OCR
Oxford Cambridge and RSA

GCSE

Further Additional Science B

Gateway Science Suite

General Certificate of Secondary Education **J266**

OCR Report to Centres June 2014

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

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General Certificate of Secondary Education

Further Additional Science B (Gateway)(J266)

OCR REPORT TO CENTRES

B761/01 Further Additional Science modules B5, C5, P5 Foundation Tier

General Comments:

- This is the first examination available for this new specification. There was a small cohort for the foundation level paper.
- In general the paper was balanced and accessible to all candidates. Few candidates failed to complete the paper.
- Answers were appropriate to the question and there was little evidence of guessing taking place. Questions which tested the quality of written communication were largely well developed by candidates, although there was a reluctance to consider the full extent of the question to their response, often only responding to certain parts of the question. This often limited the access to the higher marks in this type of question. Only a few of these questions were no response answers.
- No artistic embellishments were observed indicating that the candidates were 'on task' throughout the session.
- The rubric of most questions was interpreted correctly.
- Candidates continue to find difficulty in questions which test the candidates' ability to apply their knowledge and understanding. Marks ranged from low twenties to upper fifties.
- Most candidates were able to apply their knowledge of genetic crosses and the effect of temperature on reactions controlled by enzyme action. Fewer candidates were able to apply their knowledge accurately to experimental observations of precipitation reactions or express clearly what a precipitation reaction actually is. Encouragingly, most candidates could calculate the image magnification in Q.11 (e).

Candidates need to be more aware of making comparisons to avoid losing marks. Candidates should also be more alert to applying their knowledge to given situations in questions.

Comments on Individual Questions:

Question No.

Q1a. Several candidates were able to refer to the data and link it to size of animal and surfaces used to get oxygen. A few candidates mistakenly assumed that whole outer surfaces meant they were using a very large surface compared to structures such as lungs and did not recognise the link with width of organism.

Q1bi. Most candidates were able to interpret the graph and common responses were linked to uptake through skin being highest in March and peak uptake by lungs is in March / April or spring.

Q1bii. Most candidates got two or three marks on this question. If the month was incorrect it was usually March that was stated.

Q2a. Almost all candidates were able to locate and label the stomach and small intestine.

Q2b. Some candidates were able to explain chemical digestion well, fewer were able to describe physical digestion successfully but it was rare to see a candidate who could link them together.

Q3a. This was a well answered question.

Q3bi. Again most candidates could answer this.

Q3bii. Most referred to less sperm and many were able to say some sperm are damaged / abnormal / defective.

Q4a. Most candidates know that an X-ray machine is used to provide images of bones, fewer could identify the fracture as a compound fracture and it was unusual to see responses that identified the ulna and radius as the bones.

Q4b. In general this was well answered, with most gaining both marks.

Q5. Although many candidates got three marks, some mixed up molar mass with mol/dm^3.

Q6a. Not many candidates could identify carbon dioxide as the gas from an acid-carbonate reaction.

Q6bi. It was also quite rare to find hydrogen as the response to the gas produced in the reaction.

Q6bii. In candidates who had less understanding the responses were often limited to ethanoic acid is a weaker acid / hydrochloric acid is a stronger acid. Only the best candidates referred to hydrogen ion concentrations.

Q7a. A well answered question with most getting three.

Q7b. Almost everyone got this mark.

Q8a. This was a poorly answered question. Many did not attempt it and those that did often referred to incorrect colour matches to the precipitation reaction. It was also very rare to see a correct description of a precipitation reaction.

Q8b. If a candidate identified universal indicator they usually got the colour match mark as well. However, a significant number referred to other indicators, mainly litmus, and as a result did not score.

Q9ai. A well answered question.

Q9aii. Most scored marks here for possible increased risk of stroke or heart attack. The other marking points were referred to in equal numbers over the cohort with the exception of the more than GDA for sodium which was seldom seen as a response.

Q9b. Often marks were gained for ideas about more research done / more experiments or new evidence obtained and may lead to different conclusions about GDA.

Q10a. Full marks to this question were rare but most got one mark for 12 x 7.

