GCSE
Additional Science (combined)

AS1FP

Report on the Examination

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General

A considerable number of students had very poor handwriting. Examiners cannot award marks if they are unable to decipher key words in the student's answer, even after using the magnifying tool in the online marking program; such students disadvantage themselves. Where a student's writing is poor, Centres may use scribes and it would be helpful to students if this was done so that their true ability in science is assessed. In addition students should be advised to use a black pen that delivers a dark black colour, rather than shades of grey which some have. This will also help examiners to read what the student has written.
Students need to think about their responses to multiple choice questions before ticking or ringing an answer. This would avoid the messy alterations and crossing out, where it was not always possible to tell what the student's final response was.
Students should also consider the need to plan their answers to longer questions before they begin to write. This was a particular issue in question 10(b) where long and rambling responses often repeated the same idea several times. Sufficient space is provided for students to write very full answers on the printed lines. However on rare occasions it may be necessary for students to extend their answer to additional paper. In such cases, students should be reminded to carefully number their continuations; some such continuations bore no indication of the question number they related to, leaving examiners to make a 'best guess'.

Question 1 – Low Demand

(a) Over half the students successfully completed this part, linking each part of the cell to its function. The most common error was to link the 'nucleus' to 'controlling the movement of substances into the cell', which is the role of the cell membrane.

(b) Although the instructions told students to complete each cell in the table with a tick or a cross, many students added only ticks. The examiners were prepared, on this occasion, to accept an empty cell as being equivalent to a cross, thus many students who might otherwise have gained no marks here got credit.
This question could be answered either by students recalling the information from their learning or by using the diagrams in Figures 1 and 2. Despite this relatively few students gained all three marks, the most common error being to attribute chloroplasts to at least two of the cell types. The table was marked initially in terms of structures found in the different cell types. Where students gained no more than 1 mark by marking in this way, the examiners marked the columns of the table. This often resulted in students gaining marks for both the 'cell wall' and 'nucleus' columns, even though the 'chloroplasts' column was entirely incorrect and they had got no marks for the completion of the rows.

Question 2 – Low Demand

(a) The vast majority of students were able to correctly identify the grid as a 'quadrat'. Only a very small number believed it to be a 'habitat'.

(b) The intention with this series of questions was that students would be able to develop their ideas and answers and so gain more credit than they might have done had they been asked only to calculate percentage cover. For many students this approach proved to be helpful, although in some cases the sequence of responses bore little resemblance to one another.

(b)(i) Counts of either '14' or '15' were acceptable responses. Some students counted only those squares which were entirely covered by *Pleurococcus*, giving the incorrect answer '7'; however this did not preclude them from getting the marks in the subsequent parts. In other cases it was unclear how the answer might have been arrived at.

(b)(ii) Students were expected to use their answer to part (b)(i) in this part. Incorrect answers in part (b)(i), if shown as the correct fraction were awarded the mark. Alternative correct equivalents to the fractions shown were accepted, such as '$^{3}/_{5}$' for '$^{15}/_{25}$'. In some cases these fractions were given in terms of hundredths, which were also accepted, although some had the correct numerator (ie 14 or 15) but gave '100' as the denominator, suggesting they believed there to be 100 squares in the quadrat, perhaps quadrats they had used in their own investigations.

(b)(iii) Converting the fraction given in part (b)(ii) into a percentage did not prove to be difficult for the majority of students.

(c)(i) Identification of an appropriate physical factor did not appear to be an easy task for very many students. The most common correct responses were 'temperature' along with 'light', although the insufficient response 'sun' was by no means uncommon.

(c)(ii) What was surprising was that a significant proportion of those students who had given 'temperature' in part (c)(i) were unable to suggest an instrument that could be used to measure temperature. Many of those who had suggested 'light' in part (c)(i) struggled here, the most common answer being 'solar panel' rather than a 'light meter'. Some students gave answers such as 'thermometer' here, but this did not match their answer to part (c)(i), so this mark was not awarded.

Question 3 – Low Demand

(a)(i) Most students put the correct answers in the appropriate places to complete the equation. The most common error was to reverse the answers, whilst a few selected 'chlorophyll' for one or other of the spaces. The other alternative, 'mineral salts', was only rarely chosen.

(a)(ii) The origin of the energy for photosynthesis, 'the Sun' or 'light' were very common responses, with a high proportion of students achieving the mark.

(b) Examiners thought this might prove to be a little tricky for many students; however a good proportion gave the correct answer, 'temperature'. Of other answers 'the volume of water' was unexpectedly quite common.

