



GCSE

Combined Science: Trilogy

8464/B/1F Combined Science: Trilogy Biology Paper 1F

Report on the exam

Published: August 2024 v1.0

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Overview

This paper is one of the six examined components for Combined Science: Trilogy. All of these papers follow a similar structure and test the same assessment objectives.

This paper has 70 marks available to students and is made up of seven questions.

- Approximately 40% of marks assess AO1; 40% of marks assess AO2; and 20% of marks assess AO3.
- Approximately 60% of marks target Low demand and 40% of marks target Standard demand.

Questions 6 and 7 on this paper and questions 1 and 2 on the Higher Tier paper are common. These questions are identical and are targeted at standard 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 is based on their attainment across all six papers.

Summary of overall performance

The questions that were common with the Higher tier proved quite challenging for students on this tier, particularly the extended response in Question 6, where understanding of enzymes and the digestive system was needed.

Many students seem to have been confused by the unfamiliar investigation into transpiration and were unable link the idea of mass loss and water loss to the investigation, which limited all the responses.

Generally, students found application (AO2) questions that required them to write something, rather than multiple-choice, challenging and many of these questions were not well answered.

The understanding of blood and donation was generally well attempted.

The questions assessing maths skills in this paper (01.5, 07.3) were generally answered well, except for graph skills (07.4, 07.5).

In some cases, students listed bullet points as their answer, without any description of what they mean. For example, in question 05.4 some students just bullet pointed carbon dioxide and photosynthesis. This did not answer the question and therefore gained no credit. However, 'there was an increase in carbon dioxide which increased photosynthesis' would have gained 2 marks.

Question 1 (low demand)

- 01.1** Virtually all students labelled the nucleus correctly. Students who gained a second mark usually did so for also correctly labelling the cytoplasm. The most common mistake seen was confusing the cell membrane and cell wall. Several students labelled C as the chloroplast and not the cytoplasm. Half of the students gained all 3 marks.
- 01.2** The majority (80%) of students gained credit for the function of the nucleus.
- 01.3** 64% of students knew the function of the mitochondria.
- 01.4** Almost all students achieved at least 2 marks, mostly for the first two marks in the mark scheme. Marking points 3 and 4, however, were mixed up in a variety of ways. 'Focus control' was the most common error for marking point 3, which should have been mirror. Many students were writing 'focus control' for the last marking point instead of objective lens. A limited number of students simply stated 'lens' instead of eyepiece lens or objective lens for the second statement, and so did not gain the mark.
- 01.5** Overall the scaffolding of this question did help students to gain marks, and the majority (69%) gained 3 out of the 4 marks available. Many students measured in centimetres instead of millimetres despite the instruction in the question. Many students were unable to correctly convert mm to μm . Some students incorrectly substituted the numbers, although this was the minority. Where students made mistakes, these were wide ranging such as an incorrect conversion from millimetres to micrometres or not dividing by 40 in the substitution section.

Question 2 (low & standard demand)

- 02.1** The majority of students were unable to identify that this was a control and that it allowed a comparison to be made. Most just repeated that it was to see the loss of mass with the fan off. Whilst this is a correct statement, it does not answer the question.
- 02.2** Many students did not express their answer well, saying that mass loss 'changed' without qualifying that the mass loss increased.

02.3 This proved a challenging question for many students and 81% did not gain any credit. Students were unable to link the idea of water loss to the mass loss from the leaves. A few students were able to articulate that mass was lost because water was lost. However, many of these students expressed this as water blowing off the leaf rather than from inside the leaf.

Many students stated that the mass decreased due to bits of the leaf blowing off; 'dirt', 'dust' and 'parts' were all regularly used as a reason for the mass loss.

There were many other incorrect descriptions of how parts of the leaf could be lost or how the pressure of the wind would affect the leaf. Some students said that the leaf could no longer photosynthesise, and this was why it would lose mass. Others wrote about the leaf using energy as it was blown around by the fan. A small number of students wrongly described the water being lost by the guard cells.

A very high proportion of students had no clear understanding of what was being lost, through what process and which leaf structure enabled the loss.

0 2 . 3 Explain why the mass of the leaves decreased at all fan speeds. [3 marks]

Leaves will lose mass from transpiration. Which is the process of water vapour escaping (evaporating) out of the stomata. Wind increases the rate of transpiration therefore higher fan settings increase the loss of mass but this happens normally.

An example of a response that gained full credit.

02.4 60% of students correctly picked greater with the common incorrect answer being smaller.