Q10b. Some got full marks but very few got the one mark part of the calculation.

Q10c. Most got the extra force (of wind) often through alternative wording, some referring to drag or air resistance as they also did with the marking point for opposing Bradley / in opposite direction to Bradley.

Q11a. Although many got this correct a significant number of candidates did not know that it was convex.

Q11b. Very few were able to identify focal length as distance or length to focal point / distance or length from (middle of) lens, so in the main few scored these two marks.

Q11c. Although some candidates identified the image as real or inverted it was rare for them to score.

Q11d. If candidates did score it was for idea of “moves lens forwards / move lens backwards”.

Q11e. Almost all candidates could do this question.

Q11f. Many candidates could identify reflection, unsurprisingly a number put refraction, and however, TIR was rare to see.

Q12. It was common to see a response with a reference to particles moving quicker and producing more force or pressure or equal and opposite forces propelling rocket, but it was rare to see any candidate linking the two ideas of reactions and forces involved. As a result responses were often limited to level 2.

Q13a. A well answered question.

Q13bi. Most scored for alternative wording on the idea that this satellite moves across the earth.

Q13bii. Many knew that the ore detailed image was the result of the I.S.S. being closer to Earth.

Q13c. Again a well answered question with most responses referring to the satellite being higher above the Earth.

B761/02 Further Additional Science modules B5, C5, P5 Higher Tier

General Comments:

This is the first sitting of this new specification and candidates were well prepared. The paper produced a mean mark of 35.4 with a standard deviation of 13.5. About 80 candidates would have been better entered for the foundation tier having scored less than 20 marks. Most candidates attempted the 6 mark questions and usually scored some marks. These questions are marked using a level of response mark scheme which uses the concept of 'best fit'. The biology question concerned the function of protease and hydrochloric acid in digestion. It was targeted at all grades up to and including grade A. About a fifth of candidates gained level 3 (5 or 6 marks) and about a third gained level 2 (3 or 4 marks). The chemistry question concerned the use of barium chloride solution and lead nitrate solution to test river water. Candidates struggled with this question with less than a tenth of candidates scoring level 3. The physics question concerned how rockets are propelled forwards using ideas about force and momentum. Again about a tenth of candidates scored level 3 with the majority scoring level 1 (1 or 2 marks). Candidates need to ensure that they address all aspects of the question if they are to access level 3. Candidates should understand that, if they require more space to answer these questions, they may use any blank spaces left on that page before asking for extra paper.

Candidates performed well in straightforward calculations.

Overall Examiners felt that the question paper, although challenging, was appropriate to the ability range of the candidates intended.

Comments on Individual Questions:

Question 1

1(a) Both parts (i) and (ii) were well answered. The liver was the most popular incorrect answer in part (i) and the lungs in part (ii).

1(b) Most candidates scored 1 or 2 marks on this question with many scoring all 3. Candidates could interpret the data correctly and the best candidates quoted it in their answers. Occasionally the kidney was quoted as the organ that produced urea.

Question 2

2(a) Candidates could interpret the graph well and scored highly on this question. Most correct answers focused on the peak oxygen uptake though the lungs in April and the fact that uptake through the outer surface does not vary much throughout the year.

2(b) Only the best candidates scored 2 marks on this question. Many failed to realise that a moist skin was required for oxygen absorption and fewer still mentioned that in dry areas the frog would lose too much water.

2(c) This question was poorly answered. Few answers referred to the brain detecting carbon dioxide levels in the blood. More candidates understood the concept that breathing would be stimulated.

Question 3

3(a) Just under a half of candidates failed to score on this question. Many did not mention that food molecules were large and needed to be broken down into smaller molecules so that they could be absorbed into the blood. Many thought that they had to be broken down so that they could pass through the body.

3(b) Most candidates scored at least level 1 (1 or 2 marks) with many scoring levels 2 and 3. Some excellent answers which correctly described the roles of protease, hydrochloric acid and mucus were seen. A number of candidates failed to appreciate that hydrochloric acid provided the low pH which is the optimum pH for protease action. Many thought that its function was to break the food into smaller pieces or kill bacteria. Weaker candidates thought that mucus provided a slippery surface for the food to slide easily through the digestive system. Its role in protecting the lining of the stomach was required.

