



GCSE

Combined Science: Synergy

8465/1F Paper 1 Life and Environmental Sciences Foundation Tier

Report on the Examination

8465
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General comments

This paper was of the same general difficulty as previous 8465/1F papers. Students were able to access all of the marking points. However, the majority of students were unable to apply knowledge of the Required Practical Activity on waves in a ripple tank, so few marks were gained for this question.

Levels of demand

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

- **Low demand** questions are designed to broadly target grades 1–3.
- **Standard demand** questions are designed to broadly target grades 4–5.

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

Question 1 (low demand)

- 01.1** Most students understood that the primary consumer eats the producer, but nearly two thirds assumed this must be the top consumer and named the polar bear instead of krill.
- 01.2** Predator was well understood and correctly named by over four fifths of all students.
- 01.3** Terms used in ecology were generally well understood and matched to definitions. Over 40% of students gained all 3 marks and a further 40% gained 2 marks.
- 01.4** The effect of a change in the food chain could be predicted and over three quarters of all
& 01.5 students gained credit in each question.
- 01.6** Approximately two thirds of students could calculate a percentage having been given the equation to use.
- 01.7** The role of magnesium ions in chlorophyll was less well recognised with only half of students gaining the mark.
- 01.8** Some confusion clearly still exists about the meanings of biotic and abiotic factors. Half of all students did correctly choose the two correct options.

Question 2 (low demand)

- 02.1** Students mostly made a correct calculation using the given equation. The understanding of the unit was less widespread with many giving J as the unit rather than J/Kg.
- 02.2** Four fifths of students knew that the extra energy was transferred to the surroundings.
- 02.3** 20% of students were able to choose the two ways to reduce energy loss.
- 02.4** A significant number of students could not identify the change in temperature from the graph, usually giving 82 °C, possibly by assuming it started at 0 °C. As questions 02.4 and 02.5 were marked together, just over half of students gained 2 marks in question 02.5 with an incorrect temperature change in question 02.4.
- & 02.5**

Question 3 (low & standard demand)

- 03.1** Over three quarters of students deduced, rather than calculated, the value **X** to gain 2 marks.
- 03.2** Students found the comparisons of gases on Earth today and Mars today very accessible, and nearly 60% gained all three marks. Some students gave other facts about Earth and Mars, including water content, temperature and gravity comparisons.
- 03.3** Volcanic activity was well identified as the source of nitrogen in the Earth's early atmosphere.
- 03.4** It was less well known that the oceans dissolved the carbon dioxide with many thinking it had either condensed or evaporated.
- 03.5,** The unfamiliar context of the meteorite seemed to confuse some students who then struggled with these questions. Electrons was the most common response in question 03.5 and the majority of students felt the meteorite may contain toxic substances.
- 03.6**
- & 03.7**

Question 4 (low & standard demand)

- 04.1** Two thirds of students knew that antibiotics do not kill viruses.
- 04.2** While the role of mucus in trapping pathogens was often seen, students were very vague about cilia and often confused them with nose hairs.
- 04.3** Stomach acid was given as having various effects from producing antibodies and phagocytosis to the vaguer burning, dissolving or fighting the pathogens. Only breaking down or destroying pathogens were accepted as meaning the same as killing the pathogens.
- 04.4** Vaccines were generally identified as containing weakened pathogens.
- 04.5** White blood cells were identified as those that produce antibodies by over two thirds of all students.

- 04.6** Very few students gained 2 marks for the sketch graph in question 04.6. Only two thirds attempted a response, and a few gained one mark for a line rising above the first peak. The second mark for a steeper gradient was rarely seen.
- 04.7** This simple ratio was answered well by four fifths of all students.
- 04.8** The advantage of vaccination to stop the spread of measles was known with many mentioning herd immunity.

