



GCSE

Combined Science : Synergy

8465/1H

Report on the examination

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General

This paper performed well, allowing students to gain credit for a range of questions set from standard to high demand. The demand was comparable to previous papers, and to other AQA higher tier GCSE science papers. There was a significant reduction in the number of entries for the higher tier paper. It would appear from the standard seen that more able students have moved to either Biology (8461-1H) or Trilogy Biology (8464/B/1H) so the remaining students did find this a difficult paper and marks were often low on high demand questions.

Levels of demand

Questions are set at three levels of demand for this paper:

- **Standard demand** questions are designed to broadly target grades 4–5.
- **Standard/high demand** questions are designed to broadly target grades 6–7.
- **High demand** questions are designed to broadly target grades 8–9.

A student's final grade, however, is based on their attainment across the qualification as a whole, not just on questions that may have been targeted at the level at which they are working.

Questions 1, 2 and 3 are common with questions 8, 9 and 10 on the Foundation tier. These questions are identical with each other and are targeted at standard demand.

Question 1 (standard demand)

1.1 The most common correct answers were temperature and water levels, although some students gained credit for oxygen, ions or blood pressure. There was a common misconception that various hormones, especially insulin, were controlled by homeostasis rather than being the mechanism by which homeostasis can work. Two thirds of students named a correct condition.

1.2 This question was well done overall, with four fifths of all students gaining both marks. Some students misread the peak value but could still gain 1 mark if their value was in the range of 4-9 and they subtracted successfully.

1.3 There were very few plotting errors. The most common mark missed was for drawing a straight line of best fit instead of a curve. About two thirds of students gained full marks.

1.4 About half of students identified the release of insulin for 1 mark. Only a small percentage went on to explain how this worked to decrease the blood glucose concentration by moving it into muscle, liver or cells, or by converting it to glycogen. Common errors were that glucose was stored in the pancreas or sent to various places in the body to provide energy.

1.5 Two thirds of students correctly identified glycogen.

1.6 Students clearly understood that both exercise and diet are important aspects of lifestyle to be addressed in treating Type 2 diabetes. However, a very large number of students only gained 1 mark because they were too vague about what should be done about the diet. A balanced diet, a healthy diet, not eating junk food and watching your diet were all insufficient to describe a diet low in carbohydrate, low in sugar or low in fat. A third of students gained both marks and a further half gained 1 mark

Question 2 (standard demand)

2.1 On the higher tier, students showed a better understanding about the meanings of the numbers on the atom. About two thirds did the simple mathematics to work out that there were 79 electrons and 118 neutrons. The most common error was to just use the numbers from the atom, giving 197 for the number of electrons and 79 for the number of neutrons.

2.2 A third of all students knew the correct answer for the structure of an alpha particle. The most common alternatives were 'small', 'round' and 'a circle'.

2.3 Many students realized that the total number of particles would be needed and gained 1 mark for 172696. Nearly a half of students then knew how to convert the 196 into a percentage to gain a further 2 marks.

2.4 Full marks were gained by just under half of all students. 1 mark was also a common score, usually for recognizing that alpha particles passed through because atoms are mainly empty space.

Question 3 (standard demand)

3.1 More than half of students knew that mutations could stop cells producing a protein. Many decided instead that it would cause cells to divide.

3.2 This question was well answered on the higher tier paper. MP1 was usually recognized for realizing that white lions would not camouflage in the brown grass and so would be more visible. Many were able to relate this to lack of food and starvation. This mark was also awarded if students thought that predators or hunters would kill the lions, as GCSE students are not expected to know that lions are top predators in a food chain. Some students did realise this and specifically said it would be the white cubs which would be killed. Less than a fifth of students gained MP3 which was about the impact of this on natural selection.

3.3 The genetic diagram for 6 marks was generally very well done. By far the most frequently missed mark was for being unable to identify the brown and white lion phenotypes. Some students did not successfully transfer the parental gametes from the stem of the question, however could still gain 4 marks if derivation, identification and correct probability for their gametes were given. About a quarter of students gained all 6 marks and a further half gained 5 marks. A good range of marks was seen for this question which discriminated well.

Question 4 (standard and standard/high demand)

4.1 Some students misread the question, substituting 'atoms' for 'nuclei'. This led to them including electrons in their responses for similarities and so not gaining this mark. Just over a third of students did gain the mark.

4.2 Students showed a lot of confusion about penetration properties and found it difficult to express. The mark scheme allowed alternatives for what would stop each type of radiation, and a compensation mark for a comparison of penetrating power if no other marks were awarded. References to ionisation were frequent but were ignored. Many students gained MP1 and / or MP2 for alpha and beta radiation but were not specific enough for MP3 as 'stopped by lead / concrete' was insufficient. Overall, a third of students gained some credit.

4.3 About a half of all students gave the correct equation.

4.4 Less than a fifth of students provided a correct definition of half-life. Many students missed the mark because they referred to 'atoms' rather than 'nuclei' decaying.

4.5 A good range of responses were seen although about half of students did not attempt the question or scored 0 marks. Many students noted that with such a short half-life that iodine would have undergone hundreds of half-lives and so the radiation and risk would now be very low or non-existent. Fewer were able to argue the opposite for caesium, with many students writing that the radiation and risk would not have diminished at all because it was not time for one half-life yet.