Question 4

4(a) Just under a half of candidates scored the mark in part (i), recognising that larger animals have a higher blood pressure as blood needs to be pumped **further** around the body. Weaker candidates just quoted the relationship without suggesting a reason and failed to score. A wide range of correct answers was seen in part (ii). Common correct answers referred to the wide range of values for mean blood pressure and that the pressure was similar to a rhesus monkey.

4(b) About two thirds of candidates correctly performed the calculation in part (i). Part (ii) was well answered with most candidates able to state that the trout has a single circulatory system and a rabbit a double circulatory system. Better candidates wrote at length about this with detailed descriptions of both single and double circulatory systems.

Question 5

5(a) The majority of candidates over-complicated this straightforward calculation and failed to score in part (i). Part (ii) was better answered and candidates were allowed error carried forward from part (i). Most realised that they had to multiply the answer to part (i) by 24 to gain the answer.

5(b) About a third of candidates scored both marks on this question. There were a number of instances of the incorrect calculation of the relative formula mass of sodium carbonate. Those that calculated it correctly then went on to calculate the number of moles of sodium carbonate in 53g and then divided by 2 to get 0.25mol/dm^3.

5(c) Approximately half of all candidates could give the correct formula for calcium carbonate. $CaCO_2$ and Ca_2CO_3 were common incorrect answers.

Question 6

6(a) Only better candidates could write the formula of a hydrogen ion or a sulfate ion correctly in this question. H^{2+} and SO_4^- were common incorrect answers. Many tried to write an equation with little success.

6(b) Part (i) was well answered by most candidates. They understood the concept of a limiting reactant. Better candidates included the idea of the same number of hydrogen ions. Part (ii) discriminated well. Most candidates stated that ethanoic acid was a weak acid and better candidates included the idea of fewer hydrogen ions or only partial dissociation. A number of candidates also related the number of hydrogen ions to collision frequency.

Question 7

7(a) Just under half of all candidates scored on this question. Better candidates quoted atmospheric pressure and a temperature of 450^{o}C. Weaker candidates made vague statements such as 'high pressure' or 'high temperature', which were insufficient to score.

7(b) This was generally well answered with almost all candidates recognising that a catalyst speeds up the rate of a chemical reaction. Fewer realised that the position of equilibrium was unaffected. Weak candidates often stated that the equilibrium position moved to the right.

Question 8

8(a) As previously stated candidates found this question difficult. The idea of testing for sulfate ions and halide ions was not well understood. Just under half of candidates failed to score. The best candidates gave excellent answers which understood precipitation of barium sulfate as a test for sulfate ions and also realised that the halide ion present was the bromide ion rather than the iodide ion as the colour of the precipitate was cream. They could also write correct ionic equations with state symbols. Weak candidates did not understand the tests and frequently tried to write ionic equations reacting barium ions with lead ions.

8(b) About a third of candidates scored on this question. Usually this was the recognition that ions were involved. Some made reference to more collisions without reference to ions and did not score.

Question 9

9(a) Many candidates identified one of the food types that was over the GDA but far fewer identified both. Both were required to score the mark.

9(b) Only the best candidates were able to calculate the mass of salt as 3.23g. Many just calculated the relative formula mass of sodium chloride and did not proceed from there.

Question 10

10(a) This question was well answered. Most candidates could choose the correct equation and perform the substitution correctly.

10(b) Candidates found this calculation more demanding. Just under a third of candidates scored the marks. Even if some candidates selected the correct formula and rearranged it correctly, they then did not calculate the change in speed correctly and lost the marks.

10(c) Most candidates scored at least 2 marks on this question, usually for calculating the vector sum of forces for each trial. Better candidates could then interpret this data and comment correctly about resultant forward force and the speed during each trial.

Question 11

11(a) About three quarters of candidates could not draw the path of the rays correctly. Some candidates had the rays changing direction in mid-air. Others had the rays changing direction inside the lens but then passing through the junction between the shaded area and the unshaded area.

