

GCSE
COMBINED SCIENCE:
SYNERGY

8465/1H: Life and environmental sciences (Higher)
Report on the Examination

8465
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General

The paper ramps in demand from beginning to end, and to a lesser extent ramps within questions.

Students made good attempts at answering the whole paper, with no indication of problems with time constraints being seen.

Mathematical questions seem to have been attempted more frequently this year relative to last year. Students need to have a calculator in this exam.

Confusion was seen in some responses regarding command words, with the terms describe and explain causing the most significant issues for students. Guidance on command words can be found on the AQA website.

Questions 1 and 2 were common to Foundation and Higher tiers and were targeted at standard demand.

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.

Question 1 (standard demand)

01.1 Students were provided with the binomial name and a third of students could give the genus name from this. '*Canis lupus*' was a common incorrect response. In this instance, attempts to capitalise, or italicise, or not were ignored.

01.2 Even students taking the Higher tier paper found this challenging, despite the question being AO1, to demonstrate knowledge and understanding. There was a clear divide between students who knew what classification is and those that did not.

Many correct answers referred to either just original methods of classification, such as groups based on behaviour, or more recent methods, such as DNA analysis, and therefore could not gain full marks.

Many incorrect answers were confused between classification and natural selection and detailed descriptions of evolution were seen. These did not answer the question.

01.3 More students could define the population, than the term community. Answers were expected to be in terms of biological definitions, as detailed in the specification. Frequently, incorrect responses referred only to human populations, or were too vague to gain credit. Many students defined biodiversity when attempting to describe the term community.

01.4 Most students made excellent attempts to explain the effect of killing the grey wolves on the populations of other organisms. In this extend response question:

- to reach level 1, simple statements regarding changes in population, or interpretation of the food web were required
- for Level 2, students were expected to state and explain a population change, or describe the population change for at least two steps in the food web from grey wolves
- at Level 3, responses were expected to clearly link relevant points from the indicative content in the mark scheme.

Less effective responses referred to just general increasing or decreasing populations, without being specific. Some responses misinterpreted the food web, with references to rabbits having no grey wolves to eat.

01.5 Around 71% of students gained the mark for identifying that reintroduction of grey wolves to an area from different areas would reduce the effect of inbreeding.

01.6 Many students correctly obtained two figures from the graph and could calculate how many times greater the population of grey wolves was in 2014 compared with 1995. Frequent incorrect answers calculated the difference in populations in the two years or read from the graph incorrectly.

01.7 Most students identified that the population has remained stable since 2009. This could be expressed in a variety of ways.

Question 2 (standard demand)

02.1 About 61% of students could identify the difference between isotopes of the same element.

02.2 Around 45% of students could identify both types of sub-atomic particles in an alpha particle. Many students only ticked one box.

02.3 Most students could complete the relative atomic mass and atomic number. However, fewer recognised that the symbol would require looking up on the provided periodic table.

02.4 Around 57% of students could determine the half-life from the graph.

02.5 Many students calculated that five half-lives had passed, and then used a variety of methods to calculate the mass remaining after 44 days.

Partial credit of one mark was available for calculating the number of half-lives, or evidence of dividing 5 (mg) by two, five times but ending with an incorrect mass. The most frequent error seen was dividing by two only four times, despite notes within the response regarding five half-lives.

02.6 Most students were aware that emission of alpha radiation inside the body would cause cancer, or mutations. Fewer students could describe alpha radiation as highly ionising, often just referring to ionising.

- 02.7** Many students could apply their knowledge of alpha radiation to describe alpha radiation being stopped by glass. References to alpha radiation being stopped by paper were insufficient. Some students referred to 'it' being stopped by glass but were not clear whether 'it' was the isotope or alpha radiation.

Question 3 (standard & standard/high demand)

- 03.1** This is a Required Practical Activity (RPA), yet there were a large proportion of non-attempted responses. The most common correct answers were descriptions of adding ethanol and water to test for fat in foods. Answers simply stating ethanol were insufficient for marking point 1, because this does not describe a correct method completely. These answers sometimes gained marking point 2 for stating cloudy, milky or white.

The reagent Sudan III was a common correct response, but fewer students opting for this method gained the second marking point, with a wide range of colours suggested for an incorrect positive test result.