(c)(i) Most students did well here, with a high proportion correctly identifying that an incorrect mass of sodium hydrogen carbonate had been added. Those who qualified this almost always said that too much had been added. In a similar way many suggested incorrect timing and if qualified, stated that the time had been too long. It was good to see that students were thinking through their answer to this question.

(c)(ii) It appeared that many students believed that a 'line of best fit' must necessarily be a straight line of best fit, as few attempted a curving line, and even fewer showed the plateau beyond 0.6 g of sodium hydrogen carbonate. Had students drawn a single straight line of best fit, examiners might have understood this misunderstanding, however it was far more common for students to simply draw their line joining the first point with the last one, paying no notice to all those in between. This demonstrated a weak understanding of what constitutes a line of best fit.

(c)(iii) Students who had drawn a poor line of best fit in part (c)(ii) were not penalised here. Examiners checked the line that had been drawn and awarded marks appropriately. Even with a poor line, a mark could still be awarded for a value in the correct range, even though it was unclear how the student might have decided on this value.

(c)(iv) It was not uncommon for students to suggest alternative chemicals which might be added to the water to provide carbon dioxide. Many of these, such as 'sodium hydroxide' were wholly inappropriate. Examiners though, were looking for a natural source of carbon dioxide for plants, the most immediate one being dissolved in the pond water itself. However examiners also accepted indirect sources such as being 'breathed out by animals' whether these were aquatic or terrestrial animals. A very few students realised that carbon dioxide would be available from the pondweed's own respiration.

Question 4 – Low Demand

(a)(i) This was very well answered with most students being able to interpret and add value to the data in the table to obtain at least one mark, usually by referring to the relative strength of the materials.
The second mark, for comparing density was less likely to be obtained, students often wrote in terms of 'lightness' or 'heaviness' which were ignored as there was no specific reference in the unit to mass or weight.

(a)(ii) Most students were able to identify 'cost' as another factor that should be considered when choosing a material to use.

(b)(i) Approximately two thirds of the students were able to identify the structure of graphite. The first and third diagrams proved to be equally popular for those who did not identify the correct one.

(b)(ii) Most students were able to identify 'diamond' as another form of carbon.

(b)(iii) Most students were able to correctly compare the thickness of carbon fibre with a nanoparticle. The third alternative, giving the reverse of the correct answer was the more popular of the distractors.

(c)(i) Students who knew how to use the data to calculate the percentage of aluminium in the alloy were usually able to correctly determine the answer to gain both marks.
There were two alternative ways of getting 1 mark; by either making an incorrect subtraction of 100-12 or by making an arithmetical mistake on the addition of metals but then correctly calculating the percentage of aluminium using these figures. Alternatively if students had made a mistake in the addition of the other metals, but had used this correctly to calculate the % they could obtain one mark.
The most common incorrect answer was '12' where students had correctly added the percentages of other metals but then not subtracted from 100 to gain the percentage of aluminium. '3' was also seen on occasions with students again calculating the percentage of other metals but then appearing to try to find the mean mass by dividing by 4.

(c)(ii) Most students were able to use the data sheet to name a metal mixed with aluminium in the alloy.

(d)(i) Approximately half of the students were able to identify 'tangled polymer chains' as the structure of a thermosoftening plastic, with over a quarter of students believing that thermosoftening plastics have hexagonal layers.

(d)(ii) Just over three quarters of students knew that a thermosoftening plastic would 'melt' when heated.

Question 5 – Low Demand

(a) Nearly every student could give at least one reason as to why an instrumental method is used, with two thirds being able to correctly identify two reasons. 'Low sensitivity' was the most popular distractor and the examiners were further disappointed that an appreciable minority of students ticked only one box, despite the three clear instructions to give two answers.

(b)(i) Most students could interpret the diagram to identify the peak representing carbon dioxide.

(b)(ii) Just over half the students could interpret the diagram to identify which substance travelled though the column the fastest.

(c)(i) The formula for carbon dioxide appeared to be better written than in previous years with most students using clear upper case letters and a subscript no higher than halfway up the O, fewer incorrectly written formulae such as 'Co_2' or 'CO^2' were seen.

(c)(ii) Approximately two thirds of students knew that simple molecules do not conduct electricity.

Question 6 – Low Demand

It should be noted that students who used technical terms such as layers were more likely to gain both marks.

