GCSE

COMBINED SCIENCE: TRILOGY

8464/B/1F – Paper 1 Biology Foundation
Report on the Examination

8464
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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 223 compared to the usual summer entry of over 150 000.

Comments on Individual Questions

Questions 5 and 6 were common with Combined Science: Trilogy Biology Paper 1 Higher Tier.

Question 1 (low & standard demand)

This question was about cells and cell structure. More than half of the students identified the drawings of animal, bacterial and plant cells. Most students could identify the drawing of a bacterial cell. Knowledge of the function of cell structures was variable, but most students knew that the nucleus contains genetic information and many knew that photosynthesis happens in chloroplasts. There was some confusion between the function of the cell membrane and cell wall.

01.3 was about chemicals in cells. Most students knew that cellulose strengthens plant cell walls and many knew that urea is excreted by animals and starch is stored in plant cells. Knowledge of glycogen was set at a higher demand, and few knew that it is stored in animal cells.

In **01.4**, many thought the function of a muscle cell is for strength, which was ignored. A reference to movement or contraction was needed. Approximately a quarter of students scored a mark for saying that muscle cells have many mitochondria, but a weak expression of language in reference to energy meant that very few students gained both marks for **01.5**. Energy being produced, made or created is never credited and students should be encouraged to say that energy is transferred.

Over half of the students gained both marks for calculating the correct magnification. If units were added to the answer this prevented students gaining one mark. Common mistakes included incorrectly substituting into the equation, or multiplying their answer by a factor of 10.

Question 2 (low & standard demand)

This question was about communicable diseases. Most students performed well across the questions relating to the antibiotic investigation. The most common control variables given were the length of time the Petri dishes were incubated, the incubation temperature or the size of the paper discs. Some students gave more than two correct control variables, but if an additional incorrect variable was given the list principle was applied and maximum marks were not awarded. It is advisable just to give the number of variables specified in the question.

Most students correctly interpreted the results shown on the two Petri dishes and selected the correct conclusions. The two questions relating to fungal nail infections were set at a higher level of demand. Some students referred to cleaning hands, surfaces or tools between customers to reduce the risk of nail infections being spread. Wearing gloves or PPE was ignored unless qualified, for example by saying wear new gloves for each customer.

Question 3 (low & standard demand)

Ths question was about anaerobic respiration. Two of the questions tested understanding of the equation for fermentation. The equation shows that fermentation is anaerobic because there is no oxygen reacting with the glucose. Many students thought it showed an anaerobic reaction because carbon dioxide was being produced or being used. In a later question some students thought fermentation stopped because the carbon dioxide had all been used up. Few students knew that fermentation is used to make beer and wine because ethanol or alcohol is produced, but more said yeast is used to make bread because it makes the dough rise. Hardly any students linked this to the production of carbon dioxide.

Most students recognised that the steepest part of the graph represented when the rate of gas production was the fastest, but more than half thought that the horizontal line on the graph showed that gas production was slowing down, when it had actually stopped being produced. Two-thirds of students scored a mark for saying no carbon dioxide was being produced at 2 ºC because it was too cold, or because it was not hot enough. Some said the enzymes were denatured at 75 ºC. A tenth of students identified the names of both the reactant and the product for anaerobic respiration in animal cells. Many students wrote down more than one reactant or product.

Question 4 (low & standard demand)

This question was about plant transport systems. Half of the students said that water is absorbed from the soil through the root, with stem being a common incorrect response. The name of an organ was asked for, so naming root hair cells was incorrect. Almost half of the students knew that nitrate ions are absorbed from the soil by active transport, with the remaining students being equally split between diffusion and osmosis. Over half knew that translocation is the process which moves sugars through the phloem. A similar proportion of students correctly named the guard cells and knew that the stomata open during the day to allow carbon dioxide to enter the leaf.

The two calculation questions were done reasonably well. When calculating the number of stomata per mm^2 no tolerance was allowed on counting the number of stomata in Figure 5. A common error was to divide 9 by 0.25^2 which was incorrect. Students who showed their working and divided 9 by 25 giving an answer of 0.36 scored 1 mark. Students who added a unit to a correct answer only scored 1 mark. Almost three quarters of students correctly calculated the mean number of stomata on the lower surface of the leaf, but some gave the median value of 35 instead. Almost half the students scored 1 mark in **04.9** for saying there are fewer stomata on the upper surface of leaves, but very few could explain why. Many thought the stomata were to allow water to enter the leaf.

Question 5 (standard demand)

This question assessed knowledge and understanding of Required Practical Activity 5: investigating the effect of light intensity on the rate of photosynthesis. Two-fifths of students correctly identified the balanced equation for photosynthesis, with a similar proportion knowing that the distance of the pondweed from the lamp was the independent variable. Almost half of students stated a higher temperature would cause the pondweed to produce more bubbles, which was allowed. On the Foundation Tier students did not go on to explain why the rate would be faster at a higher temperature, nor did they suggest how the investigation could be improved so the temperature of the water did not increase. Many students did not understand what was being investigated, and suggested moving the lamp further away from the pondweed. A fifth of students scored one of the marks for **05.5**, usually for saying that using the same pondweed would make the results more valid. Quite a few students referred to carrying out repeats, but did not go on to say calculate a mean, or remove anomalies.

A third of students correctly calculated the rate of photosynthesis as 3 bubbles of gas per minute. The most common error was to divide the distance by the number of bubbles produced at that distance, or to multiply the distance by the number of bubbles. Over half of students made a correct conclusion describing the effect of light intensity on the rate of photosynthesis. Some students only described a pattern, such as ‘as distance increased the number of bubbles decreased’, which was insufficient. A reference to light intensity or distance from the lamp was needed, as well as a reference to the rate of photosynthesis, or to the number of bubbles produced. Cause and effect also had to be the correct way around, to link back to what the investigation was set up to find out.

Approximately two-thirds of students correctly plotted the results on the graph paper, using a small cross drawn with a sharp pencil. Only a few went on to join the points with a smooth curve. Most drew a ruled straight line. About a quarter of students extrapolated their line to predict the number of bubbles that would be produced if the lamp was 60 cm from the lamp.

Question 6 (standard demand)

This was an extended response question which assessed knowledge of Required Practical Activity 3: using qualitative reagents to test a sample of food for protein, starch and sugar. A fifth of students did not attempt the question and half scored zero. It was evident that only a few students were familiar with the practical. Very little knowledge of food tests was demonstrated.

Concluding remarks

It was clear that in the unusual teaching circumstances leading up to this exam, it had not been possible for more some topics and practical work to be covered in the typical way. It was a small and seemingly 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.