AQA

GCSE
COMBINED SCIENCE: SYNERGY

8465/2F
Report on the Examination

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General

As might be expected with the new Foundation Tier papers extending to assess knowledge, understanding and skills up to grade 5 challenged many students. The new emphasis on mathematics was an added hurdle to many. Students usually scored well on the initial low demand knowledge aspects of a question, but many did not do well with the more demanding aspects which required application of knowledge and logical thinking. Generally, students did not score well in the two questions based on Required Practical Activities.

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 This symbol does not come from the periodic table so the commonly seen answers of atomic mass or relative atomic mass were not correct. 13% of students achieved mark for 'the number of protons and neutrons' but a greater number knew it was the mass number.

01.2 75% of students achieved a mark in this question for giving the number of protons.

01.3 41% of students achieved the mark for giving the number of neutrons.

01.4 68% of students correctly assigned the 10 electrons in the two shells.

01.5 Most students confused the overall charge on an atom (neutral) with the question here which was asking for the charge on the nucleus (positive). Consequently, 32% of students gained credit.

01.6 A large number of students saw that the number of each particle was 10 and re-wrote that in their own words. Some wrote 'they are all balanced'. 9% of students achieved the first mark while 3% gained the second mark.

01.7 31% of students correctly selected isotope.

01.8 Students are clearly familiar with the model representations of particles in solids, liquids and gases with 93% achieving both marks.

Question 2 (low demand)

02.1 Mitochondria were the best known examples of animal cell components. Plasmids proved a powerful distractor despite only being associated with bacterial cells. 29% of students achieved full marks.

02.2 51% of students did not make the link needed between mitosis producing new cells and the need for new cells for repair.

02.3 This calculation was quite well attempted, with 41% of students gaining two marks.

02.4 This calculation was well attempted, with 48% achieving two marks. 11% of students did not attempt the question.

02.5 60% of students knew that a muscle body cell would have double the number of chromosomes found in a sperm cell.

02.6 87% of students were able to name the process of fertilisation.

Question 3 (low demand)

03.1 Students answered this question well with 48% achieving full marks. A large number of students did not work out the correct scale, therefore two or more points were plotted incorrectly. Lines of best fit were generally well drawn unless the student had decided to join the points with straight lines. 18% of students gained no marks here.

03.2 Quite a few students extrapolated the wrong line. Some didn't extrapolate at all but still got the right answer, therefore, they lost the mark for extrapolation but gained one mark for the final correct answer. Many also gained the second mark for correctly reading off an answer for 2020 after having extrapolated the wrong line. 56% of students achieved one or two marks.

03.3 Correct answers most commonly related to a change in eating habits. 'Sugar tax' was only credited if students went on to say that people would thus eat less sugar in their diets.

03.4 63% of students achieved at least one mark. The first marking point for rising cases of diabetes was seen most often. If an answer was made in terms of income or population increase no credit was gained.

03.5 73% of students were able to identify why the percentage of people in the world with diabetes has changed (gone up) from the graph.

Question 4 (low demand)

04.1 39% of students were able to answer this question assessing knowledge direct from the specification.

04.2 65% of students knew that white blood cells produce antibodies.

04.3 61% of students were able correctly to identify the points as those where the level of antibodies started to rise for the second time. Misinterpreting the scale on the *x*-axis, meant that some students gave values outside the acceptable range.

04.4 64% of students were able to identify point of peak concentration. As with question **04.3**, misinterpretation of the *x*-axis resulted in incorrect answers.

04.5 70% of students achieved both marks for selecting reasons for the decrease in the number of children contracting measles.

04.6 Many students misinterpreted this question and wrote 'cost to the parents' rather than the NHS. Some students realised that the effectiveness of the vaccine and the severity of chicken pox would be a factor. Marking points two and five were rarely seen. 5% of students achieved both marks.

Question 5 (low demand)

05.1 The use of the binomial naming system did not appear to be well known to students. 23% of students were able to use the data in the table to give a correct answer.

05.2 This exercise in observation and interpretation was generally well done with 57% of students achieving the mark.

05.3 Even those students who did not successfully answer question **05.2** used their own knowledge to suggest that the pig was most closely related to humans. Some students gained credit by giving 'chicken' if their number in the previous question for pig and wheat were above 3. 81% of students achieved this mark.

05.4 Students found this tough with 2% achieving the mark. 19% of students made no attempt to answer. The main response seen was 'pigs are not like humans'. Very few made the link between the lack of data and the validity of the conclusion.

05.5 Some students did well with 19% achieving two or three marks. But the majority did not get past breeding the first selected chickens together. Students were vague in their descriptions of how the process continued from there. There was evidence of confusion with genetic modification and cloning.

05.6 32% of students were clear that this would generate more money or profit for the farmer. Many felt it would make it easier for him to obtain the chickens he wanted, implying that the farmer carried out the selective breeding himself.

05.7 57% of students identified the problem with overweight chickens.

Question 6 (low demand)

06.1   This question on a Required Practical Activity was not answered well with 62% of students unable to achieve any marks. A 'measuring jug' was the most common piece of equipment used.

Most students seemed to know that there has to be water displacement and so the second marking point of either method was the one most often awarded.

Whichever route they took, it was the third marking point they seldom gained as calculating or measuring volume with a measuring cylinder was not referred to by most students. Answers such as 'measure the water' or 'find the difference' were more common.

