Version 1.0 07/03/2012

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2F Unit Biology 2

Report on the Examination

2012 examination – January series

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Set and published by the Assessment and Qualifications Alliance.

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Registered address: AQA, Devas Street, Manchester M15 6EX

Additional Science / Biology
Foundation Tier BLY2F

General

Examiners continue to be concerned that a small minority of students are inappropriately entered for the Foundation Tier. A proportion of these students may well have been able to achieve higher than the maximum C grade for this paper, if they had been entered for the Higher Tier.

Examiners noted some deterioration in the quality of students' writing and presentation. There were those who formed letters so poorly, in question 1 for example, that it was difficult to determine which letter was intended. Other students choose to alter answers by overwriting an original. This again makes it almost impossible for the examiners to determine what is intended and again the response will gain no marks. When students wish to change an answer they should cross out the original and write their selected response close by. Some students choose to ignore the instruction on the front page, to 'answer in the space provided' and the reminder on each page 'Do not write outside the box'. However, this is to their cost, as answers written outside the frame on each page will not be scanned and thus will gain no marks.

Each year students are reminded to pay particular attention to command words. 'Name', 'describe', 'explain' and 'suggest' all have significance in directing students towards the approach they need to take to gain marks. Furthermore, instructions such as 'use data / information from…' are intended to alert students as to what is needed in an answer and to give them every opportunity of accessing the complete range of marks. There is now an AQA information booklet concerning the use of command words in Science examinations on the AQA website in the new Science area.

Question 1 *(Low Demand)*

A high proportion of students were able to match the correct cells to the questions. Students appeared to be more comfortable with the role of chloroplasts, in cell 'B' for photosynthesis, than with the roles of cells D and A, but these too were correctly identified by about three-quarters of the students.

Question 2 *(Low Demand)*

(a) Most students selected the correct figures, '3.5' and '0.5', and then went on to complete the calculation correctly, in part (a). Both marks were awarded irrespective of working, if a candidate gave the correct answer, '3'. Some students, though, chose the correct figures and then used them incorrectly, for example adding, multiplying or dividing one by another. Provided these students showed their calculations they were awarded one mark for use of the correct figures. A number of students though arrived at an incorrect figure without showing working. Hence a candidate who gave the answer '4' may well have added 3.5 and 0.5 but as they did not show their figures, no mark was awarded. The attention of students should be drawn to the advice on the front page 'In all calculations, show clearly how you work out your answer'.

(b) Some students did not read the instructions carefully and ticked only one box, thus reducing their potential marks. Approximately two-thirds of the students scored both marks.

(c) **(i)** Again some students did not read the instructions carefully and ticked only one box. More than half of the students scored both marks.

(c) **(ii)** This part was a development of the theme in (c)(i). Having identified that pigs kept inside lose less energy than those kept outside, students were asked to explain why meat from pigs kept indoors is usually cheaper. Better students realised that this is because these pigs grow faster and gained the mark, however far too many students went off at a tangent and offered all manner of unacceptable suggestions, such as pigs kept indoors would be 'bigger', have 'less tasty meat' or even have 'dirty meat'. Other students referred to the ethics of keeping pigs indoors and often suggested that 'free-range pigs would have more expensive meat', which missed the point, somewhat. Students who referred to less movement usually did not go on to develop the idea that this would result in faster growth.

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

(a) Most students gained full marks in this question. Students are not expected to know which fuel aeroplanes use, although a few attempts at 'kerosene' were seen, so a range of reasonable suggestions was accepted, however, this did not stretch as far as 'coal' or 'wind power'!

(b) **(i)** Examiners accepted either carbon dioxide or carbon monoxide, although some students who offered 'carbon' either did not read the question '…a gas called…' or believed that carbon is a gas.

(b) **(ii)** Again a range of unexpected answers was suggested, although most offered 'air'.

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

(a) The correct symbol was drawn by almost all of the students, with just a few offering one of those already in the key.

(b) Over three quarters of students gained the mark for this question.

(c) **(i)** The fact that the allele is recessive was worked out by many students and a very high proportion identified the correct chance.

(c) **(ii)** More students however, struggled with this question with less than half ticking the correct box. It might have seemed logical that having identified that there is a 'half' chance of the next child being a girl, in part (c)(i) that the answer to (c)(ii) must be one of the first two alternatives, where 'some…', as opposed to the 'all…' of the third alternative, was a key term. However, this was not the case and similar numbers of students ticked the third box as ticked the second.

Question 5 ***(Low Demand)***

(a) The majority of students knew that 'water' and 'oxygen' were involved in the word equation, and although most students put them in the right order a considerable minority reversed them and so gained neither mark. A relatively small proportion gained just one mark, usually selecting either 'chlorophyll' or 'minerals' for one of the spaces and choosing a right answer for the other space.

(b) Students demonstrated considerable confusion with poor use of the terms 'absorb', 'opaque' and 'transparent', sometimes implying that clear plastic would absorb light, when they meant 'transmit light'. Conversely, answers such as 'black bags absorb sunlight' needed further information to convince the examiners that the candidate was not implying that light was getting to the plant. Heat was confused with light by some students. Many students thought that the bag needed to be clear in order to see the results. This demonstrated that students had not read the information carefully enough, i.e. that the plants were 'left… for four weeks' and so there would be no need for occasional inspection. These statements though were ignored by examiners, provided the acceptable concepts were given.