02.5 About three-quarters of students correctly picked how to improve repeatability.

Question 3 (low & standard demand)

- 03.1** 28% of students could correctly identify a white blood cell.
- 03.2** Most students (61%) could correctly pick platelets.
- 03.3** This question was well answered, with 58% of students gaining 2 marks. The most common correct answers were oxygen, glucose, carbon dioxide and water. The main misconceptions were where students named components of the blood such as red blood cells, white blood cells and platelets.
- 03.4** Answers for this question needed to be comparative and so 'easy to extract' was not good enough to gain credit. In the best answers students clearly articulated why blood is taken from a vein. Most students who successfully achieved this stated that veins were 'easier to access' or 'closer to the surface'. Other common correct answers were (in veins) 'blood pressure is lower', it's 'easier to extract the blood', and 'veins have thinner walls'.

Many students who did not gain credit wrote about the direction of blood flow and oxygenated and deoxygenated blood.

There were some misconceptions with regards to veins having less blood than arteries.

0 3 . 4 Suggest **one** reason why blood is removed from a vein and **not** from an artery. [1 mark]

vein transports blood in and artery transports it out. veins have thin walls and veins are more accessible. As they are on arms & hands etc.

An example of a strong response: the key to this is the use of the word 'more'. The statement 'thin walls' alone would not gain credit as it's not comparative.

- 03.5** For the advantages, most students were able to articulate that lives are saved, or that quality of life is improved. Several students simply stated that it 'increased blood levels' without any further qualification, which was insufficient.

For the disadvantages, many students correctly identified risk of infection, or a named blood-borne infection, or risk of rejection. Many were able to talk about the blood type might not match. Some responses did not provide enough details for an allergic reaction and often had written insufficient statements such as 'side effects'.

- 03.6** For the advantages, most students were able to access marking points stating that they were helping others or they were saving a life. Many students had written that the donor could have full health checks as a result, but this was insufficient for this marking point.

For the disadvantages, many students could articulate pain, risk of infection or name symptoms of being unwell. A common misconception was that donors would lose blood or too much blood, rather than stating that the disadvantage was the risk of re-bleeding.

Question 4 (low & standard demand)

04.1 The majority of students gave the correct symptom of gonorrhoea.

04.2 This question was well answered: 63% gained credit, with most correct answers being gained from 'not all cases are reported/recorded' (or words to that effect). The idea of false positives and negatives was seen by examiners less often; however, the idea of misdiagnosis was seen more frequently. References to population numbers only being estimates was very rarely seen.

Some students incorrectly commented on the numbers and data given in the table and a significant few suggested that the 100 000 was an estimate as the numbers were too high to count. Other students talked about not being able to ask everyone in the city.

Some students incorrectly said the numbers weren't accurate because the numbers in the table don't add up to 100 000.

04.3 Three-quarters of students correctly picked bar graph for representing the data given.

04.4 Very few students gained any credit for this question, many making reference to the data being an estimate, which was not creditworthy. Students did not really appear to understand the need to manipulate data to make it comparable.

There were many incorrect ideas:

- counting everyone would be too many or take too long
- smaller numbers make it easier for people to understand
- smaller numbers make collecting data easier and quicker
- because they do not know the exact number
- it is better to give a rough estimate
- makes data more accurate
- linking it to a graph, eg 'makes the data easier to plot', 'smaller numbers for plotting on a graph', 'number would be too high to plot on a graph'.

A very large proportion of students talked about unreported cases / 'not knowing they have it', giving what would have been a correct response for question 04.2.

04.5 68% of students gave two correct risks for increasing plaque in the coronary artery; 28% gained 1 mark.

04.6 About two-thirds of students correctly identified a stent as to the treatment for plaques in the coronary artery.

04.7 The most common answer was able to articulate that there was a lack of blood flow, gaining 1 mark. However, students failed to link this to lack of oxygen or respiration.

Many students showed a misconception of the heart attack being caused by the heart having to beat faster to get blood past the blockage. Many descriptions/explanations were given as to what caused the blockage, which was not answering the question asked.

There were incorrect references to muscle cells moving in the blood rather than being part of the heart. A lot of answers saw students discussing the general role of arteries which were not specific to the question and they did not gain marks as the question asked about coronary arteries.

0 4 . 7 A heart attack can happen when plaques block a coronary artery.

During a heart attack muscle cells in the heart die.

Explain how the blockage can lead to the death of muscle cells in the heart.

[3 marks]

When the coronary artery fills with ^{Plaques} ~~plaque~~, it decreases the flow of blood to the heart as it may clot. This leads to death of muscle cells as less blood is being transported to them, meaning the heart has less blood to pump around the body so the muscles contract less, which leads them to be weaker.

This response demonstrates the most common type of answer: the student has got to the idea of there being less blood flow to the heart muscle but does not link this to there being less oxygen, and therefore less respiration.