Question 5 (low & standard demand)

- 05.1** Students at foundation tier find the reflex arc difficult to understand. While most could identify that the receptor was in the skin, they usually had this travelling along the spinal cord and the effector being a neurone. One tenths of students did gain full marks and some gained two marks for the receptor in the skin and the muscle as effector.
- 05.2** The gap between neurones was known by approximately half of all students as a synapse.
- 05.3** In the reaction time investigation, sex or gender was the most common correct answer. Hours of sleep, no caffeine or no distractions were also seen quite often. The most common incorrect answers were vague terms like weight, height, fitness, and very often age despite this being the independent variable.
- 05.4** Reading the reaction time from the bar chart and identifying the lowest mean reaction time were
& 05.5 done well.
- 05.6** Students also knew how to calculate a mean and were able to describe this.
- 05.7** The conversion of milliseconds to seconds met with mixed success, with many multiplying by 1000 instead of dividing. Those who did divide sometimes appeared to lose count of the decimal places so still did not gain the mark.

Question 6 (low & standard demand)

- 06.1** Students were better this year in understanding and applying the binomial name system, so just over a half of students gained the mark for Quercus.
- 06.2** Approximately three quarters of all students also appreciated that two species in the same genus would be closely related.
- 06.3** It was rare for a student to relate the tips of the branches to a growing shoot and so give the correct response of meristem. Most scored 0 marks and a quarter of students did not attempt an answer.

- 06.4,** Although it appears that some students struggled with the unfamiliar context of an acorn gall,
06.5 those who read the stem were able to give fertilisation as the process leading to seed formation,
& 06.6 mitosis as the process which produces cells with two sets of chromosomes and evolution as the process which causes change over time.
- 06.7** Students were on surer ground in questions 06.7 and 06.8 about transport in plants. Xylem and
& 06.8 phloem were given by a majority of students from the words on offer.
- 06.9** Less than one in ten could name transpiration as the process that moves water from the roots to the leaves. Transportation was seen fairly regularly.

Question 7 (low & standard demand)

- 07.1** Students either clearly knew the structure of an atom well, or had very little idea. So two fifths gave answers worth 4 marks, and others scored 0 despite the words being given.
- 07.2** Two thirds of students were able to identify the element as lithium.
- 07.3** Less than a tenth of students gained the mark. Some did come close with the idea that electrons and protons cancelled each other out.
- 07.4** While the nucleus of a helium atom was mostly identified as the smallest structure in the list, a great many students thought the protein molecule was the largest and so were limited to 1 mark.
- 07.5** Most students were able to express the figure given in standard form.
- 07.6** The plum pudding model was well recognised but various puddings, including pies and tarts were seen. Only the plum pudding model gained the mark.
- 07.7** A third of students were able to recall that the models contained electrons and so earned a mark.

Question 8 (standard demand)

- 08.1** Less than half of students knew that bacterial cells are prokaryotic.
- 08.2** A fifth 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.
- 08.3** A large majority of 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. A quarter of students gained the mark.
- 08.4** 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 2 marks by dividing correctly.

- 08.5** Approximately one quarter of 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. Many 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’.
- 08.6** The role of climate change causing more extreme rainfall was linked by most students to flooding and so more cases of *E. coli*.
- 08.7** Methane was fairly commonly known as a greenhouse gas, but water vapour less so. There was a tendency to name any gases the student could remember.
- 08.8** Burning less fossil fuels, using electric cars and planting more trees were the 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 rarely seen. About a half of students gave a correct way to reduce carbon dioxide concentration in the atmosphere.

Question 9 (standard demand)

Most students showed some familiarity with this Required Practical Activity about photosynthesis, and were able to gain some marks for basic facts about the method. Usually at this level the lack of details, not identifying the independent or dependent variable or lack of any control variables restricted the student to Level 1 and so 1 or 2 marks. However, a range of responses were seen up to a full 6 marks for a very good method. No marks were gained by those students who just suggested moving the pondweed further and further away until it stopped bubbling.

Question 10 (standard demand)

- 10.1** Most students gave parallel as the direction of oscillations in transverse waves with a third giving the correct answer of perpendicular.
- 10.2** Students did not appear to have a good understanding of the ripple tank Required Practical Activity. Those with some knowledge were usually restricted to 1 or 2 marks for the idea of counting the number of waves in a set time period. Details of suitable equipment to do this and how to calculate frequency gained a higher score.
- 10.3** The equation for calculating wave speed was well recognised with about four fifths of students gaining the mark.
- 10.4** 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 3 marks if correctly converted to metres, substituted in the equation and calculated. About a sixth of students gained 3 marks for a correct measurement and calculation but failing to convert 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.