



**General Certificate of Secondary Education**

**Additional Science 4463 /  
Biology 4411**

**BLY2F      Unit Biology 2**

**Report on the Examination**

*2011 examination – June series*

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

The decision as to whether candidates should be entered for the Foundation tier or Higher tier paper is always a difficult one. However, had they been entered for the Higher tier paper some 2000 candidates might have achieved a grade B, rather than the grade C to which they were limited on the Foundation tier paper.

Examiners reported that there was some improvement in technique from candidates. This was particularly evident in closed questions where fewer candidates failed to follow the instructions. However there remain those who do not read the instructions to, for example, “tick **two** boxes” and tick only one or occasionally all the boxes, perhaps in the vain hope that the examiners will choose for them or maybe that only the correct box is viewed when marking on line and so, if it is ticked, then any other boxes will not be seen and so be ignored. However, on this matter, their premise is incorrect.

When candidates complete answers in additional space around the paper it is important that they indicate that their original attempt, in the correct space, has been continued. When marking on-line examiners can see little beyond the space provided for the answer. If the candidate’s answer appears to be complete, in this space, then no attempt will be made to look elsewhere on the paper and vital marks may be lost. Better still, candidates should be encouraged to complete answers on additional sheets. However, it is concerning how many of these additional sheets are poorly identified, often missing at least one, and occasionally all three, from the vital: candidate name, centre number and candidate number. Examiners are however pleased that very few candidates now write outside ‘the box’ on the paper which would mean that whatever they write there will not be visible in any circumstance. Furthermore, examiners also recognise that fewer candidates now write with unsuitable instruments such as pencil, blue ink or, the once ubiquitous, gel pens and as a result the vast majority of responses can be read without difficulty.

Examiners are also heartened at the efforts candidates go to, to complete the paper. Even when they are clearly struggling with answers the vast majority of candidates are able to write something biological in every space, even if it gains no credit.

**Question 1 (Low Demand)**

- (a) The concept of organisation, as in part (a), has not been directly examined for several sessions and it was clear that many candidates had not included this in their preparation, as answers here often showed a disappointing lack of understanding.
- (a) (i) The correct answer, ‘tissue’, was selected by only just over half the candidates, with ‘cell’ coming a very close second.
- (a) (ii) By far the greatest number of candidates chose the incorrect ‘organism’. This is particularly surprising for examiners, who expect that the term ‘organism’ is one that candidates will encounter frequently in their work.
- (b) However, there were more pleasing attempts in part (b) Many candidates selected the correct two layers, ‘B’ and ‘C’ and then went on to explain their selections with appropriate reasons, referring to chloroplasts or chlorophyll. Those who selected A and D in part (b)(i) usually gave a logical, if incorrect reason for their choice, usually that these two layers were on the outside so would be most exposed to light. Despite there being a general improvement in candidates following instructions, in questions such as this, around 6% did not tick just two boxes despite the required number being emboldened twice, along with the mark allocation providing further evidence as to how many boxes should be ticked. Those who gave reasons

which did not exclusively refer to chloroplasts / chlorophyll were not credited. Thus answers such as ‘the cells in these layers have chloroplasts and a nucleus’ provided a list for the examiners to choose from. In such circumstances the examiners are instructed not to make a choice, whichever order the components of the list should be in, and thus not award the mark.

- (c) A high proportion of candidates scored both marks, with most of the rest gaining one mark, the most common problem for candidates being the decision as to what the nucleus controls.

### **Question 2 (Low Demand)**

- (a) Although the majority of candidates ticked the correct box, the idea that the gardener might ‘add glucose to the soil’ proved a fairly powerful distracter. This time very few candidates ticked two boxes and none went for all three.
- (b) Comparing responses selection in this part to part (a) it is evident that many candidates are happy to select one answer, when required, but when two answers are asked for, many again select only one. This suggests that candidates read instructions poorly; here, well over 7000 candidates decided to choose just one box to tick. The examiners can only assume that these candidates, having read the question, went directly onto the selections. Of those candidates who did choose two of the conditions, over a third chose correctly, with almost all of the others making one correct choice.

### **Question 3 (Low Demand)**

This area of the specification is well known by candidates who appear to have revised thoroughly. In all three parts a vast majority of candidates chose correctly. The most commonly chosen distracters were, in part (a), ‘protease’ and in part (c) ‘cystic fibrosis’, whilst in part (b) both distracters were equally attractive.

