



GCSE

Combined Science: Synergy

8465/1H Paper 1 Life and Environmental Sciences Higher Tier

Report on the Examination

8465
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General comments

The entry for this paper was lower than in previous years. Despite this, a wide range of achievement was seen. All marks were accessible although overall the paper proved to be slightly more difficult than previous years.

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)

- 01.1** A majority of students knew that bacterial cells are prokaryotic.
- 01.2** Approximately half of all students were able to give one difference between a bacterial cell and an animal cell, most commonly that the bacterium had a cell wall or had DNA in plasmids.
- 01.3** Answers were very poor, as more than half of all students believed that a filter would make the water safe at home in the case of bacterial contamination. Only filters with silver ions which kill pathogens was acceptable as a filter answer. The only correct answer seen regularly was boiling, and occasionally the use of chlorine tablets.
- 01.4** If students made the correct readings from the graph, they generally went on to calculate the correct answer, although some subtracted instead of dividing. A common error was to read the wrong bar for day 10 as 32, but these students could then go on to gain two marks by dividing correctly.
- 01.5** Half of all students recognised the pattern that *E. coli* cases followed rainfall after about 5 days. Most often this was expressed using the figures for day 12 and day 17. Some students did not gain the mark as they gave data for just one day, for example 'rainfall and *E. coli* cases were both high on day 17'.
- 01.6** The role of climate change causing more extreme rainfall was linked by almost all students to flooding and so more cases of *E. coli*.
- 01.7** Methane was commonly known as a greenhouse gas, but water vapour less so.

- 01.8** Burning less fossil fuels, using electric cars and planting more trees were the most common correct answers. Walking, riding a bike or using public transport only gained credit if qualified by saying to do this instead of driving a petrol / diesel car. Alternative energy sources were mentioned by some students and also less deforestation, but the idea of carbon capture and storage was rarely seen.

Question 2 (standard demand)

Most students showed familiarity with this photosynthesis required practical activity and were able to gain marks for a method. A range of marks from 0 to 6 gave this question very good discrimination. Many students at higher tier gained 3 or 4 marks for describing the basic independent and dependent variables and an outline method. They often failed to reach level 3 because of lack of precise details such as measuring equipment, control variables or repeats to calculate a mean at each distance. Just over a tenth of students scored in the top level to gain 5 or 6 marks.

Question 3 (standard demand)

- 03.1** About a third of students gave parallel as the direction of oscillations in transverse waves.
- 03.2** It appeared that students did not have a good understanding of the ripple tank required practical activity. Those with some knowledge gained one or two marks for the idea of counting the number of waves in a set time period. Those who gave details of suitable equipment to do this and how to calculate frequency gained a higher score. Just over half of all students gained two to four marks.
- 03.3** The equation for calculating wave speed was well recognised.
- 03.4** The diagram of 3 wave fronts seemed to confuse many students who were unable to work out where to measure one wavelength. The correct measurement was 1.6 cm (16 mm), but answers in the range of 15 -17 mm were acceptable. Other common incorrect measurements were 2.5 cm for a label line, 3.2 cm for 2 wave lengths and 7 or 7.1 cm which was the length of the wave fronts. Any of these could still go on to gain three marks if correctly converted to metres, substituted into the equation and calculated. A quarter of students gained the full four marks.

Question 4 (standard and standard/high demand)

- 04.1** Two thirds of students knew that antibiotics would not be used to treat measles because measles is a virus pathogen.
- 04.2** Some students appeared to not read this part carefully as they gave the skin as a barrier and stomach acid as defenses against measles pathogens entering the lungs. The mark most often gained was for mucus trapping the pathogens. Some gave the correct process by which cilia move the mucus away from the lungs but many more just stated cilia or described them as nose hairs.
- 04.3** The role of platelets to clot blood was well identified.

- 04.4** Many students did not gain credit as the antibodies produced needed to be against the measles pathogen and not just general antibodies. The mention of phagocytosis was ignored but the idea of antitoxins was incorrect as these are only produced against toxins secreted by bacterial pathogens.
- 04.5** Almost all students calculated the simple ratio correctly. Some students left the ratio as 66:11 which is not the lowest whole number ratio.
- 04.6** Just over a half of all students understood that a high ratio of vaccinated to unvaccinated people would prevent the spread of measles, but less said that this was because most were already immune due to vaccination.

