



General Certificate of Secondary Education

Science A 4405 / Biology 4401

BL1FP Unit Biology 1

Report on the Examination

2012 examination – June series

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Set and published by the Assessment and Qualifications Alliance.

Science A / Biology Foundation Tier BL1FP

General

This was the first summer series of the BL1F examination. The majority of students made good efforts to answer all the questions, although there were clearly some for whom this paper was a considerable struggle, and at the other end of the spectrum, some who may well have gained a higher grade on the Higher Tier paper.

Students are reminded that the use of black ink or ball-point pen is a requirement; there were far too many responses that created difficulty for examiners by being too faint. Poor writing also let down some students, as even with two or more examiners looking at the script and with the knowledge of what they might be expecting to read, it was impossible to decipher what had been written. Schools are reminded that the use of scribes is permitted. Furthermore some students sat this examination as an on-screen test. This report covers the on-screen test as well as the written paper.

When students consider extending their responses beyond the printed lines, then unless a continuation goes no further than one line beyond those printed, students are advised to use additional pages. These pages should be clearly labelled with all the relevant students details as the pages are separated from the rest of the script at the scanning centre. It is essential that students do not continue their answers into the borders around the pages, as these are not visible to examiners and any potentially creditworthy ideas expressed here may not gain marks. The most significant issue was the need to read the question carefully and then answer what has been asked. Students should pay attention to the command words in the question; 'explain' and 'describe' are perhaps the most commonly confused terms and doing so may cost a considerable number of marks throughout the paper. Guidance on the use of command words used in Science examinations can be found in the Science area on the AQA website under the heading 'Command Words for GCSE Science'.

Examiners also noted that there was a significant increase in the number of students who appear to have been trained to repeat large parts of the question as a preamble to their response and to write their responses in extended sentences. This latter is only needed for the QWC question (in this case question 8). Repeating the question is a considerable waste of time and may mean that students need to continue their responses onto additional paper, or simply omit significant points from their answer. The number of lines printed on the paper should be more than sufficient for students with even the largest writing to fit in a full and complete response.

Where students are asked to choose a letter from a list of upper case letters, the answer given should also be as an upper case letter, as this will avoid possible confusion between, for example a lower case 'a' and a lower case 'd' or a poorly written 'e'.

Question 1 (*Low Demand*)

- (a) Almost as many students gave the incorrect response of 'an effector' as gave the correct answer of 'a stimulus' to describe "a change in the environment".
- (b) (i) and (ii) Were completed more successfully. A high proportion of students identified **A** (eye) as the organ sensitive to light and **D** (nose) and **C** (tongue) as being sensitive to chemicals.
- (b) (iii) Was less well done, with almost as many choosing **B** (skin) as being sensitive to changes in the baby's position as chose the correct response **E** (ear). Throughout part (b) a number of students wrote the various names of the organs in the boxes. These were not credited, as they contravened the rubric of the questions. When directed to use letters in their responses, students must use letters if they hope to be awarded marks.

- (c) Was completed correctly by the great majority of students, who gave 'brain'. Although not strictly correct, 'spinal cord' was accepted here as the distinction between the two parts of the central nervous system is beyond the scope of the specification. Although the 'central nervous system' was accepted it was only very rarely seen. Reference to the 'spinal column' was not accepted.

Question 2 (*Low Demand*)

