

GCSE
COMBINED SCIENCE:
SYNERGY

8465/2H

Report on the Examination

8465/2H

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General

The quality of answers seen would suggest that a significant number of students may have demonstrated their knowledge and understanding better in the Foundation Tier paper. Answers to questions at the higher demands of this tier require more precision of language and clarity than would be expected in the Foundation Tier.

Students should be discouraged from the use of 'it' or 'they' unless the 'it' or 'they' to which the student is referring is absolutely clear. The formation of letters and numerals made some answers unclear and examiners can only credit what they can read. Ecology as an area of study was generally not well answered in this paper.

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** 60% of students achieved two or more marks for this question. Answers such as, 'the size of the bag' and, 'the volume of water' were not uncommon, but do not answer the question. The most common correct answer seen was 'use the same size bag'.
- 01.2** Resolution appears to be a concept that is not well understood with 31% giving a correct answer.
- 01.3** The stem of the question requires an answer which is comparative, so 'it was a cold day' was not awarded the mark. 64% of students achieved the mark.
- 01.4** This proved a successful question for 93% of students. However, poor formation of numerals meant that '4' could often easily be interpreted as '7' or '9'.

- 01.5** Most students selected 'black bag' with reasons based on evidence or knowledge that black is the best absorber of heat. The statement based on evidence from Table 1 required an answer such as 'because it had the **greatest** temperature rise'. A common misconception is that that black **attracts** heat and light.

Question 2 (standard demand)

- 02.1** This question required a specific answer, 'ionising radiation', or an example. Many students gave 'radiation' which was insufficient at this level. A few students correctly suggested mutagenic chemical. 14% of students achieved this mark.
- 02.2** 52% of students achieved one mark here, with 33% of students achieving two marks. 'Enzymes' was the most common one mark answer, with 'white blood cells' being the most common incorrect answer.
- 02.3** The quality of answers seen would suggest that a significant number of students struggled with this 'extended response' question. Answers were generally poorly structured, with points not in a logical sequence. It was often difficult to interpret student's meaning because of weak knowledge and understanding of the topic, and limited powers of expression.

However, the question did discriminate between students well. 7% of students were able to access level 3, 32% of students were able to access level 2, and 50% of students accessed level 1.

Question 3 (standard demand)

- 03.1** 79% of students correctly identified 'trachea' here, with 'bronchus' the most common incorrect alternative.
- 03.2** Both the scan and the X-ray show clear images so 'clear' was insufficient. The scan shows more detail. Answers in terms of not using X-rays or avoiding problems associated with ionising radiation were also allowed. 29% of students achieved this mark.
- 03.3** 59% of students were able to answer this question correctly.

03.4 18% of students achieved all three marks in this question. Common misconceptions included:

- anaerobic respiration **needs** carbon dioxide / lactic acid
- anaerobic respiration only happens in plants
- confusion between respiration and breathing
- the idea that aerobic respiration **needs** carbon dioxide and anaerobic **needs** lactic acid
- aerobic respiration **produces** oxygen / glucose
- energy is made, created or produced.

03.5 5% of students were able to construct a clearly sequenced, correct account in this 'extended response' question. Much of what was seen was colloquial, eg 'smoking rots the lungs', 'tar clogs lungs'.

Smoking is indirectly linked to a considerable range of health problems which students are taught or research for themselves. It is important however that they are aware of the clear-cut examples given in the specification.

93% of students were able to achieve at least one mark, and 32% of students gave level 2 responses.

Question 4 (standard and high demand)

04.1 75% of students achieved both marks for this question. 'Availability of food' was the most common correct answer.

04.2 62% of students were unable to give a creditworthy answer to this question. The question is about the accuracy of the **data** for the **one** woodland, so saying 'do more woodlands' was incorrect. The ideas of animals hiding so not being counted, or being counted twice were the most common acceptable answers.

04.3 This question had a mark available at all levels of demand. 87% of students achieved at least one mark, with the easiest mark for 'the line goes up and down' being given by most. The second mark was for a line where all peaks and troughs were below those of the prey line. The final and most difficult mark achieved by 6% of students was for showing that the line drawn was slightly after the prey line.

04.4 53% of all students achieved at least one mark for this question. Of the incorrect responses a significant number of students stated that voles eat mice.

Question 5 (standard and high demand)

05.1 68% of students were unable to achieve any marks in this question. Most students did not seem to be aware of:

- antigens on bacteria
- specific antibody production by lymphocytes
- rapid response by white blood cells on second exposure which prevents the production of sufficient bacterial toxins to cause illness.

Common misconceptions included:

- antibodies engulfing pathogens
- antigens (in common with enzymes) are not alive so cannot be killed
- antigens engulfing bacteria.

Many responses were not accurate and precise enough to gain credit. The body 'making stuff to kill bacteria' is not sufficient for 'white blood cells produce specific antibodies against salmonella antigens'. And 'the vaccine teaches the body to fight off disease' without further amplification is not enough either.

05.2 74% of students were unable to achieve any marks in this question.

A creditworthy answer follows the sequence of:

- **random** mutation
- survival of the organism with mutation
- reproduction by survivors to pass on the resistance gene.

Students must take care not to imply that the mutation was a conscious act. 'A mutation caused the bacteria to become resistant', not, 'the bacteria mutated to become resistant'.

Many students inaccurately wrote about bacteria becoming **immune** to antibiotics.

