

GCSE
COMBINED SCIENCE:
SYNERGY

8465/2F: Life and environmental sciences (Foundation)
Report on the Examination

8465
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General

This was the second year of the new GCSE specification and it appeared that students had sufficient time to complete the paper although it was noted that many of the extended response questions towards the end of the paper were not attempted. Questions 7 and 8 were common with the Higher tier.

The Required Practical Activity (RPA) questions on food tests and reaction time were poorly answered and in part, this suggested that students may not have reviewed this work in preparation for the exam.

Mathematics and calculations also proved to be an obstacle to Foundation tier students.

Recall of terminology was another area of weakness with many students unable to convey the meaning of key terms.

As always, students are reminded to write in black ink. Where handwriting is poor, examiners make every effort to read what is written, but some answers can be difficult to read.

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.

Question 1 (low & standard demand)

- 01.1** Around 72% of students scored the mark for correctly selecting wave B. The most common error was the selection of wave A.
- 01.2** Around 89% of students gained the mark for correctly selecting wave C. The most common error was the selection of wave A.
- 01.3** Approximately 70% of students were able to identify that there were two complete wavelengths.
- 01.4** More than a quarter of students were able to identify the correct units for all three quantities. Around 30% gained two marks and more than 26% gained one mark. The unit for wavelength was often given as m^2 or m^3 .
- 01.5** Over half of the students correctly identified the wave equation. Many suggested wave speed was calculated by dividing frequency by wavelength or wavelength by frequency.
- 01.6** Around 60% of students correctly identified sound as being a longitudinal wave with the other distractors both scoring a similar number of incorrect responses.

- 01.7** Around 77% of students were able to calculate the mean value from the table. Those that did not score the mark were often unable to divide the added test results by three.
- 01.8** About 54% of students achieved the mark for calculating speed. Most students were able to carry out this simple calculation using a calculator. However, a significant number did not gain the one mark available because the answer they gave had been incorrectly rounded.
- 01.9** A third of students identified either the fast speed of sound or the effect of human reaction time leading to inaccuracy. Those that got the mark generally referred to human reaction time.

Many others had some idea but were unable to express this adequately. For example: the student may press the button too late; don't know when to stop the watch; or can't stop watch in time. A number of students thought it was because we cannot see the sound wave or because a stopwatch does not measure distance.

Question 2 (low & standard demand)

- 02.1** Around 55% of all students gained the mark for correctly identifying guard cell. The most common error was to select xylem cell.
- 02.2** Just below half of students scored the mark for correctly selecting 8.3 μm . The most common error was the selection of 0.000083 μm .
- 02.3** Around 30% of students were able to correctly calculate the percentage of stomata that were open. Approximately a further 14% gained one mark for showing their working whilst unable to give the correct calculated value.

A significant number of students gave an answer of 40% which was unable to score any marks. Around 9% of students did not attempt the question.

- 02.4** About 28% of students achieved the mark by identifying the function of the stomata. Around half of students thought the stomata allowed water to enter the leaf.
- 02.5** Around 3% of students gained all three marks with about 18% scoring two marks and about 29% one mark. Many students referred to the dye being soaked up, sucked up or absorbed which were all too vague to gain credit.

Very few knew gave the word, xylem. Descriptions about the dye actually entering the leaf were often too vague to gain credit, as were answers referring to dye being in the leaves without any description or indication of how it had got there.

- 02.6** Around 8% of students scored two marks on this question with just below half gaining one mark. Students generally understood the idea of changing the number of leaves but were less likely to identify what to measure.

- 02.7** Around 9% of students gained both marks and almost a third scored one mark. It was also noted that around 8% of students did not attempt this question.

Common incorrect responses included heating the water and cutting the celery stick shorter. Many students were predicting the results instead of giving ways to increase the rate of water uptake. Some gave vague answers such as ‘more Sun’ and ‘see the rate’.

Question 3 (low & standard demand)

- 03.1** Food tests were not answered well with about 9% gaining all three marks. Approximately 10% of all students did not attempt to answer this question.

Most were unable to score by simply describing the colours with no reference to whether starch, sugar or protein was present.

- 03.2** About 43% of students gained the mark for correctly selecting carbohydrase. The most common error was the selection of lipase.
- 03.3** Approximately half of all students scored the mark for correctly identifying the mitochondria. The most common error given was ribosomes.
- 03.4** Around 3% of students achieved three marks with almost a quarter scoring one or two marks. Many were unable to correctly identify the food from Table 2. Most that gave the correct food only gave reference to sugar being a problem for a person with Type 2 diabetes.

