



GCSE

BIOLOGY

8461/2F Paper 2
Report on the Examination

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General Introduction to the November Series

This has been an unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

This was a very small and atypical cohort and the evidence from the standard of responses suggests that the cohort was a little weaker than in previous years. Most students completed the paper and there were very few gaps or omissions; however, the quality of response was often superficial and lacking in detail.

Comments on Individual Questions

Questions 8 and 9 were common with Biology Paper 2 Higher Tier.

Question 1 (low & standard demand)

This question was about the transfer of biomass through a food chain. In **01.2**, although many students correctly identified wheat as the producer, it was then very common for students to suggest the chicken as a secondary consumer and the dog as a tertiary consumer. A high proportion of students recognised in **01.6** that farming cows requires more land than farming insects, though relatively fewer realised that a reduction in cattle farming would slow down global warming. Of incorrect responses, the fifth alternative proved most popular.

Question 2 (low demand)

This question was about phototropism. In **02.2**, fewer than half of the students correctly identified the dependent variable. Of the majority giving an incorrect response, the most common, by far, was the temperature of the room. For **02.3** most students gave at least one correct response, usually identifying light or water as factors being competed for; although many students gave both of these. The other most commonly suggested allowable response was 'space'. In **02.4**, a large proportion of students gave the incorrect answer, that side P (facing the light) grows more than side Q – an obvious misconception about the effect of more or faster growth on one side of the shoot. Given the clear bend in the shoot, a large number suggested that the two sides had grown equally.

Question 3 (low & standard demand)

This question was about meiosis, chromosomes and an inherited disorder in humans. A little over one-third of students gave the correct answer of '4' cells being formed by meiosis in **03.1**. There were many other alternatives offered: '2' was, not unexpectedly, a common incorrect response and other suggestions included '8' and as many as '50 million' as these last students presumably either misread the question or misunderstood the process of meiosis.

For **03.6** most students ringed an appropriate offspring genotype although a significant minority (about 1 in 15) did not answer this question. The most likely reason for this is that students missed the question, rather than not understanding what they had to do. The lack of answer lines, spaces or boxes to tick should not be seen by students to mean that nothing needs to be done. Students should be reminded to read all of the words on the paper and respond accordingly. Those students who gave incorrect responses often ringed contradictory genotypes, showing a lack of understanding of genetic principles.

Question 4 (low & standard demand)

This question was about water balance in the human body and the treatment of people with kidney failure. The most common error in calculating the percentage of water lost as urine was to simply subtract the volume of urine from the total volume. Some students went on to divide this total by 2600 or by 1430. Consequently, a significant proportion of students were not credited with any marks and half scored full marks.

In **04.2** some students appeared to misunderstand what they were being asked and rather than describing an 'increase' suggested that the water lost from the skin as sweat during a long-distance run 'evaporates', 'dries up' or 'decreases (due to evaporation)'. It was common for students to identify all three of the words required in **04.4**; however, a large proportion managed to get these words in the wrong order. Students appear to know what goes on in the kidney but could not associate the specific terms, 'filtration', 'reabsorption' and 'excretion', with the given descriptions.

For **04.5** references to the advantage of a kidney transplant as not needing frequent hospital visits and the disadvantages of possible rejection and long waiting lists were commonly described. However, many students got no further than these and only very rarely was there any suggestion regarding infection, dietary control, the need to take immunosuppressants or surgical risks. Some students gave a description without any attempt to identify whether these were advantages or disadvantages of transplants; whilst others just described advantages of both a transplant and dialysis.

Question 5 (low & standard demand)

This question was about the brain and vision. In **05.6**, whilst many students realised that being able to detect UV light would enable a bird to feed, very few went on to explain that this would mean they would get more food (than their competitors). Some students suggested that this ability would enable the birds to detect predators, although there was no information that would lead them to this conclusion. Whilst others thought that only rotten fruit would reflect UV light, so being able to detect this would prevent them eating such fruit. **05.8** was not answered well, with the correct response, 'light rays are refracted less' when looking at a distant object being by far the least commonly chosen answer. More light being reflected was the preference of nearly half of the students.

Question 6 (low & standard demand)

This question was about classification, the fossil record and extinction. In **06.5** students often did not make themselves clear when describing the decomposition of various tissues. 'It' or 'they' decomposed were insufficient as the subject of the question was bones. A number of students described the fossils themselves as decomposing. Students did not find **06.6** easy, often just rephrasing the question. A small number suggested the use of carbon dating but the most common correct answers referred to depth or age of the rocks in which the fossils were found as a means of dating them.

06.7 was not well done. Many students were unable to determine the correct time period from the scale on the graph. Some of those who got close to the answer did not realise that the answer line was already primed with 'million' and left their answer as '50 000 million' million. Very few students were able to work out the required answer to **06.8**, despite the mark scheme making allowance for errors from the previous question being carried forward. Many showed numbers in their working which had no evidence of their origin from the graph.

