



**General Certificate of Secondary Education**

**Additional Science 4408 /  
Biology 4401**

**BL2FP      Unit Biology 2**

**Report on the Examination**

*2012 examination – June series*

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**Additional Science / Biology**  
**Foundation Tier BL2FP****General**

A lack of knowledge of key facts – for example not knowing the meaning of the term *carbohydrate*, or not knowing the function of a *ribosome*. Many students failed to distinguish between the instructions *describe* and *explain* and thus included much irrelevant material in their answers. Mathematical weakness in calculations – and, if working is omitted, sacrificing any mark that would have been available for its inclusion.

Evidence from diagrams or graphs not always being cited carefully and descriptions of patterns in graphs without including numerical values – which are needed if full marks are to be gained. A lack of appropriate detail in the description of a practical method – sufficient needs to be included to enable another person to carry out the investigation. Spelling of technical terms – this becomes particularly important for distinguishing between similar biological words, such as glycogen – glucagon – glycerol, or mitosis – meiosis.

Incorrect use of chemical symbols – although a name expressed in symbols is usually acceptable, the symbols must be correct. Re-stating information from the question without using it in some way: this should be discouraged as it gains no marks.

**Question 1 (Low Demand)**

This question was well answered by most students.

- (a) Nearly two-thirds of students knew it was the cell membrane which controlled the passage of substances in and out of a cell but, in (ii), slightly fewer knew that the vacuole contained cell sap.
- (b) Nearly all students could select at least one structure shown in the diagram of the plant cell which would not be present in a human liver cell.
- (c) However, only one-half knew that the oxygen produced by the chloroplasts would leave the cell by *diffusion* (rather than by digestion or respiration).

**Question 2 (Low Demand)**

- (a) Almost half of the students were able to list *tissues-organs-systems* in the correct size order.
- (b) The distracters in this section proved very distracting and less than half the students could assign the correct function to all three types of tissue – *muscular, glandular and epithelial*.

**Question 3 (Low Demand)**

- (a) As the diagram indicated, a fossil is likely to have been formed from an organism that was alive *millions* of years ago (rather than just “many years”). Details, such as being an impression (e.g. a footprint) or being formed in rock, were also acceptable as part of the answer. Most students were able to make at least one correct point, but less than half could give two.

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- (b) What should have been obvious from the diagram proved to be so for only three-quarters of the students who correctly selected group **D** as the group of organisms which were first to evolve. Slightly more realised that the diagram gave evidence that group **B** was now extinct. Most students were also able to suggest an environmental factor that might have caused extinction, such as predation, lack of food, competition or some catastrophic event.
- (c) Around three-quarters of students successfully described that group **C**'s *fossils* were the most common 10 million years ago (or that this group had the widest band in the diagram for that time). Some students merely re-stated the words of the question and so gained no credit.
- (d) Around two-thirds correctly selected the fact that having similar physical structures would indicate that all four groups of organisms had evolved from a common ancestor.

#### Question 4 (Low Demand)

- (a) Given that human body cells contained 46 chromosomes, just over three-quarters of students were able to state, in part (i), that sperm cells would have 23 and, in (ii), just over two-thirds knew that the part of the sperm cell containing the chromosomes was the nucleus (or the "head").
- (b) Similarly, in (b)(i) and (ii), around two-thirds of students were able to select 'X and X' and 'X and Y' as the sex chromosomes of, respectively, the human female and male.
- (c) However, despite success in part (a)(i), only around one-third of students knew that half of the sperm cells would contain an X chromosome.

#### Question 5 (Low Demand)

- (a) The vast majority were able to identify structure **A** on the diagram as the stomach.
- (a) (ii) Less than one-fifth knew that the acid produced by the stomach was *hydrochloric acid*.
- (a) (iii) More students knew that some sort of *alkali* would need to be present in a medicine that would neutralise excess stomach acid.
- (b) Most answers to this question were very poor, with half of the students scoring no marks at all for their accounts of carbohydrate digestion, despite being given the words *amylase*, *starch* and *sugars* for guidance. Many did not seem to know that starch was a carbohydrate or that starch was made of sugar molecules joined together. The site of amylase production and the site of its action were not always distinguished – digestion of starch does *not* occur in the pancreas or in the salivary glands as some students inferred. Some also wasted time by writing about topics irrelevant to the question, such as absorption and defaecation.
- (c) Just over one-quarter of students knew that the site of absorption of the products of digestion was the *small intestine*.