Some did not gain credit because they gave inconclusive results with phrases such as less sugar or a bit of starch. There were very few references to starch being a problem.

Question 4 (low & standard demand)

- 04.1** Most students could identify two or three of the missing cell parts with around 67% achieving two or three marks. The most common error was plasmids which are not found in a plant cell. Some students gave three types of plant cell instead of three parts of a plant cell.
- 04.2** There were very few students who appreciated that the cell wall was for strength and support with almost a fifth achieving the mark.

The incorrect responses were almost equally split between giving the cell membrane function as controlling the passage of substances in and out of the cell and the idea of protecting the cell against invasion of pathogens.

Protecting the cell was too vague, unless this protection was explained in terms of stopping the cell from bursting when water enters.

- 04.3** The vast majority of students scored the mark for identifying the meaning of partially permeable.

- 04.4** Around 63% of students gained the mark for correctly identifying osmosis as the process by which water enters the root cell. The most common error was active transport.
- 04.5** About 37% of students achieved the mark by identifying active transport. Many more thought that diffusion was how potassium ions would move into a root cell.
- 04.6** About 23% of all students gained two marks with a quarter of students securing one mark. Most were able to identify that substance C was too big. Students were less able to communicate that this would make it difficult for it to pass through the cell membrane.
- 04.7** The most common correct answer was the size of the potato cubes, but the amount of sugar solution and the time was also often stated. Over a quarter of students were able to give three correct responses and approximately 38% gained two marks.
- Using the same potato and temperature was less often given. The most common incorrect answer was the sugar amount or concentration. The most common misconception seen was to control the ‘concentration of the solution.’
- 04.8** A quarter of students scored the mark for identifying the Vernier callipers as the piece of equipment they would use. Many more incorrectly suggested a tape measure and the electric balance was also a strong distractor.
- 04.9** About 59% of students gained the mark for correctly identifying that the potato cube would stay the same size. The most common error was that the potato cube would increase in size.

Question 5 (low & standard demand)

- 05.1** Around 72% of students were able to complete the equation with oxygen.
- 05.2** More than a quarter of the students were able to identify chlorophyll as the green pigment because phonetic spelling was accepted.
- Many more were in the right area with chloroplast but as this is a cell structure and not a pigment it was not accepted. Almost a fifth of students did not attempt to answer this question which suggests a lack of basic recall knowledge.
- 05.3** This proved to differentiate between students very well. A range of answers were seen resulting in around 36% of students achieving three marks, around 27% two marks and around 18% one mark.
- Common incorrect answers given included; rain for plant roots obtaining water and chloroplasts/chlorophyll for where the energy for photosynthesis is from.
- 05.4** Half of all students gained the mark for correctly selecting fungus. The most common errors included the selection of bacteria and virus.
- 05.5** More than a fifth of students scored both marks and approximately 56% gaining one mark. The most common error selected was to give the rose bush liquid fertiliser.

05.6 Half of the students were able to calculate how many times longer the plant cell was than the microorganism. Many incorrect responses involved students multiplying the numbers together.

05.7 Only around 1% of students gained three or four marks on this question. The majority felt that the infection had caused the leaves/plant to die due to lack of water and neglect.

Those students who did process the information given linked yellow leaves to a failure to photosynthesise and thus gained one mark. A few realised that the lack of green colour, occasionally identified as chlorophyll or chloroplasts, was the cause of this.

Even rarer was the student who said this would result in a lack of glucose. No responses successfully linked this to growth through either the molecules needed for growth or respiration needed to release energy for growth.

05.8 About 6% of students were able to identify tobacco mosaic virus with many varied incorrect responses given. It was noteworthy that around 17% of students did not attempt this question being unable to come up with any answer they felt might be viable.

Question 6 (low & standard demand)

06.1 Around 54% of all students gained the mark for correctly selecting cell A. The most common errors included the selection of cell C and cell B.

06.2 Almost a third of all students correctly identified cell C. Many more incorrectly identified cell B with cell A also proving to be a noticeable distractor.

06.3 About 60% of students were able to identify cell D as being an abnormal body cell from a mosquito. Approximately 38% were able to give the correct reason.

Those that were unable to score often identified cell C.

06.4 Around 42% of students were able to identify mitosis as the process that would produce cells that were identical to the body cell. The most common distractor was meiosis.