Question 7 (low & standard demand)

This question was about DNA. In **07.1** many students knew the term 'double helix' and gained both of the available marks. Other students attempted to describe the figure lower down on the page, but usually did so in terms of the labelled components of the structure. Various acceptable terms were used as synonyms for 'helix'.

For **07.5** all sorts of mathematical manipulations were carried out with the two numbers in the question. Although these often correctly involved multiplication, the values were sometimes written down incorrectly or the million in the question was interpreted as thousands or billions or anything in between. Consequently, the correct answer was not commonly given. The answer line showed that it was unnecessary to expand the millions in the question, although many attempted to do so. In **07.6** many students carried out further calculations with no reference to the answer they had given in the previous part, introducing all sorts of numbers with no evidence as to their origin. Some multiplied by a factor of 10^9 , whilst others omitted the millions in question 07.5 and simply divided what they had written by 10^9 .

Question 8 (standard demand)

The question was about the decay of milk. In **08.4**, the need to control the volume of milk was frequently recognised, although some students forgot the aim of the investigation and qualified their answer unsuitably as cows' milk. Very few other correct answers were offered, the most common being the time of day when the pH should have been measured. A significant number of students repeated information already provided, including the duration of the investigation, or incorrectly suggested 'temperature' (which was the independent variable).

A large majority of students in **08.6** either misinterpreted the graph itself or the aim of the investigation. Thus, there were many descriptions of temperature and pH falling as time progressed. It was particularly common for students to interpret the y-axis as showing pH, despite it being clearly labelled as the time taken. Thus, a very small proportion of students gained both marks here, and many students omitted any reference to data.

In **08.7** most students did little more than repeat the information that the time taken is less at 10 °C than at 5 °C. Some contradicted the information and described the reverse relationship, whilst others again compared pH10 with pH5. Those who did gain the mark usually referred to enzyme activity. Hardly any referred to a higher rate of division of microorganisms at the higher temperature.

In **08.8** some students recognised that one possible cause was due to differences in composition between the different types of milk, however many of these did not go into detail about what those differences might be. Higher-attaining students picked up on the information and referred to lipid content, different bacteria present or differences in starting pH; however very few were able to offer two acceptable ideas.

Question 9 (standard demand)

The question was about human population increase and the problem of provision of sufficient food. For the calculation in **09.2**, both of the values required were given in the information, so it was not necessary to determine figures from the graph. Despite this, many students did attempt to, often incorrectly. For those who did show the correct numbers in their calculations, a large proportion used them incorrectly, often adding them and very few did the necessary calculation of dividing the difference by 50. Some just left the value at '0.9' and a significant number divided this by 5, rather than by 50. Others calculated the mean of the two given values rather than the mean annual increase.

In **09.3** most students attempted to draw some sort of extrapolation on the graph; however, this was often not linked to the trend shown by the line, rising a little, then plateauing or even taking a downturn. Students could still gain the second mark for reading the correct value from their own line. Often this was not done accurately, particularly by students who continued their extrapolation beyond 2050 and read off the final population value. It was clear that students who simply read the scale, and gave answers such as '10' had not considered the implication that their answer of a human population of only 10, rather than 10 billion, is unlikely.

Of the more successful students in **09.4** these showed some understanding of the term 'quota' and described limiting fishing in one way or another. However, this was as far as some got as they omitted the idea that the remaining fish would be able to reproduce, in order to maintain stocks. Lower-attaining students often suggested that a quota referred to the amount of fish that people could buy or eat. In **09.5** many students did not link the need for more farmland to an increasing population needing more food. References to the use of chemicals to enhance growth were only given very occasionally. In terms of reduced biodiversity, hardly any students went beyond 'cutting down trees' and habitat loss. Few students referred to methane production but these rarely went any further. Whilst many students filled up the available space, most of these simply repeated the same vague points in order to do so.

Concluding Remarks

Particular problems which occurred quite frequently included:

- confusion of certain terms, eg mitosis / meiosis, reabsorption / filtration / excretion
- paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response, avoid misconceptions and the inclusion of irrelevant information
- repeating, rather than using, information given in the question, for which no marks are available
- careless reading of the question resulting in an inappropriate answer, or not following instructions in multiple-choice items, such as to tick the correct number of boxes
- careless reading of data from a graph
- omitting numbers when a question asks for the use of data
- missing a question when no answer lines were provided and the answer needed to be in a table or a Punnett square
- poor handwriting, for example with numerals – especially the distinction between the numbers 1 and 2
- not checking whether the answer to a calculation is sensible – for example, in converting units over an appropriate order of magnitude, such as the conversion of nanometres to metres.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.