
GCSE

COMBINED SCIENCE: TRILOGY

8464/B/1F: Paper 1 – Biology (Foundation)

Report on the Examination

8464

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General

Questions 5 and 6 are common with Combined Science: Trilogy Biology Paper 1 Higher tier.

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** Three-quarters of the students correctly identified the stomach in the drawing of the human digestive system.
- 01.2** 30% of students knew that a protease enzyme is produced in the stomach.
- 01.3** Most students scored at least one mark, for knowing the pH in the stomach is acidic. A quarter of students also scored the second mark for saying the stomach produces an acid, or that acidic conditions provide the optimum conditions for enzymes in the stomach to work. Most students said 'to digest food', which was insufficient.
- 01.4** Half of students knew that bile is produced by the liver. Most of the other students were evenly split between selecting the large intestine and the pancreas.
- 01.5** 20% of the students said that bile increases the surface area of fats. More than half of the students thought that bile is an enzyme that digests protein.
- 01.6** More than half of the students scored both marks for identifying the reagents used to test for protein, starch and sugar. Where a single mark was scored, this was usually for knowing that iodine solution is used to test for starch.
- 01.7** 76% of students scored the mark, usually for saying to wear safety goggles when using Benedict's solution. Quite a lot of students said wear gloves or wash hands, both of which were allowed.
- 01.8** 42% of students knew the colours for positive test results when using Benedict's solution and iodine solution. More than half thought the colour blue represented a positive Biuret test.
- 01.9** Fewer than a fifth of students said that starch molecules cannot be absorbed into the blood because they are too big, or because they are insoluble. Many students said that starch is digested into sugar, but without reference to the size, or solubility, of the molecules. Quite a common answer was that starch would cause blood clots.

Question 2 (low & standard demand)

- 02.1** This question was not answered well. Students did not seem to understand the word adaptation. Some students talked about a protective layer to stop water getting in or out. There were many references to a large surface area, or to the palisade layer being thick or thin. All of these were ignored. A tenth of students scored the mark, usually for saying the layer contained chlorophyll or chloroplasts.
- 02.2** 40% of students thought the small pores on a leaf are called guard cells. A third of students selected the correct answer, stomata.
- 02.3** More than half of the students scored full marks for calculating the real length of the cell in micrometres. An additional quarter of students scored two marks. This was either for:
- a correct substitution and calculation in mm, or
 - a correct substitution and correct conversion of an incorrectly calculated length in mm.
- 8% of the students scored one mark either for a correct substitution, or for a correct conversion of mm to micrometres.
- 02.4** 39% of students thought carbon dioxide moved in and out of cells by active transport. Slightly fewer selected the correct response, diffusion.
- 02.5** Very few students scored two marks. A quarter of the students scored a mark for identifying cell A as the cell into which carbon dioxide would move at the fastest rate. For the reason, a definition of diffusion was insufficient; a comparison was required. This would ideally be a comparison between the different cells in Figure 3, although a comparison between the concentration inside and outside the cell was allowed.
- 02.6** Just under half the students gave the two measurements that would be required to calculate the rate of photosynthesis. 36% of students scored one mark, usually for the number of bubbles produced. References to the distance of the lamp from the pondweed were ignored.
- 02.7** 17% of students scored two marks for two correct control variables. 61% of students scored at least one mark. The most common correct answers were amount of light and the size or type of pondweed.
- 02.8** Most students could draw a bar chart. 42% of students scored full marks, and an equal proportion scored three marks. A complete label, including units, was needed for the y-axis. A suitable scale was 1 cm for every arbitrary unit, although 2 units per cm was allowed. Bars had to be plotted and labelled with the colour of light, not with just a letter.
- 02.9** The vast majority of students correctly interpreted the results to conclude that blue light would be the best colour of light to grow plants in. The second most common response was green light, selected by less than a tenth of students.

Question 3 (low & standard demand)

- 03.1** 59% of the students knew that rose black spot is caused by a fungus. Almost a fifth thought it was caused by a bacterium.
- 03.2** 15% of students scored the mark for saying the leaves are yellow because they have little or no chlorophyll. Saying they had few chloroplasts was allowed. Some said the chloroplasts or chlorophyll had been damaged or destroyed, which was creditworthy, but saying the chloroplasts were killed was ignored. Quite a lot of students said the leaves were yellow because they couldn't photosynthesise.
- 03.3** A third of students scored one mark, with very few achieving two marks. The most common correct answer was that there would be less photosynthesis. References to light were often phrased poorly. Leaves getting less light was ignored; they had to say less light was absorbed.
- 03.4** Most students scored at least one mark, with 63% of students achieving both marks for the control of rose black spot.
- 03.5** 40% of students knew that the pathogen TMV is a virus. A quarter thought it is a bacterium.
- 03.6** Just under half the students knew that malaria is transferred to humans by mosquitos. A whole range of incorrect suggestions were given, including coughs and sneezes, sexual intercourse, in food or dirty water and by physical contact.
- 03.7** 42% of students recognised that the spread of malaria pathogens can be controlled by draining water from swamps. Just over a quarter thought that using a tissue when sneezing would reduce the spread.

Question 4 (low & standard demand)

- 04.1** 41% of students said that mutations occur in the nucleus. The remainder of students were evenly split between thinking they occur in the cell membrane or the cytoplasm.
- 04.2** 71% of students knew that some cancers develop into large tumours because the cells never stop dividing.
- 04.3** In this question the idea that smoke or chemicals from cigarettes enter the lungs directly was needed. Only describing the effect of chemicals on the body was insufficient. Just over half the students scored the mark.
- 04.4** 16% of students said that cancer cells can be transported in the blood to other parts of the body. Most students said that cancers can spread, but they did not describe how.
- 04.5** Just over half of the students scored the mark for saying that smoking would damage the new lung, or that the lung cancer is self-inflicted by smoking. Some gave confused responses about cancer still being in the body, which would spread to the new lung.

