave the correct answer ‘pancreas’ although some variation of spelling was accepted.
- (b) (i)** A good percentage of students made the correct calculation, and although there were no marks available for working, some examiners noted that on occasion, students displayed the correct sum ‘99 – 88’ but had arrived at the wrong answer and thus gained no mark. Other common errors included using the data from the incorrect line and misreading the scale, although this latter could probably not have been simpler.
- (b) (ii)** Required students to use “evidence from the graph”, hence those who chose to suggest other ideas such as ‘their urine contains sugar’ could not gain credit, nor could answers that attempted to explain the changes in blood glucose concentration. The examiners were looking for any two of the four significant differences between the data for the two people. Thus any two from a ‘high blood glucose’ concentration, a ‘large rise’, a ‘rapid increase’ or a ‘slow fall’ in concentration would have gained the marks. It should be noted that students did not have to make clear comparisons between person A and person B or between person A and the norm, however, if only figures were quoted then some indication of comparison was required, as for example ‘a concentration of 115’ does not indicate whether this is high, low or normal. Vague descriptions such as ‘it takes a while to fall’ were not credited, as this is also true in cases where there is no diabetes.
- (b) (iii)** The reason for the fall in blood glucose concentration in this part was usually given as ‘exercise’ or the production or presence of ‘insulin’ and a mark was awarded. A very small minority gained a mark for ‘used in respiration’ but the idea that glucose was taken into the cells was only seen on one or two occasions out of the 50000 students, even though this is described in section 12.7 of the specification.

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