Students could give a number of possible methods to test foods for fats, but the positive result had to correspond to the method they had selected in order to gain both marks, rather than a mix and match approach.

The full range of other food test reagents were seen, often with corresponding positive results, but these could not gain credit for either marking point. Students were asked to describe a method for testing foods for fats, therefore descriptions applying to starch, reducing sugars or protein were inappropriate.

- 03.2** Many students gave the correct answer of statin or statins as detailed in the specification. Aspirin, or named statins, such as simvastatin would also have gained credit.

Common incorrect answers were insulin, stents, cannabis, paracetamol and antibiotics.

- 03.3** Most students achieved some marks for this calculation question. The most common error was regarding the number of significant figures, with students either not attempting to round to three significant figures, as stated in the question, or doing so incorrectly, usually to two significant figures. Sometimes this appeared to be as a result of rounding early, in the first stage of the calculation, so more than three significant figures were no longer available to round, or through incorrectly rounding. Some examples attempted to add a zero to add another significant figure, which could not gain the final marking point.

Some students attempted a percentage change calculation, rather than responding to the question as it was phrased.

Incorrect percentage calculations were frequent. Often, students forgot to multiply by 100, or attempted to divide 12 562 by 636.

Some students attempted the calculation, but clearly did not use a calculator. Students should be reminded that a calculator is required for all examinations for this specification.

- 03.4** Students found this question tough with 11% achieving two or more marks.

The most common marking point awarded was marking point 1, for describing the build-up of fatty material in (coronary) arteries. Students did not have to use the term coronary for

this marking point, so the term arteries was sufficient. However, to gain marking point 2, the term coronary arteries or a clear description to ensure students were not referring to other arteries was required. Many made vague references to blood vessels or arteries and veins, which was insufficient to answer the question.

Students frequently referred to fatty acids, rather than fatty material or plaques.

Marking point 4 was rarely awarded. Some students referred to reduced oxygen supply to the heart, but without mention of heart muscle, this was insufficient. Many students were clearly referring to blood travelling in and out of the atria and ventricles.

- 03.5** Students should be reminded to read the question carefully. Some students were clearly referring the early stages of drug trials, rather than answering the question. The most common response was side effects.

Question 4 (standard, standard/high & high demand)

- 04.1** From the two processes asked for, more students were able to recall the term sedimentation or describe the process. Few students used the term screening, but sometimes the mark was gained for a suitable description of screening, as detailed in the extra information on the right-hand side of the mark scheme.

- 04.2** Students found this question very difficult with few students obtaining marks; only around 11% of students gained any credit. However these students were often then able to give a good explanation linking ideas in the correct context.

Some confusion was seen regarding the air bubbles in Figure 4. There were some incorrect references to the bacteria producing oxygen by respiration, with many other incorrect responses suggesting that the tank was used to boil water to kill microorganisms.

- 04.3** Some students correctly stated that the water is sterilised to kill bacteria. Germs or bugs are not appropriate terms at GCSE level, but microorganisms, microbes or pathogens were acceptable alternatives.

- 04.4** About 6% of students could name the process as reverse osmosis. The incorrect response of osmosis unqualified was frequently given, as were filtration and evaporation.

- 04.5** This question differentiated well between higher-attaining students. Most students could not describe a complete method to measure the concentration of dissolved solids in a sample of seawater. Many incorrectly described filtration.

Marking point 1 was not awarded if inappropriate equipment, such as a petri dish, was used that was later heated.

Marking point 2 was more often seen as measuring the mass of the sample, rather than the volume. This often resulted in students not accessing marking point 6.

Of the marks awarded, marking point 3, for describing heating to evaporate the water was the most common. Sometimes, students implied that the salt had evaporated, so should take care to give clear answers.

Frequently, subtractions were referenced, but inappropriately, such as subtracting the mass of salt from the mass of seawater.

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

- 05.1** Many students correctly plotted the graph and joined the points appropriately. The most common errors were when plotting the negative temperatures.
- 05.2** Students found this question challenging and few realised the significance of a pure substance melting/boiling at a specific temperature. Many incorrectly stated that substance B must be a pure substance because it doesn't decrease in temperature below zero degrees. Others referred to a steady gradient.
- 05.3** Students were often unable to interpret the graph correctly, giving the boiling point, rather than the melting point.
- 05.4** Some students made a good attempt to calculate the rate of temperature change and less than half of the students gained at least one mark.