- 04.6** 79% of students made two correct graph readings and subtracted one from the other to give an answer of 300 more new cases in males aged 40 to 44 than in males aged 15 to 19.
- 04.7** A tenth of students could suggest why there are no new cases of skin cancer in males younger than 15. Those who did score usually said that younger males used sunscreen. Many students thought the reason was that younger people were healthier, had healthier skin or were still developing.
- 04.8** Just over half of the students gave a correct conclusion from the bar chart. The most common one was that most new cases each year are in males aged 65 to 69 years old. Errors were seen in reading the age ranges.
- 04.9** 64% of students scored at least one mark. The question asked why survival rates for cancers has improved. Answers relating to reducing the risk of getting cancer, such as not smoking, were ignored. Marks were often awarded for the ideas of better medicines and treatments, improved technology and earlier diagnosis. References to better medical staff were ignored.

Question 5 (standard demand)

- 05.1** A quarter of students scored both marks for identifying the cell membrane and cytoplasm as structures that are found in both bacterial and animal cells. Just over three-quarters scored at least one mark. Two fifths of students incorrectly thought that both types of cell contained a nucleus.
- 05.2** One symptom of salmonella food poisoning was asked for, with students instructed not to refer to vomiting and diarrhoea. Almost half of the students were awarded the mark, usually for stomach ache or fever. Many described fever as having a high temperature or sweating, which were allowed. A few said 'nausea' which is equivalent to vomiting, and so was ignored. Many references to secondary symptoms of an infection were given, which could have applied to a wide range of infections. For example, tiredness, fatigue, headaches, dizziness, fainting or dehydration. These were all ignored. A primary symptom, such as those given in the specification, was needed.
- 05.3** 36% of students said that penicillin was the first antibiotic developed. A wide range of phonetic spellings were accepted. The most common incorrect answers were the names of well-known painkillers. Quite a lot of students did not attempt the question.
- 05.4** A fifth of students scored this mark. Most correct responses referred to a time delay before the antibiotics became effective, or started working. A few students said the bacteria would be reproducing or multiplying. There was some confusion with antibodies, and incorrect references to bacteria fighting the antibiotics, or antibiotics fighting bacteria. Some thought that antibiotics make antibodies, whilst others said that the wrong antibiotic had been given.
- 05.5** Half of the students knew that a child will start to feel better after taking antibiotics for a few days because there will be fewer toxins in the body. Most other students thought the child had become resistant to the bacteria.

- 05.6** 15% of students scored the mark, usually for saying overuse of antibiotics could result in antibiotic resistance. Quite a lot of students said the patient or the antibiotic would become resistant, which was incorrect. A common mistake was to confuse immunity with resistance. Many students scored the mark for the idea that the person would get better without taking any antibiotics, which was allowed.
- 05.7** A third of students thought antibodies are produced by red blood cells, with slightly fewer selecting the correct drawing of the white blood cell. It could be that students were unfamiliar with drawings of blood components.
- 05.8** A third of students identified platelets as the part of the blood that starts the clotting process. Few selected plasma as their answer.

Question 6 (standard demand)

- 06.1** A quarter of the students put gene, chromosome, nucleus and cell in order of increasing size.
- 06.2** Fewer than a tenth of students gave the correct answer, differentiation. Some said specialisation, whilst most students thought the process was mitosis or cell division.
- 06.3** 19% of students correctly calculated the number of cell divisions to form a 16-cell embryo.
- 06.4** 41% of students knew that the cells of a human embryo have 46 chromosomes.
- 06.5** 23% of the students scored any marks for this question. Most of these students scored a mark for Stage 1 by saying that the cell grows or that there is an increase in the number of sub-cellular structures. Some students thought Stage 1 was fertilisation, and they went on to describe the development of an embryo.

A mark for Stage 2 was less often awarded. Many students said mitosis happens, but as this was written on the cell cycle diagram it did not gain credit.

For Stage 3 many students only referred to two daughter cells forming, when reference to two identical cells was required. Reference to specialised cells being formed was seen quite a lot.

- 06.6** The question asked students to compare the growth of boys with the growth of girls, using data from growth curves.

There are three main sections in the graph:

- a section from birth to age 10 or 11, where the height and growth rate of boys and girls is very similar
- a section from age 10 or 11 up to age 14, where girls grow faster than boys
- the section from 14 to 18 years, where boys continue to grow rapidly whilst girls have stopped growing.

Within each section there were several comparisons that could be made.

To score the highest marks reference to all three sections of the graph was required, in addition to at least one comparison of the rate of growth. This was rarely seen, where a quarter of students scored three marks. Similar proportions scored two marks and one mark, amounting to 81% scoring at least a single mark.

As the command word was 'Compare' it was important that comparative statements about boys and girls were made. All the statements given in the indicative content are comparisons.

Many responses gave descriptions of what they had learnt about puberty and growth spurts, but if they did not match the data given in the graph they were not credited. Any data given had to be correct.

Common errors in interpreting the graph included:

- boys grow faster than girls up to age 11
- boys grow shorter, or stop growing, at age 11
- girls stop growing at age 18.

- 06.7** 8% of students scored this mark. The question asked for one way that mitosis is important in fully grown animals; so saying 'to grow' was not credited. Some students said for growth and repair, which was insufficient.

Replacement of cells or tissues was required. Repair of tissues, organs or wounds all gained credit. Repair of damaged cells is incorrect.

Many students said mitosis is needed for reproduction, or development of an embryo, both of which were ignored.

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.