### **Question 4 (Low Demand)**

- (a) (i) Although ‘carbohydrase’ was recognised by the majority of candidates, in part (a)(i), ‘protease’ proved to be a very strong distracter, attracting almost 40% of the candidates. It is expected that candidates would recognise that both starch and glucose as being carbohydrates and thus the only reasonable answer would be carbohydrase.
- (a) (ii) However, answers to part (a)(ii) were more convincing, with a healthy majority recognising the reason why slimming foods might contain fructose, rather than glucose.
- (b) (i) there were only two correct answers in the list of properties given, this meant that those candidates who reverted to guessing had less chance of making two correct selections, than in part (b)(ii). Despite this a good percentage of candidates gained both marks, the most common errors involving confusion regarding low and high temperatures.
- (b) (ii) Part (b)(ii), with a greater range of correct selections was well done, with less than 7% of candidates failing to gain both marks. The most common errors again involved confusion about temperature. Examiners noted that the most frequently chosen ideas concerned the use of face masks and the cost of enzymes, rather than the properties of the enzymes themselves, perhaps candidates were focussing their ideas on “industrial”, in the question, rather than

the actual “properties of enzymes” in the list, although both approaches were equally acceptable. A few candidates chose to add explanations to their choices, some were detailed and accurate, but sadly for these candidates, these attracted no additional marks, as they had not been asked for. Other candidates chose to ignore the list of properties provided and devise their own answers from scratch, most of which were not worthy of credit; further evidence that candidates continue to need to be reminded to read all the instructions properly.

### Question 5 (*Low Demand*)

On the whole, this question was answered well, with candidates demonstrating a good grasp of the basic principles of genetics.

- (a) A great majority of candidates correctly identified ‘dominant’ in part (a)(i) and almost as many chose ‘recessive’ in part (a)(ii).
- (b) Candidates continued to show their secure understanding as applied to the context presented, in part (b)(i), with again, a high percentage correctly choosing ‘aa’. However this good start was halted somewhat in part (b)(ii), where ‘AA’ proved to be more attractive than the correct answer, ‘Aa’. Perhaps candidates failed to complete reading the question, particularly having just completed part (b)(i), and thus did not notice the ‘from a *first generation* plant’.
- (c) The vast majority of candidates recognised that the figures given in the question represented a 3:1 ratio, in part (c), only a single candidate chose to give other than the one answer.

### Question 6 (*Standard Demand*)

- (a) Most candidates were able to read the correct value of ‘1800’ (cm<sup>3</sup>), although a significant number gave ‘1080’. The examiners did not take any account of those candidates who considered this to be a positive or a negative value. In questions of this nature, examiners take account of errors that have an impact on future calculations and in this case, such errors may have been carried through part (b) into part (c).
- (b) Those candidates who were working in negative values occasionally became tangled in their calculations, however the majority arrived at ‘3200’ (cm<sup>3</sup>). Some candidates interpreted the question differently and subtracted the ‘gain’ from this value, to arrive at ‘200’ (cm<sup>3</sup>) and these too were awarded both marks.
- (c) Many candidates failed to connect the three parts of the question together or missed the reference to ‘the person’ in the question, and gave their answer in general terms, describing what a person would need to do to ensure that there was a daily water balance in the body. Thus answers often began with ‘if a person has too much water...’ then continued with ‘if a person has too little water...’, or alternatively to indicate only that there is a need ‘to balance losses and gains’. As these candidates did not indicate the situation for *the* person in the question then no marks were awarded. However, although it was common for candidates to indicate that the person should drink more water, fewer indicated the extent of the additional drinking required, ‘200’ (cm<sup>3</sup>). There were also many candidates who arrived at quite different solutions to the shortfall of water in the body, answers such as ‘sweat less’, ‘exercise less’ or ‘go to the toilet less’ were not uncommon, although ‘avoid breathing’ was, thankfully for any individuals involved in such a situation, relatively rare.

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**Question 7 (Standard Demand)**

- (a) Most candidates correctly selected the third alternative. The most common distracter was the first alternative, as candidates perhaps confused the size of the individual organisms with the required pyramid of biomass. Candidates should be aware that, as pyramids of number are considered at Key Stage 3 and below, then, on the current specification, they will not be asked questions concerning anything other than pyramids of energy or biomass, and these are (almost) always the same general shape.
- (b) The majority of candidates recognised that ‘the sun’ is the ultimate source of energy for the food chain, although a surprisingly high number suggested that energy could be acquired from ‘minerals’.
- (c) Many candidates scored both marks. ‘Heat’, ‘movement’, ‘faeces’ and ‘urine’ were the most common correct responses seen. Some good answers about ‘not all the parts of animals being eaten’ were also seen. A few answers which referred to ‘keeping warm’ did not gain credit as this is not appropriate in this food chain. ‘Growth’, on the other hand, does not result in energy loss from the food chain and so these answers did not gain credit.