- (a) (i) Most students successfully read the correct value, '7500' from the chart in part (a)(i). Inevitably some chose to give the 'energy taken in as food' figure, and many of these were unable to arrive at the value, mid-way between the scale values of 5000 and 7500. Others subtracted the input and output values, again with varying degrees of success.
- (a) (ii) Many students did not realise why the amount of energy used by the body might be different for person **D** than for the other people. Incorrect ideas often included reference to different amounts and types of food being eaten. Of the several acceptable answers, age, gender and exercise were the most common creditworthy responses. Some students attempted to be more precise and suggest that, for example '**D** is less active than **C**'. This was acceptable, however where these descriptions were incorrect, '**D** is more active than **C**', the mark was not awarded. A number of students gave only one suggestion, despite the emboldened "two" in the question, along with "reasons", rather than 'a reason' and the "2 marks" allocation. Students must be prepared to read all the information and instructions carefully and then act upon them.
- (b) Here all of the people from the graph were chosen to various extents. The selection of the correct person, 'A', gained the first mark, irrespective of the reason given. The reason for the chosen person being the one to gain body mass was also marked independently from the person chosen. A significant minority of students failed to write a letter in the box provided, choosing instead to write this in their explanation; this was accepted. The correct response, 'A because more energy or food was taken in than was used' was the most common. The most frequent misconception, 'C because he ate the most', showed that students equated overweight with high food intake, rather than the balance between intake and use. Other suggestions such as 'B because he had equal energy input and output', and more rarely 'D because he used more energy than he took in' also showed poor understanding of this high profile health issue. Figures were not required to gain full marks.
- (c) Many students gained both marks as more students gave two suggestions. 'Exercise', an example of an exercise, such as 'running' or an implication of exercise 'go to the gym' were acceptable alternatives for the one of the marks. The second mark required a clear indication of a reduced intake of food. Acceptable suggestions included 'reduce portion size', but eating a 'healthy diet' or a 'balanced diet' were not sufficient to gain the mark. A few students came up with advertising slogans such as 'eat less, exercise more' which of course gained both marks and 'it's all about size – exercise and portion size' which only gained the one mark as this gives no indication as to whether portion size should be increased or decreased. Reference to an artificial or surgical means of reducing food intake was accepted as an alternative to reducing food intake directly, and a small proportion of students gave one of these, although the vague 'get a doctor to remove the fat' was not credited.

Question 3 (Low Demand)

- (a) (i) The 'Sun' being the source of energy for green plants, was well known by a large majority of students. Most Students also knew that 'photosynthesis' (in a wide variety of accepted spellings) was the process for which plants use light energy. There was some evidence of confusion with 'phototropism'.
- (b) Here students were expected to choose answers to complete a description of photosynthesis. Most students knew that photosynthesis changes light energy into 'chemical' energy; although a significant minority chose 'electrical' energy. Students always seem to have difficulties remembering the gaseous inputs and outputs of photosynthesis, perhaps because of vague and imprecise descriptions they heard early in life.
- (b) (ii) Up to a third of students chose the incorrect answer 'oxygen' rather than 'carbon dioxide' as the gas used for photosynthesis.
- (b) (iii) More than half the students chose 'minerals' as the carbon-containing compounds produced by plants, despite 'carbohydrates' having the same first five letters as carbon.
- (c) The loss of biomass from the food chain 'as faeces from the blue-tit' was well known, however 'as food eaten by the hawk' proved to be a powerful distractor and many students chose this, apparently unaware that biomass in the food chain is conserved unless matter is lost. In excess of 2000 students contravened the instruction to tick "two" answers, many choosing only one and in a very few cases all four. The importance of reading the information and then following all of the instructions is essential.

Question 4 (Low Demand)

- (a) Students who only repeated the information they had been given that the body 'froze in ice' and 'did not decay' were not awarded the marks. What was required was a development of this information. Students should be aware that although microorganisms are more active at warmer temperatures, they remain active at low temperatures; thus a description of the temperature being 'cold' was insufficient to gain the first mark. Instead the more extreme 'too cold' was required for this mark. Surprisingly few students were aware that decay requires the presence of microorganisms, so there were not many who gained both marks. The most common reference to microorganisms came from those who stated that microorganisms would be unable to access the mammoth if it is frozen in ice, and these were awarded one mark, as were those who stated that oxygen could not enter and thus decay would be prevented. Although neither of these is strictly true, as microorganisms would already be present both in and on the mammoth and many of these would be anaerobic; the examiners were prepared to accept these ideas at this level.
- (b) The definition of extinction was very well known. Few students who did not gain the mark often gave the definition of endangered.
- (c) Required understanding of adult-cell cloning. This appeared to be relatively well understood, in this format. Most students identified the 'egg cell' and 'nucleus' in (c)(ii), although they were less confident with the need for an 'electric shock'.
- (c) (iii) Both distractors, 'mixing with sperms' or 'treatment with enzymes' proved too attractive for over half the students.

- (c) (iv) Although 'womb' was given by most students, it was clear that many students were confused about the role of the ovary, perhaps confusing the name with that of uterus.
- (d) It was widely understood that the mammoth's genetic material caused the offspring to look like the mammoth. The reference to the lack of elephant genetic material was also accepted by examiners. A common answer which did not gain credit was that the mammoth's 'skin cell' was used in the cloning, without specifying the genetic material, or that the 'mammoth's skin cell was used so that the baby would have mammoth skin'. Other incorrect responses included the idea that there was 'more DNA from the mammoth than from the elephant'.

