



GCSE COMBINED SCIENCE: TRILOGY

8464/B/1F

Report on the Examination

8464

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General

There were 7 questions on the Foundation Tier paper. Questions 1–5 mainly targeted grades 1–3. Questions 6 and 7 targeted grades 4–5 and were common with the Higher Tier paper.

Practical skills have to be assessed in the question papers. Paper 1 covers five of the seven Required Practical Activities. These can be used to teach skills related to:

- planning investigations
- the different types of variable
- use of apparatus
- identifying errors in methods and suggesting improvements
- presenting and analysing results.

These skills can then be applied to different investigations. It was noticeable in the quality of response when a student had a good practical understanding.

Students demonstrated good maths skills, including plotting graphs and taking readings from graphs. However, students found analysing graphs in order to make conclusions much more difficult. There must be some added value in a conclusion, not just a description of the data.

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 51% of students identified A as being the cell membrane. Almost as many thought it was the cell wall.

01.2 39% of students achieved full marks for identifying the three ways that white blood cells defend the body. Almost a third of students had not read the instruction to tick three boxes, and only ticked one box instead of three. The majority of students knew that white blood cells produce antibodies.

01.3 60% the students achieved two marks. 195 of students achieved one mark. This was usually for a correct subtraction of incorrect graph readings. Some students attempted to subtract the values for 2013, 2014 and 2015 from that for 2012.

01.4 38% of students suggested a correct reason for the decrease in the number of cases of measles. They usually said it was due to the use of vaccines or vaccinations. Some referred to the MMR vaccine.

Vague responses such as new cures, improved medical knowledge, new medical technology or new treatments were insufficient. The use of antibiotics was seen quite often, which was incorrect.

01.5 43% of students knew that measles is caused by a virus so cannot be treated with antibiotics. Some said antibiotics would not treat measles because they were not strong enough. Others said measles is not a disease, or is not caused by a pathogen.

01.6 34% of students gave a correct method to control the spread of gonorrhoea. The majority of these said use a condom. Safe sex, use protection, or contraception unqualified were insufficient. Others achieved the mark for saying 'vaccinate people'.

Some students said use antibiotics, which was given in the question and was therefore ignored. Others did not realise gonorrhoea is a sexually transmitted infection and said wash your hands or cover your mouth when coughing.

01.7 62% of students gave a correct control variable. The concentration of the antibiotic or size of the disc was often given. Just saying paper disc unqualified was ignored; the size, shape or type of paper disc was required. Many said the type of antibiotic, which was the independent variable.

01.8 27% of students understood why one disc was soaked in water. They usually said it was for a comparison with the antibiotics.

Most responses were not clearly expressed. There were some confused ideas about the water affecting the antibiotics or the agar.

01.9 Many students identified antibiotic A as being the most effective in treating gonorrhoea. 67% of students also included a correct reason for their choice to achieve full marks.

Question 2 (low & standard demand)

02.1 44% of students achieved both marks for identifying glucose and oxygen as the products of photosynthesis. 20% of students were awarded zero marks. Most of these had selected the reactants of photosynthesis, carbon dioxide and water.

02.2 77% of students scored one or more marks for this question. Many realised that counting the number of bubbles produced in one minute would be more accurate than counting them in 30 seconds.

02.3 36% of students achieved this mark. Many responses were poorly expressed confusing heat and temperature. Many said that temperature was a limiting factor, which was ignored.

02.4 70% of students calculated that 52 bubbles would be produced in two minutes when the light source was 10 cm from the pondweed. The most common error was to multiply the number of bubbles produced in 30 seconds by two, rather than by four.

02.5 When plotting graphs it's advisable to use a pencil so errors can be erased. Some students plotted dots instead of crosses. Dots cannot always be seen.

28% of students achieved full marks for plotting the graph and drawing a suitable line of best fit, which was a curve through all the points. Very thick lines or sketchy, double or broken lines were insufficient.

