
GCSE

COMBINED SCIENCE: TRILOGY

8464/B/2F: Paper 2 – Biology (Foundation)

Report on the Examination

8464

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General

There were six questions on this paper. Questions 5 and 6 are common with Combined Science: Trilogy Biology Paper 2 Higher tier.

Practical skills have to be assessed in the question papers. It was noticeable in the quality of response when a student had carried out practical work effectively. This was particularly evident in describing how a quadrat can be used to measure the size of the buttercup population in an area of a field.

Some students demonstrated good maths skills, such as when calculating a mean and calculating the area of a quadrat. A common error was seen in misinterpreting the graph in Figure 6. Some problems were seen in relation to the percentage calculation and the use of standard form.

Credit is never given for repeating information from the stem of the question. This wastes both time and space. There is adequate space provided for relevant material without recourse to additional answer sheets.

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 demand)

- 01.1** 72% of students could identify larger yields as a useful characteristic that crops are genetically modified for.
- 01.2** Around half of students could identify a concern about GM crops.
- 01.3** 40% of students could name 'gene' or 'allele' as a piece of DNA that codes for a characteristic. Frequently seen incorrect answers were chromosome, genome and phenotype.
- 01.4** Just over half of students knew that protein was made using the DNA code.
- 01.5** 50% of students knew the definition of a recessive allele.
- 01.6** 52% of students could identify that heterozygous was the appropriate term.
- 01.7** A quarter of students could correctly derive the three missing possible genotypes of the child and draw a ring around hh. Many students could derive the genotypes, but did not draw a ring, or circled Hh or HH.

- 01.8** The probability selected here needed to match the proportion of hh in their response to **01.7**. Half of students achieved this.
- 01.9** Many students gave the first marking point, for the idea that there may be harm to the embryo. Some responses were too vague, such as 'religion' unqualified. 'They might not want to know' was considered insufficient. Despite the question context relating to cystic fibrosis, many students only referred to screening identifying the gender of the embryo. Some misconceptions were seen, such as embryo screening causing cancer and incorrect references to radiation were common.

Question 2 (low & standard demand)

- 02.1** This was an 'extended response' style of question. Such questions are marked holistically. There are overall generic descriptions for the two levels of response at the top of the mark scheme, giving a hierarchy of response. Within each level of response there are two marks.

For Level 2 (3–4 marks) the method needed to include sufficient detail to collect a representative sample (a valid outcome), such a random or systematic placement of quadrats, counting or recording the number of buttercups in a quadrat and repeating. The highest scoring responses also included more detail, such as is shown in the indicative content section of the mark scheme.

Some students repeated the question, which is never given credit. Many students could give the idea of counting the number of buttercups in a quadrat, and understood the need for repeats. Fewer students described placing the quadrat randomly or systematically. Throwing quadrats is not random, therefore could not be credited as part of a response.

- 02.2** 44% of students knew that water in the soil was an abiotic factor in this investigation.
- 02.3** 41% of students could give two factors that might affect the number of buttercups growing on the school field. Students were reminded not to refer to water, but this was frequently seen, along with references to dry soil and rain which were ignored.

The most common correct answers related to light intensity, temperature and trampling.

- 02.4** 43% of students could identify that the number of buttercups was the dependent variable.
- 02.5** 71% of students could calculate the area of the quadrat.
- 02.6** 29% of students could use their answer from **02.5** to calculate the number of buttercups per m².
- 02.7** 10% of students could give two improvements the students could make to give more valid results. The most common answers related to using the same number of seeds in each box or repeating the investigation. Answers such as measure the soil, or measure the acid, were insufficient.

- 02.8** Most students could calculate the mean value. The most frequently seen incorrect answer indicated a potential issue with calculator use, such as $11+12+11+17+19\div 5 = 54.8$, where $19\div 5$ is occurring first, followed by the addition. Students should think about whether their answer to a calculation is sensible.
- 02.9** Students could describe the effect of acid soil on the growth of the bean plants in several ways and 60% of students were awarded this mark. Sometimes, responses were insufficiently detailed, such as acid soil affects the growth.

Question 3 (low & standard demand)

- 03.1** Two-thirds of students knew that knowledge of how DNA controls inheritance supports the theory of evolution by natural selection.
- 03.2** 62% of students knew the fly had been preserved in amber because there was no oxygen in the amber.
- 03.3** 55% of students could correctly interpret the evolutionary tree.
- 03.4** 43% of students could identify the most recent ancestor of both grasshoppers and beetles using Figure 4.
- 03.5** 28% of students could work out the group of present-day insects which have wings which do not fold.
- 03.6** Generally, students could not correctly place the four words to demonstrate understanding of classification by Carl Linnaeus or the binomial system. 6% of students achieved all three marks. Animalia was the most common correct answer.
- 03.7** 43% of students could identify the domain insects are in.