(a) The diagram was given to prompt the students but many just gave a general description of the pattern or changes in position of the rows such as the 'bottom row goes to the right' or 'moved to get gaps' without any indication as to what exactly was happening. Others realised that something was sliding but often did not gain the mark as they did not indicate it was atoms / layers sliding over each other.
A statement that the layers slide was insufficient as it didn't give any indication that the arrangement of layers relative to each other had changed. Alternative wording for slide could be move or slip. References to 'particles' instead of 'atoms' was allowed.

(b) The first marking point was for either the idea of the arrangement of copper being changed by the presence of the tin atoms or tin atoms having different sizes, which was more usually given with few giving answers in terms of distortion of the structure. Responses that stated that bronze atoms were bigger were not credited. Answers such as tin atoms having different surface areas were accepted.
Incorrect responses usually gave general (and often) incorrect responses such as 'stronger structure', 'stronger atoms', 'tin reinforces copper' or 'harder atoms'. There were many incorrect references to bonding. A few though did gain the second mark without the first by realising that the layers / atoms could no longer slide.

Question 7 – Low Demand

(a)(i) Only a small proportion of students realised that the current would be the same at any point in the series circuit. The great majority, having noted the greater resistance through R_2 than through R_1, gave one or other of the distractors.

(a)(ii) A majority of students realised that they had to add together the resistance values, arriving at a value of '40 (ohms)'. Weaker students subtracted or even multiplied the values.

(b)(i) Whilst many students were able to draw the correct symbol for a voltmeter, few were able to position it correctly in the circuit, the most common position being in series with the resistor R_2.

(b)(ii) Only a small majority of students selected the correct answer '3 V', with almost as many choosing '1.5 V', presumably believing the potential difference to be divided equally between the two arms of the parallel circuit. Only very few suggested that there would be no potential difference across the resistor.

(b)(iii) Again only just over half the students chose the correct, second, answer, showing an understanding that the current values shown on the diagram needed to be added together. It was thought that many students would recognise the first answer was a correct calculation and so tick this response without bothering to read the others, however they were generally proved wrong as the most common incorrect answer by far was the third alternative, showing that students were at least showing good examination technique.

Question 8 – Low Demand

(a)(i) This part was not well done by the majority of students. A whole range of suggestions being offered, rather than 'opposite' which was required.

(a)(ii) Many students were able to select the correct equation and perform the calculation correctly, and many were also able to give the correct unit. Despite the fact that three units were given to choose from, a significant number of students identified a completely different unit.

(a)(iii) The examiners were pleased that a relatively high number of students realised that as the sprinter's speed increased the air resistance acting on him would also 'increase'.

(a)(iv) A very large proportion of students correctly selected '0.5 seconds'. There was roughly equal selection of the two distractors, though examiners wondered if those students who suggested the third alternative had really thought about their answer in relation to the context and its consequences for such an athlete.

(a)(v) A little under half the students recognised that the gradient on the graph represented the 'speed' of the athlete, with the majority selecting 'acceleration', again perhaps not relating their answer to the context of a sprinter continuing to accelerate throughout a 100 m race.

(b)(i) Most students answered this correctly. However, examiners would prefer students to refer to the time 'decreasing', rather than the 'time getting quicker', as time is a fixed dimension. Some answers were given in terms of the sprinter's speed, rather than his time, as asked. A significant number of answers indicated that because the time was decreasing, the sprinter was running more slowly.

(b)(ii) Some good answers were seen, with students giving other factors as to why the given conclusion was not valid, the most common referring to 'fatigue' or 'injury'.

Question 9 – Low Demand

(a) Many students were able to select the correct equation and perform the calculation correctly. Some students attempted to perform the calculation without the aid of a calculator, often arriving at improbable answers.

(b)(i) A large proportion of students correctly selected 'electron' from the particles offered. Incorrect answers were roughly evenly split between the two distractors.

(b)(ii) Only a minority of students stated correctly that 'opposite charges attract'. Some poor answers referred to 'positive electrons'.

Question 10 – Standard Demand

(a)(i) Students should be familiar with the term 'diffusion' however a significant number were unable to recall this and many simply offered no answer at all.

(a)(ii) Students demonstrated poor understanding of the way in which oxygen might enter a cell. Cell A was by no means the most common answer, and cells C and D featured prominently in selections.

(a)(iii) Having given an incorrect cell in part (a)(ii), it was more difficult for a student to gain the mark here. Even for those who had given the correct answer in part (a)(ii), by far the most common type of response was based on numbers of oxygen molecules rather than their concentration. As a result this question was answered poorly and was often left blank.