56% of students achieved two marks for plotting all the points correctly. A mark was sometimes missed because the final point, where no bubbles were produced, was not plotted.

02.6 19% of students gave a suitable conclusion. Many described the pattern shown in the graph, but a reference to the rate of photosynthesis, or rate of bubble production was required. Rate could be expressed as faster, or with a reference to time.

Question 3 (low & standard demand)

- 03.1** 48% of students achieved this mark. Many said that drying the potato would remove the water from the outside. Better responses referred to the water affecting the mass of the potato.

Some students thought drying the potato would remove water that the potato had absorbed. This implied the water was inside the potato so did not gain credit.

- 03.2** 73% of students achieved at least one mark. This was usually for saying that the potato in water would increase in mass. Fewer said that it would also increase in length. A decrease in hardness was a common incorrect response.

- 03.3** 56% of students achieved two or more marks. Marks were more commonly awarded for knowing water moves by osmosis, and for saying the water would move into the cells. As this was a low demand question diffusion was allowed for osmosis. At a higher demand students would be expected to know that water moves by osmosis. Some students talked about water moving through the cells which was ignored. The direction of water movement into the cells was needed.

Most errors were seen in relation to the concentration of the solution outside the potato. Many said it was at a higher concentration than inside the cells, which was incorrect. Others said that it was at zero concentration, which was given on the diagram, so was ignored.

- 03.4** This question was set at standard demand. 9% of students said the concentration in the cells was 0.4 mol/dm^3 , or the same as the solution in tube B. Many rephrased the stem of the question and said water did not enter or leave the potato, or that osmosis did not take place. Others said the concentration of the solution was higher or lower than that inside the potato.

- 03.5** Many students did not know the term root hair. 51% of students achieved one or more marks.

Question 4 (low & standard demand)

- 04.1** This question was set at standard demand. 50% students achieved one mark. This was usually for giving three correct graph readings, without comparisons. 11% of students achieved more than one mark.
- 04.2** 62% of students achieved at least one mark. This was usually for saying breathing rate increased in order to supply more oxygen. Some students referred to changes in heart rate, rather than breathing rate. Only a few mentioned that more energy would be required during increased activity.
- Some who did refer to energy used poor terminology, for example to produce more energy, which was not allowed.
- 04.3** 16% of students achieved a mark for this question. Students confused which side of the heart pumped blood to the lungs or to the body. Others thought the lungs pumped the blood. Quite a few students referred to oxygenated and deoxygenated blood but did not include sufficient detail to gain marks.
- 04.4** The question asked why the wall of the left ventricle is thicker than that of the right ventricle. Therefore a comparison had to be implied. 19% of students achieved this mark. A common incorrect idea was that the left ventricle pumped more blood than the right ventricle.
- 04.5** 27% of students achieved this mark, usually for saying that exercise would strengthen the heart muscle. Saying that exercise would prevent a heart attack was ignored. The idea of reducing the chance of another heart attack was needed.

Question 5 (low & standard demand)

- 05.1** 33% of students achieved both marks for knowing the sequence of events in the cell cycle. 51% of students achieved one mark, which was usually for realising that in the final stage the cell divides into two.
- 05.2** The majority of students thought the mass of DNA in the new cells produced by mitosis would be half of that in the cell at the start of the cell cycle. 30% of students said the mass would be the same.
- 05.3** The majority of students incorrectly thought that animal stem cells divide by meiosis. 31% of students correctly said that meristem cells in plants can differentiate throughout the life of the plant.

05.4 The majority of students copied sentences from the information given in the question. There had to be some added value in order to be awarded marks. A fifth of students scored 1 mark. This was often for saying therapeutic cloning would produce replacement cells or could treat some diseases. Very few gained 2 marks. A lot of students confused therapeutic cloning with IVF treatment.

05.5 The majority of students copied the sentence about the embryo being destroyed, which had no added value, and so it was ignored. Those who rephrased this to say a life is killed or destroyed were awarded a mark. Another common correct response was that the procedure may not work.