11(b) Just under half of candidates identified that the image would be real. Diminished and inverted were also common acceptable answers. 'Virtual' was a common incorrect answer.

11(c) About half of candidates realised that the lens needed to be moved closer or further away to bring the image into focus. Others thought that the shape of the lens would change or that the lens had to be turned and did not score.

11(d) Most candidates could correctly calculate the magnification as 2.5. A small number of candidates inverted the numbers and arrived at 0.4, which did not score.

Question 12

12 The majority of candidates scored level 1 (1 or 2 marks). They usually made a simple reference to momentum or quoted Newton's third law concerning the forces acting on the rocket. A smaller number gained level 2 (3 or 4 marks) usually because they realised that momentum was conserved or that there were a large number of particles or high energy particles. Level 3 (5 or 6 marks) was gained by a small number of candidates who talked about the change in momentum of colliding particles creating forces.

Question 13

13(a) Almost half of candidates could correctly calculate the speed of light in ice. A number made a mistake in the number of decimal places and lost one mark. Weak candidates multiplied 3×10^8 and 1.31 rather than divided and failed to score.

13(b) Over two thirds of candidates failed to score on this question. Few understood that a higher refractive index gave a smaller critical angle and there was confusion between total internal reflection and refraction. Some candidates thought that the light spent longer in the diamond which was insufficient to score.

13(c) Most candidates correctly calculated the dispersion coefficient of both diamond and quartz for the first marking point. Many also divided the one by the other or multiplied the value for quartz by 3 and gained the second mark.

B762/01 Further Additional Science modules B6, C6, P6 Foundation Tier

General Comments:

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates. All candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions.

Candidates often found it difficult to communicate their answers clearly. There were a few cases where deciphering a candidate's writing posed a serious difficulty.

The majority of candidates had attempted all three levels of response questions. There was some evidence that candidates had been well prepared for this style of question. Responses at all three levels were seen, however candidates tended to score better in section B Q9. This was mainly due to the nature of the question involving mostly interpretation of data rather than the need to recall facts.

Comments on Individual Questions:

Question No. 1

In part (a) the majority of candidates were able to place the steps of insulin production on the correct order. They also correctly identified the process as genetic engineering.

Question No. 2

In part (a) very few candidates could identify the disease caused by bacteria. All possible combinations were seen. However in part (b) the majority of candidates understood that resistant bacteria could not be killed by antibiotics. In part (c) most could identify the correct pattern. The main misconception was that greater resistance in bacteria would require a more doses of antibiotics.

Question No. 3

Very few candidates scored all three marks. Most gained one for either the idea of decomposition or toxic gases. Very few identified methane as a gas with most of those that mentioned a named gas incorrectly choosing carbon dioxide. Many candidates incorrectly assumed the rubbish would contain disease causing bacteria.

Question No. 4

In part (a) many candidates assumed the sugar was added to make the wine sweet. Only the better candidates answered in terms of fermentation. When answering part (b) many candidates did not refer back to the hydrometer in the diagram. Instead they gave the general pattern seen in the results table. This highlights a common misconception of some candidates not understanding the terms table, diagram and graph. They often confuse these terms and can refer incorrectly to tables of data as graphs. Few candidates successfully completed the calculation in part (c). Some of those that did missed out on the second marks by not stating that the calculated value was less than the maximum value. Very few candidates understood the idea of turning wine into spirit involves distillation.

Question No. 5

In part (a) less than half the candidates realised that the other sugars taste sweeter. Many incorrectly thought that the other sugars did not dissolve. Most candidates found the level of response question difficult. Few could interpret the graph and link the higher optimum temperature of the immobilised enzyme to the need for higher energy costs. Only a few candidates were able to describe how enzymes are immobilised. The majority confuse the process with denaturing. Very few could recall the advantages of immobilising enzymes.

Question No. 6

The majority of candidates were able to explain why ethanol is not a hydrocarbon. In part (b) few could give two uses of ethanol. Many gave examples of named products that could have contained ethanol but they needed to provide its use as a solvent. Some candidates incorrectly thought it could be used to make petrol rather than to replace it.