**Question 8 (High Demand)**

It was disappointing that candidates did not do better on this question, as a whole. Candidates must spend considerable amounts of class time carrying out practical work and will also have done coursework tasks. However the use of common terms such as ‘range’ and ‘interval’ along with ideas about experimental design were surprisingly weak.

- (a) Many candidates appear confused between control variables that must be maintained for all experimental trials and the independent variable that only has to be maintained for each separate trial. As such, a considerable proportion of candidates made inappropriate suggestions such as ‘temperature’, the independent variable, and ‘time’ which is unclear as it may refer to the dependent variable or the time spent in the water bath before mixing the enzyme and substrate. Other candidates, considered that the ‘amount of water in the water bath’ was an important control variable. Candidates’ use of the term ‘amount’ (of lipid or lipase) was acceptable, in this case, although they should be encouraged to use more precise terms, such as ‘volume’.
- (b) Answers to this were better, with three quarters of candidates realising that the time in the water bath was to allow the lipid and lipase to reach the right temperature.
- (c) Overall candidates who wrote less and stuck to a description of the effect got the best marks, in part (c). Many candidates tried to explain the effect as well as describe it. An explanation was not required and tended to result in candidates getting muddled and losing marks. Many candidates who did this tended to say that ‘the increase in temperature caused the degrees (instead of time) to fall’. Misreading the question, thinking it referred to the whole temperature range in the table, from 5 °C to 95 °C, also created problems and many candidates answered with respect to events above 50 °C and missed the second marking point. Although not asked for, a common misconception seen was that the lipid, in the mixture, was the one to get denatured. Another misconception was answering with respect to lipid breakdown instead of time so the increase in temperature was linked to the decrease in lipid, when in fact; the extent of lipid breakdown is the same at each of the temperatures in the question. Descriptions that involved both time and rate of breakdown were accepted by the examiners and it was common for answers that began with rate descriptions, ‘it got faster’, ended with time descriptions, ‘then it took longer’.

- (d) Reference to 'repeat' was a common acceptable answer; however other terminology that candidates ought to be familiar with was much less secure. Candidates frequently gave suggestions such as 'increasing the interval' or 'increasing the range', however if they then went on to give examples, such as 'test every 5 °C', the examiners overlooked the error. The language of some candidates became so entangled that it was difficult to interpret exactly what they meant, answers such as 'make the time 10 °C' were not considered adequate. Further candidates believed that 'measuring in seconds, instead of minutes' would improve the investigation, when this would only make the numbers bigger.
- (e) (i) The idea of denaturation of the lipase / enzyme was not as common as might have been expected, with many candidates only suggesting that 95 °C is 'too hot for lipase'. Examiners were pleased to report that the number of candidates who referred to the enzyme being 'killed' was not as high as in recent examinations.
- (e) (ii) Although half the candidates correctly selected 'fatty acids and glycerol', almost as many believed that lipids would break down into 'amino acids'.

### Question 9 (*High Demand*)

- (a) Most candidates found this part difficult, although it was pleasing to see so many coming up with ideas, however implausible some of these were. Only just over half the candidates managed to achieve at least one mark, usually stating that the swelling of the cell was due to water passing into it. Most candidates struggled to add to this basic idea, with many answers involving long rambling answers, filling space, rather than getting to the crux of the issue. Many linked the entry of water with the cell needing it 'for photosynthesis', whilst others ignored the idea that the information was about cells and described how water was absorbed into 'the plant' so it could be carried up 'to the leaves'. It is also commonly believed that the cell has stomata which open and close to let water in and out, whilst there was the occasional suggestion that viewing under a microscope makes cells look bigger than they really are! Few candidates went on to refer to 'osmosis' and even fewer attempted to describe the involvement of a partially permeable membrane; and some of these suggested that the membrane is fully 'permeable'.
- (b) Answers to this part were more encouraging, with over half of the candidates explaining that plant cells have a 'cell wall' which prevents them bursting. Some candidates who realised that cell walls were the essential component in this case, incorrectly described them as being 'elastic', 'flexible' or 'semi-permeable', whilst others who failed to gain credit often included additional organelles such as the 'vacuole' in their response or suggested that animal cells also have cell walls but that plant cells have 'thicker cell walls'.

### Mark Ranges and Award of Grades

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