GCSE

COMBINED SCIENCE: TRILOGY

8464/B/2H: Paper 2 – Biology (Higher)
Report on the Examination

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General

There were six questions on this paper. Questions 1 and 2 are common with Combined Science: Trilogy Biology Paper 2 Foundation 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 a method to investigate the effect of water on the number of buttercups in a field.

Students generally demonstrated good maths skills. Some errors included inappropriate choice of scale on the graph, and a poorly drawn line of best fit. Some problems were seen in relation to rounding numbers 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 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 57% of students knew that aerobic respiration produces water.

01.2 Many students could name three/four of the five parts of the water cycle shown on the figure. The most common marks awarded were for evaporation, condensation and precipitation. Fewer 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. Some confusion was seen between transpiration and translocation.

01.3 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 only if they attempted an incorrect calculation using numbers from the question, and then gave that answer in standard form.

01.4 62% of students could identify two reasons why more people have severe water shortage now than in 2007.

01.5 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 CO_2 is an acceptable alternative to carbon dioxide but CO2 and CO^2 are not.

01.6 64% of students could identify that nitrates released into the soil is a benefit of fallen leaves for living plants.

Question 2 (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 them to water pollution.

Question 3 (standard & standard/high demand)

03.1 Half the students could identify one biotic factor affecting the number of buttercups. Abiotic factors were frequently seen, such as light intensity and minerals in the soil.

03.2 The mark scheme allowed for two alternative valid methods to investigate if the amount of water in the soil affects the number of buttercups in the field. Transects were often referred to but not always correctly. Students who described a transect in the wet area and also a transect in the dry area were following the first method on the mark scheme. For the first method, references to marking a grid in each area were seen, and more frequently, for the second marking point, some reference to a method of placing quadrats such as a description of using a random number generator and coordinates. It was equally valid to describe a random method or a systematic method to place quadrats. However, throwing quadrats is not random or systematic and therefore was not accepted. Simply stating 'randomly place quadrats' was insufficient for this marking point because a method was required.

Many students gained the third marking point. Estimating percentage cover was insufficient.

Few students made an attempt to measure soil moisture readings or to describe how this could be achieved.

Clear descriptions of calculating a mean and using the total area correctly in calculations were seen.

The alternative method could also gain all six marks. Many of the marking points are the same for the two alternative methods. Care was required if students referred to calculating a mean from the results from a transect. Sometimes, students indicated they would use all the results along a transect to calculate a mean, which was incorrect for the eighth marking point.

Question 4 (standard/high & high demand)

04.1 The most common correct answers referred to temperature, light intensity and number of plants/seeds in each box.

Incorrect answers frequently referred to the nitrate ion concentration or the mass of corn, showing a lack of comprehension of the method given. 82% of students achieved at least one mark.

04.2 Students selected a wide range of scales for the *y*-axis of their graph. The most common scales were 20 grams per 1 cm or 25 grams per 1 cm. Some students compressed the *y*-axis, which was acceptable provided an indication of a compressed or broken axis was shown. Point plotting was generally accurate, even when unusual scales were chosen.

For the line of best fit, many students drew a straight line or joined points with straight lines which were both inappropriate.

04.3 Students were asked to describe the relationship between nitrate ion concentration and mean mass of corn, referring to data from the table. Some students very succinctly stated that mass increased up to 30 ppm and then decreased which scored both marking points. However, many students missed out the fact that there was a maximum mass at 30ppm, failing to use data from the table when describing the relationship. Sometimes, it was stated that the decrease was from 40 ppm which was incorrect.

A small number of students said the relationship was directly proportional which was incorrect.

04.4 Students were asked to evaluate both economic and environmental implications, therefore giving economic implications only could not gain all four marks.

For the first bullet point, increasing mass was ignored. This would overlap with **04.3** and is describing the relationship rather than evaluating. Failure to refer to a numerical value of fertiliser concentration when describing economic implications meant that many students did not gain marking points one or two.