Question 6 (standard demand)

06.1 57% of students demonstrated a good understanding of prokaryotic and eukaryotic cells and were awarded two marks. To achieve both marks all three structures had to be correctly linked to the type of cell where each structure is found.

When only one mark was awarded it was usually for identifying the nucleus as being found in eukaryotic cells.

06.2 59% of students were awarded the mark for identifying the vacuole, ribosome and cell wall in the plant cell.

Students were asked to tick one box, but some labelled the diagram, whilst others circled the names of the structures in the table.

06.3 17% of students achieved this mark. The cells on slide A appeared large, but blurred. The required response was a reference to focusing the image.

Many students referred to zooming in or out, to altering the magnification or using an electron microscope. All of these were ignored. However, if they said increase the magnification this was incorrect and negated a correct answer of focusing the image.

06.4 The cells on slide B appeared small but in focus. The required response was a description of how to obtain a larger image. There were two marks available for this question:

- one was for reference to changing the lens
- one was for stating that the new lens would have a higher power or magnification.

3% of students achieved two marks, and 23% obtained one mark, usually for saying increase the magnification.

Changing or using a better magnification was insufficient. Many students referred to zooming in or out or said use an electron microscope, both of which were ignored.

06.5 There were three marks available for this question.

- The first mark was for conversion of units. Many students did not attempt a conversion but could still go on to achieve two marks. A range of different errors were made which included multiplying or dividing by 10, 100 or 10 000, rather than by 1000. Some did not appreciate that a micrometre is smaller than a millimetre.
- The second mark was for correctly substituting into the rearranged equation to calculate magnification. This mark was allowed even if their initial conversion was incorrect.
- The final mark was for an answer of 400. Some students added a unit to their answer and this negated the mark.

22% of students achieved two marks. 56% of students scored zero marks. This was often for $280 \div 112 = 2.5$

Question 7 (standard demand)

07.1 Few students scored the first marking point for saying that a non-communicable disease is not caused by a pathogen. Some students gave examples of non-communicable diseases, such as CHD, diabetes and cancer. Others gave a cause, such as genetics, lifestyle or diet. These were ignored.

61% of students achieved one mark, usually for saying a non-communicable disease cannot be caught or is not passed from person to person. 1% of students achieved full marks.

07.2 56% students gained the first marking point for stating that blood flow is reduced in people with CHD. 7% of students scored more than one mark.

For the second marking point it had to be clear that reduced blood flow would result in less oxygen reaching the cells of the heart, as the question asked how CHD can cause a heart attack. Many students talked about less oxygen reaching other parts of the body.

The last marking point needed a link to less respiration or insufficient energy release. Students often incorrectly referred to less energy being made, created or produced.

07.3 This was a 'level marked', 'extended response' question. The command word was 'Explain', so the main discriminator between the three different levels was the quality of linking ideas. Students were asked to explain how lifestyle and medical risk factors increase the chance of developing CHD. Therefore examples of both types of factor had to be included, with several examples of logical linking of ideas, in order to enter level 3. 46% of students achieved three or more marks.

Many students phrased their response in terms of how to reduce the chance of developing CHD, which could achieve full credit, if explanations were included. References to doing exercise and not eating too many fatty foods were often seen, but if these were not linked to explanations the answer was limited to level 1. References to bad or unhealthy diets were too vague without going on to mention high levels of fat, sugar or salt.

An answer such as a fatty diet and not enough exercise can lead to obesity, which increases the chance of CHD, achieved three marks as there is an attempt to link ideas. To be awarded four marks better links had to be made, or more factors referred to. Smoking and alcohol consumption were sometimes mentioned. With reference to smoking, a number of students were under the impression that smoking leads to the build-up of tar in the coronary arteries.

Many responses were limited to level 2 because there was no reference to any medical risk factors. Where medical factors were included it was often in relation to diabetes or genetic factors. A family history of heart problems was sufficient for this idea. High blood cholesterol was sometimes given as a medical risk factor.

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.