Question No. 7

In part (a) the majority of candidates gained at least one mark, normally for the correct use of anode and cathode. Although some candidates failed to clearly identify the anode as positive and the cathode as negative. Placing + and – signs in the solution was not adequate as it was unclear if they were referring to the charge on the ions or the electrodes. Many candidates neglected to include a power supply in their diagram instead drawing a single wire connecting the two electrodes. In part (b) candidates of ten lost the second mark as they referred to chloride and iodide instead of chlorine and iodine. Only the more able candidates understood that molten lead bromide has free ions. Some incorrectly referred to electrons confusing the idea with conducting electricity in metals.

Question No. 8

Most candidates were able to identify CFC in part (a). The most common wrong answer was to choose A as it contained carbon and fluorine – hence CFC. In part (b) most candidates could identify that compound A contained three elements. They were also able to write the molecular formula for A. A few candidates however counted the atoms successfully but could not write it as a formula, 4F+2C+2H being a common answer. Candidates were unable to recall the properties of CFCs listed in the specification. Many answered part (d) in terms of the harm CFCs do to the ozone layer.

Question No. 9

The majority of candidates gave a level 2 response to this question. They were able to list the metals in order and provide an explanation. Although few referred to displacement reactions instead they answered in terms of metals reacting with more or less solutions. Many candidates failed to achieve level 3 as they could not provide a correct word equation. A common error was to miss copper off the end. A few candidates answered in terms of the most reactive solution rather than metal.

Question No. 10

Most candidates could give at least one use of vegetable oil, normally either in cooking or as a fuel.

Question No. 11

Most candidates were able to write the balanced symbol equation. A few lost the marks because they changed the formula or water to H_2O_2.

Question No. 12

Candidates were unable to draw the symbol for a capacitor. Many drew a resistor or a circle containing the letter C. Only a few candidates recalled that a capacitor stores charge. In part B very few candidates realised the diagrams showed full wave rectification.

Question No. 13

Most candidates provided a level 2 answer as they attempted to describe how current and voltage varied. Many made incorrect references to the resistance in A being greater. They did not realise that the resistance in A was constant and in B increases with increased voltage. Very few identified at least one of the types of conductors.

Question No. 14

In part (a) only few candidates could identify the not gate. However most candidates correctly answered b(i) and b(ii). Few candidates correctly completed the truth table; there was no clear pattern to the incorrect answers. In part (c) many candidates incorrectly thought the bulb would not light because it needed an LED to light it. About half the candidates gave the correct answer of relay in par c(ii)

Question No. 15

Most candidates were able to complete the table and identify the relationship in part (a). In part (b) many identified the component as a resistor but not a variable resistor. Candidates were unable to explain how the output voltage changed. In part (c) they could describe the pattern but unable to identify the fact that it was not linear. Most candidates incorrectly stated it would not work at high light levels they did not realise that the change in resistance would be too small to resister. Some candidates incorrectly thought that the LDR gave out less light as the resistance increased.

Question No. 16

Most candidates were able to interpret the graph to give the correct pH and describe the change in pH. In a(iii) the majority of candidates explained why bacteria A should be used. In part (b) most candidates identified the trend but fewer were able to explain why ‘cows used for milk’ did not fit the trend. In part (c) candidates were able to calculate the mean but were unable to explain why the experiment was useful. Many answered in terms of the making the milk safe to drink as they did not realise that after adding the bacteria the milk would turn to yoghurt.

B762/02 Further Additional Science modules B6, C6, P6 Higher Tier

General Comments:

This is the first time that papers in this new specification have been offered. The cohort was relatively small but candidates performed well on some of the more challenging topics from the Gateway course. There appeared to be few candidates that were entered for the wrong tier and the standard of numeracy was good. In a few areas candidates would have benefitted by focussing on the wording of the question more closely and not simply repeating information from the stem of the question. (eg Q1(b)(i), Qu10(b), Q14(b).)

Comments on Individual Questions:

Question No.