Question 5 (standard, standard/high, and high demand)

5.1 This was a 6-mark extended response question on the hormones involved in the menstrual cycle. A good range of responses was seen, but most responses were in level 1. 1 or 2 marks were awarded for identification of some hormones from the graph or for isolated facts about them. In level 2, to gain 3 or 4 marks required students to link a hormone to an effect that it has. Level 3 was set at high demand and students needed to identify all hormones and be able to link them to evidence from the graph. One in ten students gained the full 6 marks.

5.2 There was generally a correct calculation of the percentage increase with two thirds of all students gaining both marks.

5.3 It appeared that the benefit of retaining antibodies for a number of years was not obvious to most students. Some did note the fact that further vaccinations would not be necessary. Overall, only about one in ten students gained this mark.

5.4 A very high percentage selected the correct option of 'by producing antitoxins'.

Question 6 (standard/high and high demand)

6.1 This high demand question tested the student's understanding of the mechanism of paper chromatography. Only a few students understood the terms mobile phase and stationary phase, with many believing that the mobile phase was while the solvent was moving up the

paper and the stationary phase was once it stopped moving. Some did deduce that the stationary phase was the paper as it did not move. MP3 was rarely seen, but MP4 was gained if students referred to different substances moving different distances up the paper. Overall, only about one fifth of students gained any credit.

6.2 Just over half of students were able to use the equation and the data given to calculate the distance moved by the substance. Those students who did not convert from centimeters to millimeters were still able to gain 3 marks.

6.3 While some students had the idea that the R_f value needed to be determined, only about half of these went on to compare this with known data to identify the substance. About one in twenty students gained both marks and a further one in twenty gained 1 mark.

Question 7 (standard, standard/high, and high demand)

7.1 A large majority of students recognized algae as the producer in the food chain.

7.2 This 4-mark extended response question was accessible at all levels, with very few students not attempting it at all. Students most often recognised that a lack of fish would lead to starvation and so the population of penguins would fall. Also popular was the idea of increased predators killing penguins. All the factors in the mark scheme were mentioned, but the effect on the population was not always explained. A wide range of responses was seen with nearly a third gaining full marks.

7.3 This was a high demand calculation, and two fifths of students were able to obtain the correct answer. Many students gained 1 mark for calculating the total area covered by nests. The numerous students who used either 60 000 m² or 2 m² from the stem data as the total area were not able to gain any credit.

7.4 The distinction between abundance and distribution in ecological terms was not well understood, so few marks were gained. Answers tended to be very vague and insufficient such as 'abundance is how many there are'. Some marks were awarded for the correct mention of quadrats to measure abundance and transects for distribution.

Question 8 (standard, standard/high, and high demand)

8.1 The link between meristem and mitosis was not well known. About two fifths of students chose the correct option.

8.2 Responses were very vague and general, with less than a quarter being specific enough to gain the mark. 'To stop it spreading' was by far the most common, and insufficient, response.

8.3 Students made good attempts at answering this question and generally gained some credit. Students understood the function of phloem so MP2 was the mark most often awarded, with some going on to gain MP3 for understanding that blocking sugar transport to the oranges would result in them being less sweet. Very few students mentioned that the sugar / glucose was made in the leaves for MP1: although they probably knew this fact, they did not link it to the question asked. Approximately half of all students gained some credit.

8.4 This question, about why the tree would eventually die if the phloem was blocked, was very high demand. Most responses were not attempted or did not gain any marks. The mark most often seen was linked to the idea that without sugar, respiration would stop.

8.5 About half of all students gained credit for ideas on how to control the spread of the bacteria. Generally, this was to use pesticides / insecticides to kill the insects which are the vectors spreading the bacteria. There were other correct suggestions, but ideas relating to washing hands or tools, or spacing out the trees were not correct as the bacteria are not spread by contact, wind or water.

8.6 This should have been an easy question for students familiar with the required practical activity on food tests. However, it was not well answered and perhaps raises a question about how much time is needed when teaching or learning these practical aspects of the specification. Even those students who had some knowledge of Benedict's test often did not heat the mixture of juice and Benedict's solution, and thus did not give a valid method which would allow award of marks in level 2. Overall, about a third of students gained no marks, a third of students gained 1 or 2 marks in level 1 and about a sixth of students gained 3 or 4 marks in level 2.

8.7 Most students who attempted this question had an appreciation that the orange colour of orange juice would interfere with the test. To gain the second mark they needed to explain that orange colour would indicate a positive result even if sugar was not present. Some students gained a mark for indicating that assessing colour was subjective. About a quarter of students gained some credit.

Question 9 (standard/high and high demand)

9.1 Most students gained either 1 mark for a correct conversion or 4 marks for a fully correct calculation. 3 marks was also fairly common, where a student did not convert the energy from KJ to J before calculating.

9.2 It was clear students appreciated the link between increased temperature and increased pressure. MP1 was most often awarded, for the knowledge that the speed of the molecules increased, followed by MP4 to link this to increased pressure. MP2 was usually lost because there was no reference to frequency, and MP3 was rarely seen. Nearly two thirds of students gained credit, with nearly half of these scoring 2 marks.

9.3 Only about a sixth of students knew the term 'internal energy' or the alternative 'thermal energy'. The most common incorrect answer was kinetic energy.

Mark Ranges and Award of Grades

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