#### Question 6 (Low Demand)

- (a) The equation for photosynthesis was completed successfully by almost two-thirds of students.

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- (b) However, only about one-tenth were able to select '1 arbitrary unit' as the light intensity on the graph where light was the limiting factor for photosynthesis.
- (b) (ii) More than half correctly read '210' units from the graph as the highest rate of photosynthesis.
- (b) (iii) A similar proportion were able to suggest that more carbon dioxide, or a higher temperature, might have increased the plants' rate of photosynthesis.

#### Question 7 (*Standard Demand*)

- (a) Slightly over half the students recognised that the allele for cystic fibrosis was a 'recessive allele' and around three-quarters recognised that the two parents must have been 'carriers' if they had a child with cystic fibrosis.
- (b) More than three-quarters recognised that the genotype 'nn' indicated a person who had cystic fibrosis, but less than a half could work out that the chance of the next child of these parents having cystic fibrosis was *1 in 4* (or an equivalent mathematic expression).
- (c) The most common advantage suggested by students of screening embryos for cystic fibrosis was the most obvious: to avoid producing a child with the condition. The idea that early detection (3 days after fertilisation, or even before the woman became pregnant as IVF was used) was rarely mentioned. Although "ethical" issues were raised by students as a disadvantage of such embryo screening, relatively few students were able to qualify this suitably by referring to the fact that an embryo might be damaged or that surplus embryos might be destroyed. A majority of students scored at least one mark, mainly for the 'advantage' point.

#### Question 8 (*Standard Demand*)

This was the first of two standard demand questions common to both the Foundation and Higher Tier papers.

- (a) Parts (i) and (ii) posed no difficulty to the vast majority of students who were able to select the correct plants from the diagram.
- (a) (iii) Descriptions were often imprecise: the duckweed was present in *both* the aquatic *and* the swamp regions of the stream (or *only* in areas *covered* in water), not just where water was "present".
- (b) A fifth of Foundation Tier students did not even attempt this question. It was evident from what most students wrote that they had little knowledge of the use of a quadrat for sampling along a transect. Many described a method involving random placing of the quadrat in an area, presumably reflecting a practical exercise they had performed but not understanding that such an approach would *not* generate data as shown in the diagram. Most Foundation Tier students were in this category and thus scored between zero and two marks.

Some better students indicated that the tape measure should be laid out in a straight line and the quadrat placed at intervals along it. Very few students pointed out that this should be done with the tape laid across the stream and that the exercise should be repeated, perhaps at intervals along the stream. It was surprising how few students described how the presence and absence of the different plant species (there were 8 given in the data) should be recorded each time the quadrat was placed: many students merely referred to unspecified "results" being recorded.

### Question 9 (*Standard Demand*)

This was the second of two common questions.

- (a) (i) Many students quoted ‘time in hours’ from the graph as being a variable that the scientists controlled. Many included diet as a control variable, despite it being described in the question as being *different* for the two athletes since it was the independent variable. About three-quarters of Foundation Tier students were able to suggest at least two control variables, such as age and gender of the athletes or that each trained for the same 2-hour session each day, but few could suggest three such variables.
- (a) (ii) Students were less successful in suggesting variables that the scientists might find difficult to control, such as the intensity of the exercise performed by each athlete, or their initial fitness, or how much exercise they did between successive 2-hour sessions.
- (a) (iii) Should have been very straightforward to answer but only around two-thirds could state, in any intelligible way, that athlete B had less glycogen.
- (b) Most students realised that athlete A was more likely to complete the marathon due to his larger reserves of glycogen. Some then explained that this would provide him with more energy (although fewer explained that this energy would have been released in respiration). Better students knew that glycogen could be converted into glucose for use in respiration. However, a significant proportion of Foundation students had no idea of the role of glycogen in the body – some even thought it was a waste product which would impede muscle action (perhaps confusing it with lactic acid). Around one-third of Foundation Tier students scored no marks in this section, with the bulk of the remainder scoring only 1 or 2 marks.

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