Q1(a) The majority of candidates selected the two correct answers.

Q1(b) In part (i) many candidates could correctly read from the diagram and calculate the actual alcohol content. Only the better answers then compared this to the maximum possible alcohol content of 14.9%.

In part (ii) a number of candidates realised that the alcohol would kill the yeast but there were a few references to the yeast being denatured.

Q2 The main misconception that handicapped candidates in this question was the idea that the human body becomes resistant to antibiotics rather than the bacteria. There were also numerous references to antibiotics causing bacteria to become resistant. The best answers explained this in terms of Darwinian natural selection.

Q3 Many candidates appreciated the reasons for the conversion of sucrose into other sugars although sometimes the explanations were a little vague. The advantage of using immobilised enzyme with reference to separating enzyme from product was well understood. The disadvantage caused more problems, with a number of candidates incorrectly stating that the maximum rate was higher in immobilised enzymes.

Q4(a) Well answered.

Q4(b) In part (i) a number of candidates correctly identified the enzyme but there were several references to restrictive enzymes. Many candidates dealt well with the difficult idea tested in part (ii). A number scored two marks and missed out by failing to refer to ‘sticky ends’.

Q5(a) Most candidates correctly stated that Lake Malaren was surrounded by a high population density. Weaker answers then tried to link the lack of oxygen to human respiration. Others appreciated eutrophication was occurring but put this down to fertilisers. Only the best answers appreciated that this was probably due to sewage.

Q5(b) Despite the information in the stem of the question a number of candidates failed to realise that this was due to PCB pollution.

Q6(a) Well answered by most candidates.

Q6(b) Again, well answered.

Q6(b) Some candidates simply described in words the equations. The better answers explained how the chloride radicals are regenerated and so this leads to a chain reaction.

Q7(a) Generally well answered although a number of candidates stated that the reactions involved oxidation **or** reduction.

Q7(b) Many answers gave mixtures of iron in various oxidation states, chloride ions and electrons.

Q7(c) The idea of galvanisation was well understood and linked to reactivity and a protective barrier. The term 'sacrificial metal' was used by many candidates.

Q8(a) The main error here was the failure to refer to the movement of ions in the answer. Many candidates simply referred to electrons.

Q8(b) This question proved to be a good discriminator. Many candidates failed to score because they tried to include bromide ions in the equation.

Q8(c) In part (i) most candidates appreciated that as the current and time increased then so did the mass of copper. Only the best answers referred to the proportionality of the relationship. The most common incorrect answer in part (ii) was 0.8g.

Q9 The majority of candidates could use the information given to provide advantages and disadvantages of both methods. A number, however, failed to attempt a conclusion for the best method.

Q10(a) A vast array of different processes were named here and even when candidates knew the process, the spelling was often inaccurate (eg soapification)

Q10(b) Candidates frequently simply repeated the information in the question here rather than explaining that bromine reacted with the double bond to produce a product that is colourless.

Q11(a) Both part (i) and (ii) were well answered by most candidates.

Q11(b) Although a minority of candidates appreciated that the set up involved 4 diodes, they found it difficult to draw the arrangement.

Q12 A number of different conductors were stated here with thermistor being one of the more common answers. Although a number of candidates had some idea about the kinetic theory and collisions between atoms and electrons, few could use it to explain the changes in resistance. In fact many candidates stated that resistance decreased with increasing current.

Q13(a) Most candidates could state the name of a logic gate but it was not always the correct one.

Q13(b) A similar response pattern to 13(a)

Q13(c) This was better answered than parts (a) or (b) with many candidates scoring at least two marks here.

Q13(d) Many candidates seemed to appreciate the reason for different voltages in each circuit but it was often difficult to interpret which circuit they were referring to in their answers.

Q14(a) Candidates clearly found it quite difficult to work out the correct proportions in this question and few completed all three voltages correctly.

Q14(b) Many candidates could name the thermistor but then simply repeated the information in the stem, stating that changes in temperature change the output voltage without saying how.

Q14(c) Most candidates appreciated the trend in the chart but did not comment on the fact that the changes are not very even. This meant that they could not answer the second part of the question correctly.

