AQA

GCSE

COMBINED SCIENCE: TRILOGY

8464/B/1H: Paper 1 – Biology (Higher)

Report on the Examination

8464

June 2022

Version: 1.0

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General

Questions 1 and 2 are common with Combined Science: Trilogy Biology Paper 1 Foundation tier.

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 66% of students scored both marks for identifying the cell membrane and cytoplasm as structures that are found in both bacterial and animal cells.

01.2 One symptom of salmonella food poisoning was asked for, with students instructed not to refer to vomiting and diarrhoea. 60% 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.

01.3 64% of students knew 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.

01.4 Fewer than half of the 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.

01.5 Two-thirds of 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.

01.6 31% of students scored the mark, usually for saying overuse of antibiotics could result in antibiotic resistance. Alternatively, they scored the mark for the idea that the person would get better without taking any antibiotics, which was allowed.

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.

01.7 A third of students correctly identified the drawing of the white blood cell as the cell that produces antibodies. More than half of the students thought the red blood cell produced antibodies; potentially as a result of students being unfamiliar with drawings of blood components.

01.8 63% of students identified platelets as the part of the blood that starts the clotting process. Few selected plasma as their answer.

Question 2 (standard demand)

02.1 54% of the students put gene, chromosome, nucleus and cell in order of increasing size.

02.2 Half of the students gave the correct answer, differentiation. Some said specialisation, whilst most students thought the process to produce specialised cells was mitosis, cell division or therapeutic cloning.

02.3 44% of the students correctly calculated the number of cell divisions to form a 16-cell embryo.

02.4 65% of students knew that the cells of a human embryo have 46 chromosomes.

02.5 A quarter of students scored full marks, with 69% scoring at least one mark. Many 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 all the changes listed on the mark scheme were seen, but 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, and was ignored.

02.6 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. 30% of students scored four or more marks. More than two thirds of students scored three or more marks.

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.

02.7 The question asked for one way that mitosis is important in fully grown animals, so saying ‘to grow’ was not credited. Many students said for growth and repair, which was insufficient. Repair of tissues, organs or wounds all gained credit. Many students said to repair damaged cells, which is incorrect. Replacement of cells or tissues was another acceptable response. Many said mitosis was important for reproduction, which was ignored.

Question 3 (standard, standard/high & high demand)

03.1 Three-quarters of students knew that amylase is produced by the salivary glands, pancreas and small intestine.

03.2 Three-quarters of the students correctly identified the pH of the amylase solution as the independent variable. Many did not write pH correctly, but as the skill was to identify the independent variable, this was ignored. Some students gave control variables, whilst a few gave the dependent variable.

03.3 30% of students answered this question correctly**.** The question was set at high demand, so to score the mark the student had to say that iodine solution would not turn blue-black, or iodine solution would stay orange. Both the test solution and the colour had to be given. Many students gave a description of the colour of the solution, but they did not name it.

03.4 Half of the students interpreted the graph correctly and gave the optimum pH for the amylase as 6.8

03.5 92% of students interpreted the graph correctly. The time for all the starch to be digested was 82 seconds, but the vast majority of students gave the value 80 seconds. This was within the range allowed.

03.6 This question was set at the highest level of demand. A third of students scored one mark. This was usually for the compensation mark. They calculated the mean rate of sugar production at 40 seconds. Some students drew a suitable tangent, but made errors when reading the change in concentration and the change in time from the graph. 4% of the students scored full marks for the question.

03.7 47% of students performed at Level 2 or above. Most students referred to enzymes having an active site, and some went on to describe how enzymes work. Less than a fifth of students clearly explained the effect of pH on the activity of amylase; with some saying that the enzyme could be denatured.

Question 4 (standard, standard/high & high demand)

04.1 Half of the students scored the mark for saying light provides energy for photosynthesis, or that light is the source of energy for the reaction. A few correctly stated that photosynthesis is an endothermic reaction. Weak language, in relation to energy being produced or used, meant that some students were unable to demonstrate the knowledge to gain the mark.

04.2 88% of students selected the correct symbol equation for photosynthesis.

04.3 This question was set at high demand. All points on the mark scheme were seen in student responses, but rarely more than two points were made in the same script. 41% of students scored one or more marks, most of which, achieved a single mark.

Most students did not pick up on the need to refer to making accurate measurements, but gave examples of variables to control. Many students said the measurements should be repeated, but they had to go on and say calculate a mean, or discard anomalies to gain credit. Several students referred to using a gas syringe or a measuring cylinder to measure the volume of gas produced. Few students said measure the time using a timer, or other suitable piece of equipment.

04.4 This question was set at high demand. 8% of students scored at least a mark for this question. Most students described what was being plotted in each graph. They did not say:

- colour of light is a categoric or discrete variable, and so plotted as a bar chart
- wavelength of light is a continuous variable, and so plotted as a line graph.

Quite a lot of students thought that the students plotted a bar chart because it is easier to draw and to understand than a line graph. Others said the scientists plotted a line graph because they had more data, or that their results were more accurate.

04.5 Students had to interpret two graphs to determine the range in wavelength of green light. Figure 8 showed that the rate of photosynthesis in green light was very low. Students had to use this information to interpret Figure 9. A range of values for the lower and upper ends of wavelength, when the rate of photosynthesis was low, were allowed. 39% of students achieved this mark.

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

05.1 This question was set at a high level of demand. Two-thirds of students scored one or more marks, with 41% of all students achieving two or more marks. Similarities and differences between benign and malignant tumours were needed for full marks. Where differences were given the statements had to be comparative. Many students compared how harmful the tumours are, or how they can be treated, neither of which was creditworthy.

05.2 39% of students scored one mark, usually for saying younger people wear sunscreen, or have had little exposure to sunlight. Little exposure to the Sun was ignored. Few referred to ionising radiation, and just said radiation, which was insufficient. The second marking point, about less cell or DNA damage in younger people, was rarely seen.

05.3 Two conclusions about the number of new cases were needed. Many students made conclusions from the lines on the graph, rather than from the bars. A common error was to say the number of cases increases with age, but this is not true above age 69. Students often referred to the wrong age ranges. For example, saying that there were more new cases in males than females above age 55 was incorrect, it was above age 60. The most common correct answer was that most people were diagnosed between the ages of 65 and 69.

05.4 The question was set at the highest level of demand with 3% of students achieving the mark. Incorrect responses included ideas about accuracy and that there would be too many people to count, or too much data to plot.

05.5 Two trends in the number of people with skin cancer were needed. Many students did not describe trends, but instead gave information using the bars on the graph about the number of new cases. The simplest trend to identify was that the number of people with skin cancer increases with age. Half the students scored at least one mark.

05.6 18% of students scored three marks, and 10% scored one mark. This was usually for the compensation mark using a reading from the bar at age 80 to 84, rather than from the line.

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

06.1 42% of students scored the mark for saying the heart is an organ because it is made up of different tissues working together. Some said it is made up of similar tissues, which was ignored.

06.2 Students were asked to explain the effect that a leaky heart valve would have on a person. 56% of the students scored at least one mark, which was usually for saying that some blood would flow back into the heart. If the wrong chamber was named then this mark could not be awarded. As the question required an explanation the remaining marks had to link logically, so just saying the person would get tired was insufficient.

06.3 Information about biological and mechanical heart valves was given in the question. When describing advantages and disadvantages of the biological valves, the student had to add some value to the information provided. Saying that biological valves have a reduced risk of blood clots adds little to the information given, so is not creditworthy. Something extra had to be added, as detailed in the mark scheme, as the question was set at high demand.

The advantage of a biological valve that the woman would not need to take anti-blood clotting drugs was often given, but reference to blood thinners was insufficient. If students just said ‘they wouldn’t have to take drugs’ this had to be qualified by adding ‘…for life’.

The disadvantage that the valve may be rejected was seen, and saying that it is unethical to use valves from animals was allowed.

Some students evaluated the use of biological and mechanical valves. To score marks they had to make the advantages and disadvantages for a biological heart valve over a mechanical valve clear.

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.