06.5 Around 45% of students were able to identify that females had two X chromosomes or that males had XY chromosomes. Some responses that were not creditworthy suggested that all the female chromosomes were X. This indicated that students were looking at the total number of chromosomes. About 10% of students were unable to attempt this question again indicating a lack of subject recall knowledge.

06.6 About 39% of students were able to identify the genotype as bb. Many incorrect responses gave b on its own or BB.

06.7 The slightly unusual format of the Punnett square diagram seemed to confuse many Foundation tier students who filled in either genotypes or eye colour but rarely both. However, they could gain the probability mark from either, unless they did not match in which case eye colour was used. About 43% of students gained all four marks in this question that differentiated between students very well.

- 06.8** Many students were able to access this question with 34% achieving two marks and over two-fifths gaining one mark. Many correct answers related to the long legs, muscular legs or slim body of the greyhound.

Question 7 (standard demand)

- 07.1** About 44% of students achieved this mark. Common errors included 0.42 – 1.20 (most frequently seen), but also 0.14 – 0.59.
- 07.2** Students struggled with this extended response question with 9% providing answers that satisfied the requirements of the Level 3 descriptor. Approximately 35% accessed Level 2 by naming a reaction test along with detail about how they would change the independent variable. Many gave details only of the reaction time test they would use which if carefully described gained four marks. When the drop ruler test was described the most common misconception was to ‘time’ it rather than record the distance.

Many students made the error of using just two students, one having caffeine and one without, which also restricted the marks gained. About 17% of students did not attempt this question.

- 07.3** Around 69% of all students scored the mark for correctly selecting receptors.
- 07.4** Around 11% of students gained two marks for identifying a control factor. Approximately 36% scored one mark. Common correct responses included tiredness, age and use of drugs/alcohol.

The most common responses that did not gain credit related to mass or diet of the athlete. It was also noted that around 11% of students did not attempt this question.

- 07.5** Test 4 was correctly identified by about 58% of students. The most common incorrect response was test 3.
- 07.6** Students struggled with this calculation with more than a third achieving two marks. Another third did not give their answer to four significant figures so only scored one mark. The most common error was to give an answer five significant figures.
- 07.7** Around 8% of students were able to convert 138.2 ms (milliseconds) to s (seconds). Common errors included multiplying by 1000 or dividing by 100.
- 07.8** More than a quarter of students scored the mark for correctly selecting that anomalies could be identified. The results being more precise was the most common error gaining a higher percentage of selection than the correct answer.
- 07.9** A fifth of students realised that testing just one athlete of each sex was an insufficient sample for an investigation. Many students did not read the data table correctly and believed that five of each sex had been tested or simply gave the idea of ‘different females being different’.

The majority of students made vague comments about differences between males and females.

Question 8 (standard demand)

- 08.1** About 5% of students scored two marks and approximately 29% gaining one mark. Common incorrect responses included students reiterating the stem of the question. Many also gave simple statements about recycling rather than suggesting an increase in recycling.

The use of the computers, mobile phones or the internet were sufficient to gain a mark. However, terms like eco-friendly or just simply stating there were better ways to produce paper was insufficient.

About 12% of students did not attempt this question.

- 08.2** Approximately 6% of students scored two marks, with less than a third gaining one mark. Many gave simple statements about using renewable resources rather than suggesting an increase in renewable resources.

Students were often too vague to score marks even when they may have a related idea. It is only three years from 2012 to 2015 so electricity production techniques are not likely to be more efficient. However, many students did realise that the UK uses or produces less electricity now than in previous years.

It was noteworthy that almost a fifth of students sitting this exam did not attempt this question.

- 08.3** This calculation was not well attempted, with about 23% achieving two marks. Just over a fifth of students did not attempt this question with perhaps the extraction of data from the table causing a lack of confidence.

- 08.4** Around 8% of students were able to access Level 3 of this extended response question. They achieved this by giving a clear outline of the mechanism and giving detailed, linked consequences.

Approximately 23% of students scored marks within Level 2. They were able to identify the mechanism of a rise in greenhouse gases or global warming. The most common consequences were linked to the ice caps melting.

Those in Level 1 gave a brief mention of greenhouse gas, global warming, climate change, ice caps melting or the fate of polar bears.

Students that did not score either talked in vague terms about pollution including acid rain and the ozone layer or by mistakenly linked their answer to the previous question and wrote at length about paper, deforestation and electricity production.

This question differentiated between students very well. Almost a fifth of students did not attempt this question.

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.