Q15(a) The main issue here was that many candidates read from the graph incorrectly, stating that pH levels all dropped to 4.0 rather than 3.8.

Q15(b) The trend was identified by most candidates although only a minority could suggest why the cows used for milk did not follow the pattern.

Q15(c) In part (i) the most common error was to refer to the control of aflatoxin levels throughout the experiment although this was the variable that was being measured. Milan's comments were well explained with calculations of the average. Very few candidates commented on the small number of repeats to back up Shaz's comments.

B763 Further Additional Science controlled assessment

General Comments:

Controlled assessment in its present form has now reached the half way point. This is the third year of its life and there are three more to go.

The addition of 'Extended Science' to the range of options available proved popular with some centres.

Centres are, in general, coping more efficiently with the system and some excellent work accurately marked was seen particularly in the separate sciences.

There were, of course, some exceptions and a number of centres used tasks from last year or from next year in error. This mistake will not disadvantage candidates but the centres concerned will be forbidden to use the same tasks for next year's assessment.

There seemed to be fewer large adjustments to the marks given by Centres as a result of moderation though, of course, there were still some which marked over-generously.

Most centres annotated candidates' work to show/explain where marks had been awarded. This aided the process of moderation and Centres are thanked for the efforts involved in this annotation.

Most centres also submitted samples of work which were well organised and securely fastened together. Moderators are grateful for this as again, it makes the process of moderation more straightforward.

Centres are reminded that in signing the CCS160 (Centre Authentication) form they are guaranteeing that the work submitted is the candidate's own unaided work.

There were a small but significant number of centres where too much assistance had clearly been given to candidates. In a few cases two or more candidates were found to have completely identical work.

In previous years comments on individual Skill Qualities have concentrated on how centres could avoid common errors in the interpretation of the criteria. Centres which feel the need for such guidance should consult the reports written in 2012 and 2013.

This year the report will deal with strategies to ensure that candidates score well in each Skill Quality. Some of the points made will, of course, be the same.

Research

Candidates should focus on the bullet points from Stimulus Sheet 1. They should deal with each of these points separately and ensure that each question posed is answered fully. It should be clear from references within the text where the information was sourced from.

It is not necessary to produce extensive research notes. The inclusion of material which is not relevant to the Bullet Points reduces the mark available as the candidate has not demonstrated their ability to 'select' the information which is relevant. Quality is much more important that Quantity.

Planning

A hypothesis, where appropriate, should start with the prediction and follow it with a scientific explanation of the reasons for making it. It need not be unnecessarily long.

Whilst not being essential, it is helpful if the variables which are part of the task are listed and an explanation of each including control where possible is given.

It is also helpful if apparatus to be used is listed and the reasons for choosing are given. This allows candidates to fulfil the criteria of 'ensuring accuracy' and 'avoiding errors'.

A plan should be detailed and step by step. Details of how to set up apparatus should be given where appropriate (a diagram can be helpful here).

The plan should give details of the range of values to be investigated and of the number of replicates to be attempted.

It is not necessary to introduce a moderation though if the planned method is changed the reason for this should be given.

The plan should always be designed to produce numerical data which can be displayed as a graph (see Processing).

Collecting Data

Structure is more important than neatness. A very neat table which is confusing or incomplete is not worth the highest marks. A table laid out logically with appropriate headings and units where it is easy to understand how the data relates to the task and where all the raw data is included is worth high marks even if it is not very neat.

If all the data is there, well organised, easy to understand and with correct headings and units, centres should not be afraid to give full marks.

Managing Risk

The criteria for 5/6 marks state 'All **significant** risks in the plan **evaluated**'. The risk of having a heart attack whilst squeezing a clothes peg is not significant. Too many times candidates invent spurious risks. Evaluated means that the candidate needs to appreciate and state whether it is a low risk or a serious risk.

They also state '**Reasoned** judgements are mode to reduce risks by **appropriate specific** responses'. The highlighted words speak for themselves.