(a)(iv) Only the better students knew that oxygen would be used for 'respiration'. Weaker students again left the answer line blank and there were many insufficient responses that got no further than 'movement' or 'living'. The question asked why a cell might need oxygen; hence 'movement' could not be accepted unless a motile cell had been identified. 'Photosynthesis' was by no means uncommon amongst incorrect responses.

(b) A small but significant number of students chose to forsake the potential six marks and made no attempt to answer this question. Many of those who did attempt a response offered few of the ideas needed to gain marks.
Those students who realised that the sequence of structures given in the question was the hierarchical sequence, or who had remembered the sequence from their learning, were able to develop answers, along the lines that each successive level of organisation was made up of a group of the previous structure, thus 'tissues are groups of cells' and 'organs are group of tissues' were given by a number of more astute students. Most students who attempted the question were able to offer at least some examples of structures; most notably organs, such as the 'stomach' and 'brain' and systems such as the 'digestive system'. However the answer could not simply name structures; in order to gain credit they had to be linked to the right level of organisation.
Unfortunately a considerable number of students, presumably having read that parts of cells should not be referred to, proceeded to do just that, and there were long accounts of the structure of and differences between animal and plant cells.
To gain level 1 a student only had to give a simple description of one level of organisation or match one structure to a level of organisation.
Level 2 required a little more detail, either giving both ideas from level 1 or describe two levels of organisation or give examples from two levels of organisation.
To achieve level 3 there needed to be links between descriptions of levels of organisation and named examples from levels. However to achieve full marks, students needed to refer to at least one example from both plants and animals, thus a student who described all the levels very well but gave only animal examples could only gain 5 marks. Few students gained all 6 marks.
The Quality of Written Communication component of the mark scheme rarely resulted in mark amendments for students, as a general rule the QWC component was at least as good as the level achieved for biological content.

Question 11 – Standard Demand

(a)(i) Approximately half the students managed to obtain one mark, which was more likely to be the proton mark. Few were able to obtain both marks. Charges were quite often seen with students not appreciating that only the relative mass had been asked for. Common incorrect values for the proton were '0' or '-1' or quite often '7', where the students had counted the electrons in the ring.
For electrons a relative mass of '0' was often given as a response but was not accepted, and answers such as smaller than '1' were not considered sufficient. '7' was also a common incorrect response where the candidates had counted the electrons from the energy level diagram given in the question.

(a)(ii) Only a third of students knew the term 'isotopes'.

(a)(iii) Over half the students knew how to determine the number of neutrons in a chlorine atom from the given mass and atomic numbers.
Incorrect values that were seen were the atomic number, '17', the mass number, '35', or '52' which was the sum of the atomic and mass numbers.

(b)(i) Just under half of the students knew that 'covalent' bonding is found in a chlorine molecule.

(b)(ii) A large percentage of students did not attempt the question, though the great majority of those who did obtained both marks. The examiners suspected that many of those who had omitted to offer an answer had simply not seen the question. This can only be because of a failure to read all of the information provided.
Usually if a student correctly added the shared pair of electrons, they were able to carry on and complete the diagram. Most students followed the instructions to only complete the outer energy level though some were seen with a fully drawn complement of electrons in the correct energy levels.

Question 12 – Standard Demand

(a)(i) Many students scored 2 marks for performing the calculation correctly. However, the unit given was often incorrect, or not consistent with their answer, eg the value 15510 should have the unit kJ, but was often given as J. However just over a tenth of students made no attempt to answer this straightforward calculation.

(a)(ii) The majority of students realised that the 'kinetic energy' of the train would be increased by its acceleration.

(b)(i) Many students were able to select the correct equation and perform the calculation correctly, thus scoring both marks. A significant minority of students copied one or more of the values, usually the mass, incorrectly.

(b)(ii) A significant number of students did not attempt this question. Of those who made an attempt, few realised that the answer would be the same as their answer to part (b)(i). Some realised the connection with the gravitational potential energy value, but subtracted the mass (or some other arbitrary number) from their value.

(b)(iii) Students who realised that some energy would be transferred to the surroundings generally answered the question well. However, there were many incorrect ideas as to why the increase in kinetic energy would be less than that calculated, some referring to a different change in height and some to the effect of gravity.

(d) Many students gained a mark for this question. The most common answer was that there should be a legal limit for the acceleration, usually linked to the idea of protecting passengers from potential harmful effects or referring to possible 'unconsciousness'.

Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator