GCSE

COMBINED SCIENCE: TRILOGY

8464/B/1H – Paper 1 Biology Higher
Report on the Examination

8464
November 2021

Version: 1.0

Further copies of this Report are available from aqa.org.uk

General Introduction to the November Series

This has been another unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

A small and atypical cohort of students chose to take the autumn series of examinations. The number of entries for the Foundation Tier was only 155 compared to the usual summer entry of over 110 000.

Comments on Individual Questions

Questions 1 and 2 were common with Combined Science: Trilogy Biology Paper 2 Foundation Tier.

Question 1 (standard demand)

This question assessed knowledge and understanding of Required Practical Activity 5: investigating the effect of light intensity on the rate of photosynthesis. Almost three-quarters of students correctly identified the balanced equation for photosynthesis. Just over half correctly identified the distance of the pondweed from the lamp as the independent variable.

More than two-thirds of students described how a higher temperature would increase the rate that the bubbles of oxygen were produced by the pondweed. A a quarter of students could explain why the rate would be faster at a higher temperature. A third of students suggested how the investigation could be improved so the temperature of the water did not increase, usually saying use an LED bulb. Many students did not understand what was being investigated and suggested moving the lamp further away from the pondweed. A third of students scored one of the marks for **01.5**, usually for saying that using the same pondweed would make the results more valid. Quite a lot of answers referred to carrying out repeats, but did not go on to say calculate a mean, or remove anomalies.

Half of the students correctly calculated the rate of photosynthesis as 3 bubbles of gas per minute. Common errors included dividing the distance by the number of bubbles produced at that distance, dividing a distance by 5 minutes, or dividing an incorrect number of bubbles by 5 minutes. **01.7** was answered well on the Higher Tier. Almost three-quarters of students made a correct conclusion describing the effect of light intensity on the rate of photosynthesis. Cause and effect had to be the correct way around, to link back to what the investigation was set up to find out.

Most students correctly plotted the points on the graph, using a small cross drawn with a sharp pencil. Fewer than a third of students went on to join the points with a smooth curve. Most drew a ruled straight line. Fewer than half correctly extrapolated their line to predict the number of bubbles that would be produced if the lamp was 60 cm from the lamp.

Question 2 (standard demand)

This question assessed knowledge and understanding of Required Practical Activity 3: using qualitative reagents to test a sample of food for protein, starch and sugar. Only a few detailed, and logically sequenced methods were seen which indicated few students had carried out investigations on this practical.

A fifth of students scored more than 3 marks. This was generally because the methods had not appeared to have been learnt. Many students could not give one complete method which linked a correct reagent to the food it is used to test, and to the colour of a positive result. This limited the response to Level 1 of this question which required an extended response. To achieve Level 3, at least two complete tests plus another correct statement was required.

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

This question assessed the application of knowledge related to fermentation, and analysis of an investigation into the effect of temperature on fermentation. Over half the students gained the mark for describing what exothermic means. Common errors included saying an exothermic reaction produces energy, or ‘it gets warmer’. Reference to energy being released or emitted was required.

Very few students realised that the layer of oil was needed to keep oxygen out of the mixture. Incorrect suggestions included to prevent the liquid evaporating, to prevent gas escaping or to stop the yeast rising. Very few students knew that the mixture was left for 20 minutes to allow it to reach the correct temperature. Some had the correct idea, but thought the mixture had to warm up, rather than cool to 2 ºC. When explaining the results for the flask at 2 ºC half the students scored any marks, which was usually for saying that no gas was produced. There were confused references to a small amount of gas being produced, but this was not clearly related to when, or at which temperature. Very few references to enzymes were seen.

In **03.5** half the students acheived 1 mark for saying that gas was produced. A quarter of students scored 2 marks for also stating that 35 ºC was a suitable temperature for yeast to work. The third and fourth marking points were set at a higher level of demand and were rarely given.

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

This question was about diseases in humans and plants caused by pathogens. More than half of the students scored full marks for linking human diseases to the type of pathogen that each was caused by. Almost half scored 1 mark for saying that releasing sterile mosquitos into the environment would decrease reproduction in mosquitos. Few went on to explain how this would reduce the spread of malaria. As is often the case in questions about communicable diseases, students did not make it clear that reducing the spread of a disease is due to reducing the transfer of pathogens.

A third of students said an electron microscope would be used to view the virus; most just said microscope, which was insufficient. About a third of students knew what type of calculation was required to work out how many times longer the spore was compared to the virus. Few students realised that both measurements had to be converted to the same unit, and errors were seen when unit conversions were attempted. No student gave a full explanation why plants infected with TMV grow slowly. Some said there would be less photosynthesis or that the leaves would have less chlorophyll.

Question 5 (standard/high and high demand)

This question assessed the understanding of blood flow through the heart and heart attacks. About a third of students identified the blood vessel that transported blood with the highest oxygen concentration into the heart, and a similar proportion identified the vessel which transports blood at the highest pressure. Almost half knew the route of blood flowing through the heart to the lungs.

05.4 was an extended response question, set at high demand, to evaluate the use of statins or a stent to reduce the risk of a heart attack. A quarter of students scored 1 or 2 marks, often stating blood flow to the heart muscle would increase. References to surgery being required for a stent was also seen. Both treatments had to be discussed to move above Level 1. Many students simply repeated the stem of the question, which did not gain any marks, or they mixed up the two treatments. Just over a quarter of students scored 3 marks or above. For Level 3, advantages and disadvantages of both treatments were needed, as well as a judgement.

Few students could explain why people who survive a heart attack get out of breath easily. Three-quarters of students scored zero for this question; a quarter scored 1 mark. This was usually for saying the heart is not as strong after a heart attack. Students did not include enough detail for the other marks, for example they did not link oxygen to respiration.

The last two items were about the use of stem cells to repair damaged heart tissue. Fewer than half the students scored any marks for **05.6**. Most did not understand the difference between differentiation and specialised cells. Just over half the students scored 1 mark for saying that stem cells made from the patient's own cells would be less likely to be rejected, or that they would not involve risking the life of an embryo.

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

This question was about plant transport systems and the questions required detailed responses. Few students could describe how water is transported from the soil to the atmosphere through a plant. Most responses lacked the correct terminology or detail. A third of students scored any marks. A fifth of students knew the term translocation.

Few students identified any adaptation of sieve tube cells, although a few noticed that companion cells have many mitochondria. Saying the cells had mitochondria was insufficient, as some are found in all plant cells.

A tenth of students could give a reason why dissolved sugars must be moved upwards and downwards in a plant. Some mentioned respiration, but did not link this to the question. A reference to the whole plant, or all cells, needing sugar for respiration was needed.

Concluding remarks

It was clear that in the unusual teaching circumstances leading up to this exam had made it not possible for some topics and practical work to be covered in the normal way. It was a small and atypical cohort of students who have chosen to take the autumn series of examinations. Gaps in both knowledge and skills were evident.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.