Question 5 (low and standard demand)

- 05.1** Just under two-thirds of students gave the correct reactant and product and very few (4%) gained only 1 mark. The most common reason for incorrect answers seems to be confusion between the reactants and products. Those students who correctly used formulae rather than the words were credited.
- 05.2** The vast majority (89%) of students identified the correct formula for glucose.
- 05.3** Students really struggled to gain credit in this question. Those who did gain credit usually met marking point 1 for respiration or energy: 'Used for energy' was the most common correct answer given. Convert/produce/make starch were also common responses which gained credit; however, many students simply wrote 'for storage', 'for food' or 'to store as food', which lacked the detail needed. Some students referenced fat and cellulose for marking point 3 and marking point 4, but very few students referenced amino acids or protein for marking point 5.

The most common incorrect answers were for growth and for repair.

- 05.4** Many students achieved a mark by stating that there is an increased temperature in greenhouse B, and that there is more carbon dioxide, or that combustion releases carbon dioxide. A reasonable number of students were then able to relate this to more photosynthesis or a faster rate of photosynthesis. A more limited number of students could relate this to an increase in glucose being made, but very few went on to relate this to more protein or cellulose being made.

Explain why the plants in greenhouse B grow faster than the plants in greenhouse A.

[4 marks]

~~The~~ Greenhouse B has a wood burner which produces a lot more carbon dioxide in the greenhouse therefore they photosynthesise faster than the plants in greenhouse A as it doesn't receive as much CO₂ as greenhouse B to grow faster.

An example of a common 2-mark response, in which the student has given part of the answer but not gone on to relate the increase in photosynthesis to production of glucose, protein or cellulose.

Question 6 (standard demand)

06.1 Nearly all students attempted this question with 82% unable to gain any marks. Many made the link to fructose being cheaper but simply stated that 'it' or 'the fructose' would be cheaper or easier to get without stating why fructose would have been cheaper. Despite being told not to refer to sweetness some students still said the drink would taste better.

Several students suggested that more people with diabetes would buy the drink but had not linked this to why (less sugar used). Many students said that the company would sell more as people would like the sugary taste of it or that people would become addicted to the drink.

It was very rare to see the suggestion that the consumer would pay less sugar tax.

06.1 Glucose and fructose are different sugars.

Fructose has a much sweeter taste than glucose.

Suggest **two** reasons why the drinks company uses fructose in the drink rather than using glucose.

Do **not** refer to sweetness in your answer.

[2 marks]

1 It's healthier

2 It's cheaper to buy

A typical example of a response (from a Foundation tier paper) that gained no credit as there is the explanation as to why it was cheaper is incorrect.

06.2 Many students gained 2 out of 3 marks for this question.

Common mistakes were mixing up the chemicals and solutions. The incorrect solution most suggested was 'Biuret's solution', although many suggested iodine and a few Sudan III.

Simply stating 'use a water bath' was insufficient, as heating is needed for the test to work. 'Use a hot water bath' or 'heat in a water bath' would gain the marks.

Some students could not name a solution at all and simply stated 'heat it'. In the context of this question 'it' is the drink and such responses were insufficient as just heating the drink would not work.

Most students were able to gain the mark for the colour of the positive result, even though they could not name the correct solution.

06.3 A very limited number of students suggested adding potassium hydroxide without also adding copper sulphate and so were not awarded the mark. Even fewer students suggested using Biuret A and Biuret B.

Many students gave an answer of 'blue-purple' for the result, which was insufficient as it was not clear which colour the result was (blue or purple). However, blue to purple was accepted.

06.4 This question was not well answered on the Foundation tier paper and 55% gained no credit. Many students did not identify the two enzymes and therefore were unable to access Level 2. Many students made generic comments about enzymes and digestion sites but were unclear if they were talking about fats or proteins. Generic statements such as 'enzymes that digest proteins and fats are produced in the stomach' were ignored.

Many described the whole digestive system instead of specifically focusing on enzymes. The most common statements that were not creditworthy were that 'digestion begins in the mouth using amylase' and 'the stomach digests food using hydrochloric acid'.

Very many students did not give the site of production of each enzyme separately but said that protease and lipase are produced/found in the small intestine, pancreas, and stomach: stomach being incorrect for lipase. Some students, who clearly had some knowledge, found it difficult to get the facts into the correct order and had the products of digestion breaking down the enzyme (for example 'amino acids break down protease') or named amylase as the enzyme that breaks down proteins.

Students who were very knowledgeable of the role of enzymes in digestion were able to give enough linked information for 6 marks in just a few sentences.

06.4

The human digestive system breaks down protein and fat in the drink.

Describe how **protein** and **fat** are digested.

You should include:

- the enzymes involved
- where the enzymes are produced.