(c) There was further evidence that many students had not read the information carefully. Many appeared to imply, by their descriptions, that they believed a single plant was set up and that an extra tablet was added to the dish each week. Hence the vertical label on the graph was misread as describing how many new leaves this plant had. Such descriptions often included phrases such as 'each week…'. Those who appeared to understand the way the investigation was set up were often careless in their description of what happened when 4 or 5 tablets were added. The suggestion that 'the number of leaves does not go up' simply implied that there was no further rise, but did not describe the levelling off shown in the graph (as this answer would also be true if the number went down) so a third mark was not awarded. Weaker students appeared to only notice the rise in number of new leaves or only described the levelling off. Despite these possible pitfalls, the examiners were pleased that a good proportion of students gained all three marks in this part. A few students, often having described the relationship well, attempted explanations for the shape of the graph. Some of these described limiting factors, often very succinctly, but unfortunately gained no credit as the question only required a description. However despite this error, examiners were pleased to see students describing the relationship in this way.

Question 6 *(Low Demand)*

The great majority of students did well on this question. For most answers, comparisons of the two types of stem cell were not required as it was considered that in order to make a selection of the correct features; students must have made the comparison from the information in the table. However it should be noted, that in the new specifications clearly comparative responses will normally be required and this will raise the demand for students. Many students though, did give answers in comparative terms and these were, of course, credited. The exception to this general rule was in the cost of the treatments, as it was considered that 'costs £1000' is not, in itself an advantage of using stem cells from bone marrow.
A few students having completed part (a) correctly then made an assumption that part (b) would be asking for disadvantages of using embryonic stem cells and thus gave three incorrect answers.

Question 7 *(Low Demand)*

It was clear that a considerable minority of students were at a complete loss as to how mineral ions might be recycled. These students often strung together the words they were provided with in no particular order to make sentences that were quite meaningless. Thus whether 'microorganisms decay the leaves' (worth 2 marks) or the 'mineral ions decay roots' became something of a lottery. Other common misconceptions were that 'roots contain microorganisms', 'microorganisms transferring mineral ions into roots', that 'decay produces microorganisms' or even that 'microorganisms prevent decay'. Despite these, a good proportion of students gave clear accounts and deservedly gained all three marks.

Question 8 *(Standard Demand)*

(a) (i) Many students gained the mark for describing the trend. Some answers, such as 'the lower the temperature, the quicker the time to get frostbite' indicated a lack of security with the concept of time, but were accepted. Examiners allowed reference to 'more likely to get frostbite' as an alternative to getting frostbite quicker. Some students referred to the wind speed in addition to temperature, and examiners ignored these references and still gave the mark for a correct trend referring to time. Some students did not understand the negative numbers and assumed that minus 30 °C was warmer than minus 20 °C. As such their responses made little sense when read 'the warmer it is the more likely you are to get frostbite', implied either that students did not read or did not think about the significance of what they had written or were simply confused about the information.

(a) (ii) Some thought was needed if students were to gain the mark for this question. Many went for the obviously incorrect '10 minutes', however, the table clearly shows that being in these conditions for 10 minutes causes frostbite. Hence the answer must be less than 10. On the other hand, 5 minutes is 'safe', so the maximum safe time must be between 5 and 10 minutes. The examiners also accepted an answer of '5 minutes' as this is the longest 'safe' time shown in the table.

(b) Many students knew that 'muscles 'shiver'' in cold conditions, but fewer knew about the constriction of blood vessels. A frequent incorrect answer was that 'more blood flows through the skin capillaries'.

Question 9 *(Standard Demand)*

(a) The correct control variables that were most frequently seen were the 'amount of apple' and '10 drops'. Some students did not gain the mark as they referred to 10 drops 'of water' or 'of amylase', which are values of the independent variable. Reference to all of water, amylase and pectinase or to 10 drops of solution was required, if 10 drops was qualified. A number of students scored no mark for the amount of juice collected, the dependent variable.

(b) References to human errors such as 'incorrect counting' or 'losing count' were ignored, as was being 'unable to measure the size of a drop'. The idea that the drops might be of different sizes was required for the mark. Ideas about possible variations in the density of enzymes were sometimes given but were not mark-worthy. Students should be reminded to pay careful attention to the command words.

(c) The question required an explanation and not a description. However a large proportion of students spent considerable time filling the space and more beyond with often quite detailed descriptions, all to no avail. Students usually noticed the differences between the different treatments, but appeared loathe to suggest why these differences might have happened. Here students might have pointed out that 'pectinase breaks down apple', thus allowing the collection of a considerable amount of juice. Conversely 'amylase does not break down apple' would have gained a further mark. The added observation that 'boiling breaks down apple' would have gained a third mark. Students could have gained all three marks in three succinct sentences, but rarely did. Those students who did refer to break down of the apple often stopped after describing only one or two of the treatments, thus limiting their potential mark.

(d) All the different volumes of juice were chosen by students, but 11.6cm^3 was the required answer. Students who choose 22.9cm^3 never went on to score any marks for an explanation, simply suggesting that the two parts of the treatment, boiling and pectinase would have an additive effect . Those who chose 1.2cm^3 or 11.3cm^3 sometimes did still gain a mark for the idea that the enzyme would be 'denatured'. It was extremely rare for a candidate to point out that the result of 11.6cm^3 was the effect of the boiling only. Almost two thirds of the students scored no marks here, surprisingly forgetting that high temperatures denature enzymes, with some students even suggesting that the enzyme would 'work faster at higher temperatures such as boiling'.

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