Question 5 (Low Demand)

- (a) (i) Despite the stem of the question telling students that thalidomide is no longer used to prevent morning sickness, many gave 'morning sickness' as their response. 'Leprosy', spelt in a wide variety of ways, was recognised by examiners and given credit. Use as a 'sleeping pill' was a more common correct response along with descriptions of their action. Those students who had not included this in their revision offered a wide variety of suggestions, with frequent references to 'painkillers' and 'contraception'.
- (a) (ii) Some students knew that birth defects were caused by thalidomide or could describe them, but simply 'killing' or 'harming' the baby was not enough to gain this mark. Once more, a common incorrect answer was that thalidomide was a 'contraceptive'. The reason for the use of two contraceptive methods is to be *more* sure that the woman did not become pregnant. Common misconceptions were ideas about 'comparing the effectiveness' of the two methods or 'checking to see if she was pregnant'. A relatively small number of students correctly identified both oestrogen and progesterone as the hormones in the combined pill. FSH was a powerful distractor.
- (b) (i) The advantages of the combined pill were easily identified. There was some confusion over the signs (" $>$ " and " $<$ ") in front of 99%. The signs are described in the 'Mathematical and other requirements' section of the specification, but students who referred to effectiveness often did not realise their significance and merely stated that the combined pill was '99% effective', which gained no mark. Statements that the combined pill contains two hormones were ignored, as this was not considered to be an advantage unless linked to other creditworthy ideas.
- (b) (ii) Again the confusion over the mathematical signs meant that some students thought that the mini pill was more effective than the combined pill. It was evident that some students had not read the information carefully and they stated that 'the mini pill increased the chance of one type of cancer and the combined pill increased the chance of two types'. Others surprisingly, thought that an 'increased chance of breast cancer' was an advantage. Examiners did not give credit for saying that the mini pill only contained one hormone, but the fact that it contained a 'lower dose of hormone' would have been creditworthy.

Question 6 (Low Demand)

- (a) The lack of good communication skills meant that some students did not express their ideas clearly enough to gain the mark in this part. Although some students stated that 'insects eat crops' this was insufficient as the question required an explanation as to why the lack of insects would increase crop yield.

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- (b) The majority of students read the graph correctly. Few students were able to describe the difference in yield.
- (b) (ii) Some students realised that the yield was lower, but 'by 8' was required for the second mark. A correct answer using an error carried forward from (b)(i) was accepted for both marks. Examiners were surprised by the number of students who only quoted the figure '52' for the crop yield without the insect poison gene, and made no attempt to describe the difference between this and the value they had quoted in part (b)(i).
- (b) (iii) This part drew students specifically to "crops grown in fields". Examiners were again surprised at the number of students who did not refer to these two crops, suggesting ideas that included crops grown in greenhouses. However, the advice to 'use wheat without the poison gene' was often given. Examiners ignored an omission of the word 'gene', but any reference to spraying or poison being *on* the wheat negated answers. For the second mark a reference to a higher yield was required and vague references to growth of the wheat or to the size of the wheat plants were not credited.
- (c) Answers that referred only to the use of GM crops being 'unethical', 'unnatural' or 'against God's will' without further qualification were not given credit. Similarly vague statements about GM crops harming people were considered to be insufficient. The specification (B1.7.2f) refers specifically to the effect on human health of *eating* GM crops and this was what examiners required. The other marking point, also referred to in the specification, was awarded for a link to the effect of GM crops on populations of wild flowers or on insects. There were a small number of responses referring to the reduction of insect populations, but references to the effect on (wild) flower populations were very rare. Considering the amount of coverage the subject of GM crops receives in the media, the examiners were disappointed with the responses to this part.

Question 7 (*Standard Demand*)

- (a) Many students simply rephrased the stem of the question, with responses such as 'painkillers kill pain'. However, the question required an explanation as to why painkillers do not cure infectious diseases. Most of the creditworthy answers that were seen stated that 'painkillers *only* killed pain' or '*only* treat symptoms', implying that they do not have other roles. An alternative route to this mark required students to state that painkillers do not kill pathogens or a named type of pathogen. Answers which did not gain credit were 'because they are not designed to cure diseases' or 'they kill bacteria but not viruses'. There were only rare responses that referred to the absence of antibiotics in painkillers.
- (b) Students were asked about factors concerning the groups of volunteers and not about the potential variables that might have been controlled once the trials had begun. Although the mark scheme allowed examiners to accept a number of different factors, those such as 'the amount of pain felt during / after the trial' were not credited as not only would this be impossible to achieve but it would also defeat the purpose of the trial. The most common correct responses seen quoted 'age' and gender'; 'location' or 'severity' of the pain were less frequently given.
- (c) (i) The great majority of students failed to read the label on the y-axis of the graph carefully enough and gave '25', which was the 'decrease in pain', rather than the '75' required, here. This might well have been expected to have an impact on the answers to the rest of this but, however, this did not appear to be the case, as most students used the axis label correctly in parts (c)(ii), (c)(iii) and (d).