06.2   The full range of answers were seen in this question, with 30% of students choosing correctly.

06.3   85% of students were able to calculate volume using the equation given.

06.4   77% of students achieved full marks for calculating density. 11% of students did not attempt this question.

06.5   81% of students were able to interpret the data given to correctly identify haematite.

Question 7 (low and standard demand)

07.1   Students struggled with this question based on a Required Practical Activity. 69% of students did not gain any marks. Most students who gained credit weighed the chips before and after placing in water, and many found the difference in mass. However, very few realised that to convert this difference to a rate they would need to divide by the time taken.

Many students suggested measuring the amount of water at the beginning and at the end, and some simply said 'measure the chip' without specifying what was being measured.

07.2   It appears that the term 'cork-borer' is unfamiliar to many students with 8% achieving the mark. A description of the equipment was enough to gain the point for some students. Lots of different answers were given such as 'grater', 'potato slicer', 'ruler' or 'scissors'.

07.3   This question was challenging to most students with 155 able to achieve any credit. Most did not identify that there was a larger surface area in the potato chip, and those that did rarely linked this to a greater rate of diffusion / osmosis.

07.4 Very few marks were gained in this question. The first marking point was given mainly in terms of 'more water taken in' or simply, 'it would increase', whereas an answer was required in terms of an increase in rate. 3% of students linked this to kinetic energy or movement of particles to achieve full marks.

Question 8 (low and standard demand)

08.1 42% of students knew that potable water was safe to drink. Of those who did not gain the mark, responses were almost equally split between those who thought that it was portable water easily carried about and those who thought it was water which had been treated in some way.

08.2 48% of students achieved credit, often for 'removing the bacteria'.

08.3 65% of students achieved one mark for calculating that 6 bottles at 29p would cost £1.74. However, they then missed the next mark as they multiplied it by 365, rather than 2, not seeming to realise that new bottles were only needed twice in a year rather than every day.

08.4 Many students repeated the question text rather than going on to explain or making answers comparative. As a result, 30% of students achieved any credit.

08.5 17% of students were able to score two marks here, but as in question **08.4** some students missed out on marks as they made no comparison.

08.6 Boiling was the most common correct answer given by 43% of students.

Question 9 (standard demand)

09.1 Most students attempted to improve this method. Using the same size bags was the most common correct answer, followed by using the same volume of water. Many students gave answers to extend the investigation instead, such as suggesting using more colours.

The common answer of repeating for more time or on more days did not gain credit. 69% of students gained some credit.

09.2 Resolution appears to be a concept that is not well understood, with 6% of students providing a correct answer. 22% of students did not attempt to answer this question.

09.3   This was generally well understood, but all too often inaccuracy in expression resulted in the mark not being awarded.

09.4   The mean value was correctly calculated by 67% of students.

09.5   87% of students concluded that it was black bag that would be best to use. However, approximately half of these students did not gain the mark for their reason. Those that did so usually referred to the greatest rise in temperature. A very common misconception is that the colour black 'attracts the Sun / heat'.

Question 10 (standard demand)

10.1   4% of students were able to give a correct answer. Some students who were on the right track just wrote 'radiation' which was insufficient. Other common answers were 'extra chromosomes', 'Down's syndrome' or specific genetic disorders which may be the result of a mutation but do not cause a mutation.

10.2   Enzymes were commonly identified as used in genetic engineering, but vectors less often. Placebos were often given instead. 74% of students achieved at least one mark.

10.3   This 'extended response' question was challenging to students and discriminated well. Only the highest-attaining students were able to access level 3 (3%). 18% of students were able to access level 2 by giving the key ideas of testing on healthy volunteers followed by testing on patients. Most students in level 2 achieved three marks.

Few students appear to have a completely clear grasp of the sequence of drug testing. Many students missed the testing on healthy volunteers and / or those with Dravet syndrome. Those who gained credit seemed to be familiar with the use of a placebo and / or a double blind trial with some students describing it in detail.

Question 11 (standard demand)

11.1 57% of students correctly identified the trachea.

11.2 Many students answered in terms of the x-ray 'only showing bones' which was ignored as a clear advantage was required. Those students who did look for an advantage generally stated 'it was clearer' which was insufficient. However, 18% of students did recognise that the image was either more detailed or gave a specific example of tissues that could be seen.

11.3 This was well answered particularly with reference to ribs. Many students seem to be familiar with the problem of a punctured lung due to broken ribs. Very few students mentioned it being cheaper.

11.4 30% of students had the depth of understanding of respiration required to achieve any credit for this question. Many referred to the idea of energy being produced which negated the second marking point.

Most answers that achieved a mark were about the need for oxygen in aerobic respiration or the production of carbon dioxide. There were some good responses referencing the location of each: mitochondria and cytoplasm.

11.5 This 'extended response' question discriminated well. 57% of students were able to access level 1, and 21% of students spread across levels 2 and 3 by provided there was logical linking. The most common were tar causing breathing problems or smoking having something to do with cancer. Some mentioned the reduced oxygen carrying capacity of blood in smokers but did not know what caused it.

There were many vague level 1 answers seen. There did seem to be a lack of understanding and knowledge about the components of cigarettes and consequently how these affect the human body. Although most students answered the question in terms of the dangers of smoking, as opposed to how giving up smoking would benefit an individual, this was acceptable.

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.