For the third bullet point, 'worth the cost/money' was often part of a suitable explanation that also referred to profit or benefit depending on yield/mass/income/sales.

There were up to three marks available for the environmental implications. The statements in the extra information column relating to run-off and eutrophication are both equivalent to the fifth bullet point. However, the penultimate and final statements in this column are separate marking ideas that could both gain marks in the same response. They are beyond the specification but were credited if seen.

The most common mark awarded was for the environmental implication of fertilisers running off into water courses causing pollution. There were many vague answers such as 'fertiliser poisoning the soil' or 'killing wildlife in the fields' which did not gain any credit.

There were many misconceptions such as:

- fertiliser is a type of pesticide or herbicide
- fertiliser stops bees pollinating plants
- farmers must buy 0 ppm fertiliser
- fertiliser is made from peat bogs
- fertiliser makes food unfit to eat
- the plants over 40 ppm need more fertiliser because they aren't growing as well
- fertilisers release toxic gases.

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

05.1 A quarter of students could identify this type of hormonal control as negative feedback. Common incorrect answers were homeostasis, diabetes and endocrine.

05.2 39% of students could interpret the figure to identify hormone A and hormone B as glucagon and insulin respectively. Both hormones were allowed to be spelt phonetically, however hybrid terms that indicated a possible confusion between glucagon and other terms such as glycogen, glucose and glycerol where not acceptable. Examples such as glycogen were seen.

Common mistakes were to confuse glucagon and insulin, or to name other hormones.

05.3 Explanations usually started with the first marking point but it was equally acceptable to start at the fourth marking point. The most frequently seen mark was for release of glucagon when blood glucose concentration is low.

Confusion was common between the terms glucagon and glycogen, plus glycerol was also regularly seen.

The third and sixth marking points were very challenging. These required an understanding of how negative feedback causes the reduction in the release of each hormone.

A fifth of students scored either three or four marks.

05.4 40% of students could identify the roles of FSH and LH. Few students gained the third marking point, to fully explain why the probability of pregnancy would be greater following FSH and LH injections.

05.5 Most students knew that IVF involves fertilisation in laboratory conditions. Some inaccuracies of language were seen, such as sperm and egg mix, with no reference to or description of fertilisation, and eggs being inserted into the body, with no reference to uterus or womb.

05.6 Students found this question challenging, with 4% achieving full marks. Confusion between meiosis and mitosis was common. Responses generally lacked the detail required for the points on the mark scheme. Some students only described one process or the other, rather than describing differences.

Responses could not gain full marks if there was an implication that sperm cells go through meiosis.

The third marking point was sometimes attempted, but not expressed clearly, such as four sperm cells are made that are different, but the two liver cells are the same. Reference to *genetically* different or *genetically* identical was required.

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

06.1 Phonetic spellings were allowed throughout. Many students knew one of the four words, with animalia/animal kingdom being the most common correct response. Students who got phylum correct often also knew family. Archaea was sometimes given incorrectly as the domain.

06.2 Most students could take two correct readings from the graph. Most selected data from 1985 and 2017, but that was not necessary for full marks. Any two years could be used if indicated on the figure, or in the answer space. Clear answers often included lines drawn on the graph to help students read the data points. Some students tried to use individual data points, not the trend line, which was inappropriate.

06.3 Credit is never given for repeating information from the stem of the question. 16% of students could suggest a reason why polar bears find it harder to catch seals in autumn than spring.

06.4 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 scheme, giving a hierarchy of response. Within each level of response there are two marks.

Credit is never given for repeating information from the stem of the question. Students were expected to evaluate what might happen to the population of polar bears in the future. To access Level 2, students needed to consider both a decrease and an increase or maintenance of the population. Few students considered reasons that would lead to an increase or maintenance of the population.

As an evaluation question, the generic level descriptors refer to judgement. Students were not required to come to an overall or final judgement. Their judgement was be taken to mean the likely effect of any part of the indicative content on the population size anywhere within their response.

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.