- (c) (ii) Most students used the graph to explain that drug A gave ‘faster pain relief’. However those who failed to make a comparison with drug B, such as ‘drug A gives fast pain relief’ were not awarded the mark.
- (c) (iii) There was a little more confusion as to what the graph was showing, in this part. Some believed that the drugs were the cause of the pain and these often suggested that drug B ‘caused less pain’ or ‘gave less pain for longer’. As in part (c)(ii), the question directed Students to give comparative answers, such as, ‘decreases pain for longer (than A)’ or gave a ‘greater decrease in pain’.
- (d) Examiners ignored ‘yes’ and ‘no’ and awarded marks for correct ideas. Again there were confused answers about **A**, **B** and **X** actually causing the pain. Few students scored three marks on this question although many picked up two. Of those who thought ‘yes’, the most common acceptable reasons given were that the use of drugs **A** and **B** would be ‘cheaper’ and that two drugs together would give ‘more pain relief’ or that pain relief would be ‘longer lasting’. Very few realised that within the mixture, it would be drug **A** which would provide the rapid pain relief or that the pain relief from drug **B** would be long-lasting. A few stated that **X** was more expensive, which was not credited as this was in the stem of the question. Those who answered ‘no’ usually stated the higher effectiveness of **X** than **A** and **B** as the main reason, or indicated that taking two drugs could result in an overdose or may be dangerous. A few suggested that the two drugs might interact with each other. Some thought that buying two drugs would actually cost more or cost the same as buying **X**. However there was no need for students to give their reasons solely for the idea of ‘yes’ or of ‘no’. Examiners were willing to accept ideas that gave both pros and cons of the suggestion. It is interesting to note the higher proportion of students who felt that the advice was incorrect, as, for these two drugs, the medical advice is that they may be taken together quite safely; of course students are not expected to know this, and so any appropriate ideas were accepted.

Question 8 (*Standard Demand*)

A large proportion of students did not read the question carefully enough. These students usually spotted the word ‘adaptations’ in the question and wrote all they knew about adaptations to cold and dry habitats. Thus examiners often read through long accounts, filling all 19 lines and beyond, of the various adaptations of polar bears to life in the Arctic and of cacti to life in the desert (or ‘dessert’). Among this, as if by chance, students often happened to mention camouflage and / or spines. The frequent linking of camouflage in polar bears to its ability to ‘avoid being seen by prey’, gained no credit. Students who were more focussed often gave several different adaptations but lack of sufficient detail or explanation made it impossible to move beyond Level 1. For ‘camouflage’ the detail required was that the animal’s coat colour would match that of the surroundings, so that predators are less likely to see the animal. Students are not expected to know the food chain of animals such as polar bears, so this explanation linked to a polar bear was accepted. Similarly for the ‘spines on cacti’, it was necessary for the student to explain that attempts by a consumer to eat the cactus would hurt the consumer. To move into Level 2, students needed to refer to adaptations in both animals and plants and to give a detailed description of one adaptation. It was very rare for students to give answers at Level 3, which required details of at least two adaptations for both plants and animals along with correct references to how this helps them avoid being eaten .

Venus fly-traps figured in many responses. There were many confused accounts of these plants with references to their ‘mouths’ and ‘saliva’. The insects which they catch are not their predators, nor are they ‘eaten’, so no credit could be given. It was evident that students, trying to expand their answers to address the “many different ways” referred to in the question had vague memories of the names of organisms, their adaptations and what might eat them, thus

examiners were treated to suggestions such as ‘mountain tigers preying upon penguins’ and plants being ‘camouflaged to blend in with the background’.

Students should be aware that ‘bright colours’ or ‘warning colours’ do not in themselves protect the animal or plant from being eaten. It is necessary for the potential consumer to have had some unpleasant experience of the colouration and learned to associate the colour with that experience.

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA website

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