Question 4 (low & standard demand)

- 04.1** Two-thirds of students could identify the pancreas on Figure 5.
- 04.2** 72% of students could identify the thyroid gland on Figure 5.
- 04.3** 62% of students gained this mark. Blood, bloodstream and blood vessels were the most commonly seen correct answers. Named blood vessels were acceptable, as was plasma, but this was rarely seen.

Common misconceptions were seen, such as hormones travelling in blood cells, electrical impulses transporting hormones or the brain sending hormones out to the rest of the body.

- 04.4** 45% of students gave the correct answer 'insulin'. Phonetic spelling was allowed. Incorrect answers included a range of other hormones, diabetes and pancreas.

- 04.5** A fifth of students could identify two ways that hormone X causes a decrease in blood glucose concentration.
- 04.6** Students found this challenging, with fewer than 43% gaining the mark. Some students incorrectly gave the time that the graph peaked, others the trough or the start of the x-axis.
- 04.7** This was another challenging question, with a third of students gaining the mark.
- 04.8** Most students could give at least one lifestyle change. Exercise or descriptions of exercise were the most common correct response.
- 04.9** Students found this a very challenging question. Few students made correct reference to respiration. Energy was often referred to in incorrect terms, such as glucose making energy or glucose being needed to feel energised. Some students stated that you need lots of glucose for energy which was insufficient. Other students confused the idea that low blood glucose was because of insulin in this case.

Question 5 (standard demand)

- 05.1** 40% of students knew that aerobic respiration produces water.
- 05.2** Many students could only name one or two parts of the water cycle shown on the figure. The most common marks awarded were for evaporation and precipitation. Very few students gave correct answers for processes 4 or 5. Some students gave descriptions rather than the name of each process, which did not gain the mark unless the process was named within the description.
- 05.3** Some students only got as far as the second marking point and stopped, or then made errors in writing the answer in standard form. Two marks were awarded in either instance.
- The third marking point was not awarded for incorrect use of standard form, so 27×10^7 was frequently seen and was incorrect. Note the 'allow' statement in the extra information column for this marking point. Students gained one mark for only if they attempted an incorrect calculation using numbers from the question, and then gave that answer in standard form.
- 05.4** A third of students could identify two reasons why more people have severe water shortage now than in 2007.

05.5 Students found this aspect of the carbon cycle challenging to explain. Many students repeated information given in the stem of the question, which is never creditworthy.

The most common mark awarded was for the idea of leaves decaying. Some students incorrectly suggested microorganisms eat the leaves. References to respiration were rare, and often incorrect, such as trees using carbon dioxide for respiration. The third and fourth marking points both required reference to carbon dioxide, not simply carbon, which was far more frequently seen. Although chemical formulae are generally acceptable as alternatives to the names of substances, they need to be correct, for example CO₂ is an acceptable alternative to carbon dioxide but CO₂ and CO² are not.

05.6 38% of students could identify that nitrates released into the soil is a benefit of fallen leaves for living plants.

Question 6 (standard demand)

In this question, students had to explain how human activities are polluting rivers, lakes and seas.

This was an ‘extended response’ style of question. Such questions are marked holistically. There are overall generic descriptions for the three levels of response at the top of the scheme, giving a hierarchy of response. Within each level there are two marks.

Many students correctly referred to a type of water pollution and explained the source of the pollution or detailed consequence of the pollution. References to plastic/litter were common. Many students knew that sewage is an issue for pollution of rivers, lakes and seas and could give more information as to why this is a problem.

Within Level 1 (1–2 marks) responses students gave types of water pollution or consequences but made no links.

To access Level 2 (3–4 marks), students needed to link a type of pollution with a cause or detailed explanation. The indicative content on the mark scheme gives an indication of the types of detailed explanation required. However, with such a broad subject matter, not all possible examples could be given on the mark scheme. Other examples that were seen and gained credit as linked relevant content were ‘noise pollution from boats disrupts the communication of whales’ and references to thermal pollution (of water) from factories or power stations would be a type of pollution linked to a source.

For Level 3 (5–6 marks), students needed to give logically linked explanations relating to different types of pollution.

References to carbon dioxide emissions and climate change were frequent, but often did not answer the question to relate to water pollution.

Around half of the responses were within Level 1, or zero, indicating students had not made linked explanations. The most common responses involved stating one or two types of pollution, usually plastics (or litter) and oil.

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.