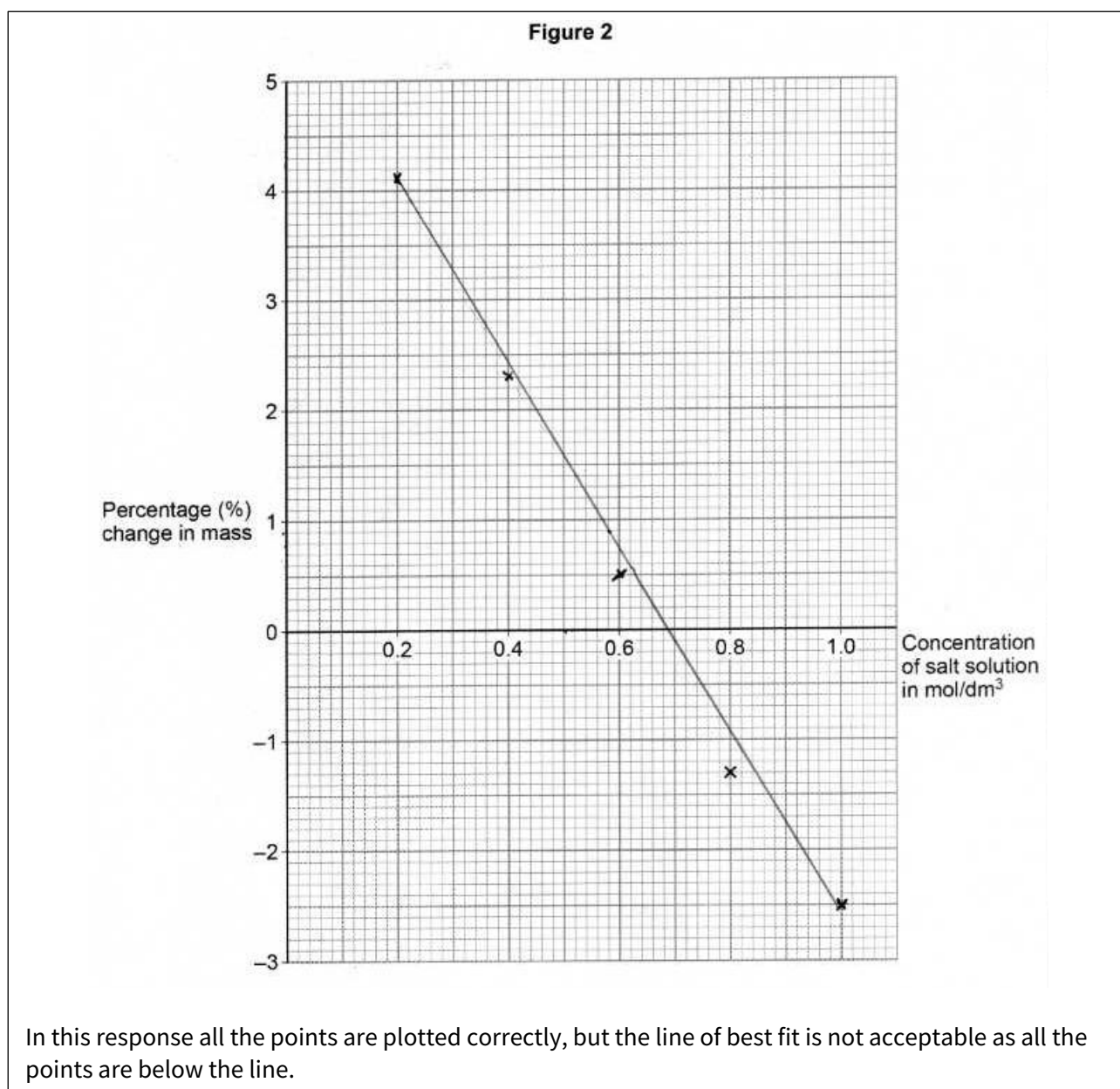
[6 marks]

- Enzymes are biological catalysts that speed up chemical reactions.
- Protease ~~are~~^{are} made in the stomach, pancreas, and small intestine, and it breaks down proteins into amino acids.
- lipase are made in the pancreas and small intestine, it breaks down fats into fatty acids.
- Enzymes are produced in the stomach
- Bile helps neutralise the acids
- They are then digested in the stomach where the acids break down the liquids.

This concise response gained 6 marks. The spelling of pancreas was taken as phonetically correct here and they are clear referring to an organ and not a different enzyme.

Question 7 (standard demand)

- 07.1** Just under half of students correctly identified the independent variable.
- 07.2** Many students talked about accuracy but failed to say that the extra mass (of the excess water) would affect the end mass. Stating 'to remove the excess water' was not enough to gain credit.
- 07.3** Only 21% of students could correctly calculate the percentage change in mass; 61% of students gained no credit.
- 07.4** 10% of students did not attempt the graph; 60% of students gained 2 or 3 marks. Those that gained 2 marks were able to plot the correct points but not gain credit for the line of best fit.



- 07.5** 18% of students did not attempt this question. Of those that did many misread the scale on the x-axis, incorrectly reading each small box as 0.1 mol/dm³.

Contact us

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