Question 6 (standard and high demand)

- 06.1** 66% of students did not achieve any marks in this question. The most common error was to calculate the percentage remaining as opposed to calculating the percentage decrease.

Rounding of 66.60606908 was often incorrect, with 66.60 and 66 seen. A significant number of students were unable to round correctly or show working where $\times 100$ was needed.

- 06.2** Most students wrote about the 'ruler dropping method' as expected, as this is the Required Practical Activity. The description given had to be a clear sequence of instructions that could be repeated to achieve full marks. Most students achieved marking points two and three, marking points one and four proved more difficult.

Marking point one required a description of exactly the reading where the ruler was held in relation to the finger and thumb of the catcher. Some students appear to have used a ruler calibrated with time, but this is not explicit in their account. Some students suggested the use of a stopwatch overlooking that the reaction time of the watch holder would also be involved. Marking point four required a description of how the ruler reading was converted into time.

The question discriminated well with 50% of students achieving at least two marks and 1% achieving all four marks.

- 06.3** 24% of students achieved the mark in this question. Many students gave 'no human error' unspecified as the answer which was insufficient.

- 06.4** 18% of students achieved both marks and 45% achieved one mark. A number of students did not appear to appreciate that 'increased reaction time' means slower.

- 06.5** This question asks for an evaluation of the newspaper's statement using information from figures 4 and 5. This question was not answered well with zero students achieving three or four marks. Most students evaluated the data rather than the newspaper statement. 45% of students were able to achieved one or two marks.

The most common one-mark answer was to say that 'accuracy decreases as both lack of sleep and alcohol intake increases'. Many students did not use the data as instructed so that their answers were unclear. Very few students were able to analyse the data and clearly state their findings. Many students made statements which they did not justify from the evidence. Many did not refer to the statement in their answer.

Question 7 (standard and high demand)

- 07.1** 23% of students achieved all four marks in this calculation, while 50% of students did not receive any credit. Common errors included:
- calculating cases \div deaths
 - reading the wrong scale
 - not using 103 correctly
 - not giving the answer correct to two significant figures
 - not rounding correctly.
- 07.2** An epidemic is characterised by a sudden increase rising to a peak. A high number of deaths is not necessarily a peak and a low number of cases is not necessarily a fall. 42% of students gained no marks while 22% achieved both marks.
- 07.3** 60% of students achieved this mark for identifying the lack of data before 2002.
- 07.4** Cholera is identified in the specification as an area of study, but 67% of students were unable to give a creditworthy answer. The essential point is that cholera must be ingested in drinking water or on contaminated food and therefore 'through water' was insufficient. Many students thought that cholera is contagious or spread by a vector.
- 07.5** A significant number of students described filtration systems using the parts in the diagram instead of describing the ideas of distillation in this context. Many students suggested that the plastic was to collect rainwater. 27% of students achieved three or more marks. 16% of students did not attempt this question and 37% gave responses that were awarded zero marks.
- 07.6** The stem of the question was designed to point the students in the right direction by stating 'the steriliser emits light'. However, a significant number of students suggested that a chemical was released. Very few of those who gave UV light were able to gain the other two marks. 17% of students achieved any marks in this high demand question (most of which were rewarded one mark).

Question 8 (standard and high demand)

08.1 This 'extended response' question was designed to test concepts and skills acquired during the performance of a Required Practical Activity. Students struggled to write a logical and clear account. Many did not seem to remember the correct terms so wrote of a 'metal wire thing' and 'Punnett squares'. Students often did not make the meaning of 'along the shore' clear.

Many students gave a reasonable account of the use of quadrats but did not answer the question regarding distribution and abundance across the shore.

The question did differentiate between students well. 32% of students accessed Level 2 and 7% achieved five or six marks. However, a large proportion of students received no marks: 13% of students did not make an attempt, and 24% gave responses that couldn't be credited with any marks.

08.2 69% of students achieved one or two marks here. 'Dog whelk' was the most common incorrect answer. A significant number of students appeared to interpret 'most abundant' as 'least common'. Many students who gave 'toothed wrack' said 'because there were more of them' without explaining how the diagram showed that.

08.3 7% of students scored any marks in this high demand question. A commonly seen answer was 'greater biodiversity because more things live there'.

Question 9 (standard and high demand)

09.1 84% of students did not gain any marks in this high demand question. 3% of students achieved three or four marks. The most common mark given was for electrons / atoms gaining energy.

09.2 This question discriminated between students very well with almost equal proportions of students spread across the mark range. Students would appear to have a sound understanding of atomic structure, with 85% achieving at least one mark, and 20% achieving full marks.

Common misconceptions were that ‘electrons must be drawn in pairs’ and ‘neutrons should equal protons’. Some stated that the number of protons, electrons and neutrons was wrong without stating details.

09.3 69% of all students answered this question correctly. The fourth option was the most common incorrect choice.

09.4 A significant number of students gave answers in term of nitrogen changing into carbon. Few answers offered the complete story of a neutron splitting to produce a proton **and** an electron.

There was considerable confusion about the meaning of the subscripted and superscripted numbers preceding the atomic symbols. The subscripted number was taken to be the number of electrons. As a result many answers were in terms of atomic number increasing because an electron had been gained. 16% of students achieved one or two marks for this question.

09.5 13% of students understood the idea of half-life sufficiently to achieve both marks. Otherwise students attempted to calculate 12.5% of 5730. The most common reasonable error was to use the calculation for 4 half-lives.

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.