Occasionally, this was with an error carried forward from question 05.3. In these instances, all three marks were still available. Few students recognised that the rate of temperature change would be negative.

Question 6 (standard, standard/high & high demand)

- 06.1** Students found it difficult to define the biological words abundance and distribution. Frequent incorrect answers defined biodiversity or population density instead.
- 06.2** Students found this context challenging. Many described a method to estimate the abundance of a plant species on a school field. Few students showed knowledge of using a transect, placing it appropriately and then recording the distances sampled. References to repeats were often too vague to gain credit, such as repeat at different distances, or simply repeat and calculate a mean.
- Many students described incorrect methods, such as throwing quadrats. It should be noted that throwing a quadrat is not a valid method of ensuring randomness.
- 06.3** Students could generally put appropriate figures in the equation. However, there was a common mistake of not realising that each student used 80 pins and the class of 30 students put their results together. In this instance, two out of three marks were still available for an otherwise correct calculation. Around 14% of students gained three marks, while more than half of the students gained two marks.
- 06.4** This was generally well answered, with common correct responses referring to small sample size. Some referred to inaccuracies in counting or missing dandelions that were touching pins, which were insufficient to gain the mark.
- 06.5** This was a challenging AO3 question asking students to identify a limitation of the method described; about 30% of students gained credit.
- 06.6** In general, there were a lot of one-mark responses for this question from marking point 2. Long lists of possible adaptations were sometimes given, without any link to the process of

evolution, therefore only marking point 2 could be awarded. Students do need to read the question and be able to put the knowledge that they know into a different situation. Some students answered the question in relation to animals and not plants.

Few students stated words to the effect of a mutation for a beneficial characteristic. If students stated 'mutation' they often didn't expand on this or state a beneficial trait.

Marking point 2 was frequently awarded, however common incorrect responses mentioned camouflage or hiding from animals.

Marking point 3 was rarely given as most said the plant survived but not always stated that plants with this gene bred or passed on the gene.

Few students gained marking point 4 because they were not stating that 'most of the population had the gene' or words to that effect.

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

- 07.1** Many students stated that the density would decrease or stay the same. Answers could be phrased in a number of ways, such as the density increases, it gets more dense, or words to that effect.
- 07.2** Around 29% students gained three out of four marks here. The largest problem was in converting cm^3 to m^3 , using the information given in the question. A maximum of three marks were available for correct calculations from an incorrect or not converted volume.
- 07.3** This was a challenging question in which around 9% of students achieved two or three marks. The most common mark awarded was for decrease in kinetic energy of particles. Sometimes, students did not qualify the energy as kinetic and therefore did not gain this mark.

Marking point 2 required a change in the frequency or force with which the inside wall is hit. This was not often awarded, with responses often incorrectly referring to less successful collisions or reactions.

Marking point 4 was not seen often. Many students stated that the volume would decrease, without offering any explanation. Students should be reminded that responding to explain and describe questions required different approaches. Guidance on command words can be found on the AQA website.

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

- 08.1** Phonetic spelling is always credited unless there is possible confusion with another term. Incorrect responses seen here included glands, pituitary, pancreas, hormone and brain.
- 08.2** About 60% of students answered this correctly. Others were confused by the context and referred to fallopian tubes or gave other incorrect answers such as nerves.
- 08.3** This difficult concept, negative feedback, was applied to a situation that was new to students. Therefore, it was an AO2 question. The most effective responses did gain all three marks. However, often responses were confused and had not made any attempt to interpret Figure 9 and apply their own knowledge.

- 08.4** Students were expected to apply their knowledge of the menstrual cycle to this question. More often, simple recall statements regarding the role of FSH and LH were seen. Often, it was unclear if students knew which hormone matures an egg, and which releases an egg, therefore credit could not be given.
- 08.5** Students had a good attempt at this question and most marks were awarded for marking points 3 and 4.

Most students referred to progesterone, but some made an incorrect assumption that progestin cancels it out or is the opposite of progesterone. Students need to apply the information that they have learnt and the information that is given to them in the question paper to a different situation.

Marking points 1 and 2 were rarely seen. If a student stated negative feedback they often didn't refer to the pituitary gland.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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