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

- 05.1** This question was set at high demand and required both the ideas of automatic and quicker, to gain the mark. Many students were able to give one only and so did not gain credit. A fifth of students gained the mark.
- 05.2** This question discriminated very well and responses gained marks from 0 to 6. The marking points most often missed were for the relay neurone in the CNS and vague terms for impulse such as signals, messages or information. These were penalised only once for the whole response.
- 05.3** Very few marks were gained because students gave various versions of the variable already controlled or suggested how to change the method to investigate caffeine intake.
- 05.4** Over half of all students calculated that the range was 170 ms, but did not, or could not, gain the final mark for converting this to seconds.
- 05.5** Very few marks were seen mainly due to students not writing about both SRT and CRT for marking point 1. Marking point 2 was rarely seen. Again many students used the opportunity to suggest extensions to look at various other aspects of reaction time, but as these did not answer the question no marks were awarded.

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

- 06.1** Volcanic activity was widely known to be the source of nitrogen in the Earth's atmosphere.
- 06.2** Many students tried to use the graph to determine a change in y and a change in x, however the x axis scale of millions of years ago decreasing to the present day proved a problem for many. Provided an attempt had been made using values from the graph, the final mark for 2 significant figures was awarded. A sixth of students gained full marks.
- 06.3** It was generally assumed that the carbon dioxide in the atmosphere had decreased due to the growth of algae which used it for photosynthesis. Students had put this into the wrong time period as when the oceans formed it was a long time before the emergence of any life forms. So a sixth of students gained this mark, usually for carbon dioxide dissolving or being absorbed in the

oceans but occasionally for the idea of formation of carbonates or being locked in sedimentary rocks.

- 06.4** Students made a creditable effort and often gained the first two marks for photosynthesis forming oxygen. Full mark answers were seen by only a tenth of students.

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

- 07.1** These questions were set at high demand and required very precise and detailed answers.
& 07.2 Less than a twentieth of students were able to give these.
- 07.3** Over half of all students gained two marks for understanding how killing narwals could have two different effects on the seal population.
- 07.4** Most students were able to apply a simple percentage calculation to find the mass of carbon passed to the primary consumer. A minority understood that it was only 8.4% of this passed on at the next two stages. A few students counted the number of stages to tertiary consumer and calculated how much would go to a hypothetical quaternary consumer.
- 07.5** Just under half of all students recognised that active transport would be needed to transport ions from a low to a high concentration of them. Osmosis was the most common incorrect answer.
- 07.6** Students mostly knew that magnesium ions were needed for the production of chlorophyll and without it the rate of photosynthesis would be less. Few went on to say this would affect the amount of glucose formed, and even fewer students mentioned nitrate ions needed for protein synthesis. Many students thought that both magnesium and nitrate ions were needed for photosynthesis and so ignored the role of nitrate ions separately. Any mention of nitrate ions in chlorophyll was ignored.

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

- 08.1** Many students could give either differentiation or mitosis as a process occurring in meristem tissue but seldom both.
- 08.2** Responses were generally weak. This was a high demand question and the majority of answers, while showing some knowledge or understanding, just did not have the detail to gain marks. Many misinterpreted the question as asking for descriptions of meiosis and mitosis which rarely gained marks.
- 08.3** More than half of students recalled that lignin was also present in xylem tissue.
- 08.4** This question part was another high demand question which did not generate many marks as there were very few answers with precise detail. It was not sufficient to refer to the characteristic, chromosome or DNA being passed on and the reference to many generations was seldom seen. Misconceptions included referring to the process as selective breeding, believing it was the acorn with the mutation and often that it was the lignin itself causing the mutation.

Question 9 (standard & standard/high demand)

- 09.1** The structure of an atom was relatively well known and about a half of students gained three marks. One mark was common for putting three crosses on the appropriate electron shells. Some students had what appeared to be a correct lithium atom using plus signs for the protons and open or closed circles for neutrons, but these were not acceptable unless labelled as requested in the question.
- 09.2** It was evident that many students only have a vague idea of the different models of the atom, and they did not appreciate the events that had led to changes over time. One or two marks in Level 1 were gained by about a half of students for giving aspects of one or more models. For Level 2 an idea of timeline and the reasons the models changed was required. However, some students had excellent knowledge of the history of the development of models of the atom and scored full marks.
- 09.3** Many students were able to convert the value to metres and standard form.
- 09.4** Many students had some idea of how a change of state could show if a substance is pure but found it difficult to describe this. Phrases such as consistent temperature, same temperature, fixed temperature or certain temperature were not accepted for specific temperature, but exact temperature or constant temperature were acceptable.

Question 10 (standard/high and high demand)

- 10.1** This calculation was done well. A third of students gained full marks and about another half gained three marks instead of 4 because they did not convert 33 kJ to 33 000 J.
- 10.2** Some students gained one mark for explaining that the joulemeter would record more energy used than the energy that actually went into melting the wax.
- 10.3** The calculation in question part was answered well with half of students scoring the full four marks.

Mark Ranges and Award of Grades

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