Processing data

To gain the higher marks a graph is essential and all tasks are designed so that they produce data suitable for graphing. Key words in the 5/6 criteria are 'scales and axes selected' These should be selected so that the correct data is accurately plotted to produce a graph which fills at least half of an A4 sheet of graph paper (this is the graph not the grid which it plotted on). A line of 'best fit' is usually a straight line or a smooth curve. Neither should be artificially forced to go through the origin, which is not usually a point.

A treatment of uncertainty such as range bars is essential for 6 marks.

If a plan does not aim to collect a sufficient range of data then a suitable graph cannot be drawn and the higher marks are not accessible.

Analysing and Interpreting data

A correct description of the trend is required. The one shown by the data not the one predicted by the hypothesis (though they should be the same). This should be linked to data (or the graph). Some scientific explanation for the trend is required though this could be credited if it present in the Conclusion.

Secondary data should not merely be mentioned but' links between primary and secondary data evaluated' Reasons for any differences should be explored. There should also be an analysis of 'the treatment of uncertainty'. Scoring 6 marks here is not straightforward and additional space may be required (see comments below).

Evaluating

A relevant comment about the data is essential. No data is perfect candidates should refer to their range bars if present. They should comment on difference between replicates and how the points drawn relate to their best fit lines. Too many candidates seem to think that they gain marks from having accurate data, not in this skill quality.

Once weaknesses in the data have been identified remedies need to be suggested. It is not sufficient to say what went wrong. How to do it better next time is what is needed.

A simple statement such as use of video camera or use a data logger is not sufficient. Why would this be better?

Consider the words 'detailed and critical consideration' and 'suggestions for improvements justified'.

Justifying a Conclusion

Here the words 'critical analysis of the data' makes it clear that a simple statement of my results support the hypothesis is not sufficient. Is there any doubt? Could they be interpreted differently? Please note also the words 'from research and investigation' this is where the answer to Q6 comes in.

However the most important words are 'clearly linked to relevant scientific knowledge and understanding'. The science used in the explanations in questions 5 and 6 must be known and understood not just half remembered from an earlier lesson. Good focussed research notes help here.

Comments

Candidates should not feel constrained by the space allocated in the Part 3 answer booklet. They can, of course continue on additional sheets which they should label unambiguously.

However, candidates are pre-programmed to write sufficient to fill the space provided and so a better solution is to create a Centre version of the booklet.

As long as the front page is retained and the wording of the questions are identical, the space allowed for answers can be as large or as small as you wish.

Such an answer booklet does not count as a writing frame as no guidance as to what to write is given.

Problems with Individual Candidates

If a candidate is absent for the research section of the task and there is no time for the task to be completed before part 3 is undertaken then the candidate will have to work without research notes and will be disadvantaged particularly in answering question 6.

If the candidate is absent for the planning stage then they may be given the plan of another candidate (but not a teacher plan). They will score zero for planning but can access all other marks.

If a candidate's plan is so poor that it will not work or is dangerous, they can again be given the plan of another candidate. Their own plan should be marked and they keep that mark for planning but, thereafter, marks may be based on the alternative plan.

Much the same applies to a candidate whose results are very poor. They should be given a mark for their own results under collecting data but can then be given the results of another candidate to use for processing etc. It is recommended that such candidates use their own results for the Evaluation section.

If a candidate is absent for the session where the investigation is carried out then they can be given the results of another candidate (but not teacher results). They will score zero for collecting data but can still access all other marks.

Candidates requiring the assistance of a scribe or amanuensis or with other access problems can receive help. For further details contact OCR.

There are a number of documents available to assist centre with the application and administration of these tasks.

- **The specification for Gateway Science**
- **Gateway Science Suite Guide to Controlled Assessment**
- **Exemplar tasks with marked candidate's work on the OCR website**
- **Candidate guidelines for controlled assessment** (section H of the guide to controlled assessment) also available separately from the website. These guidelines may be used by candidates in all parts of the controlled assessment.
- **The assessment criteria**. These may be given to candidates but the wording may **not** be simplified or changed in any way. Issuing the additional guidance to candidates is strictly forbidden.

Centres are thanked for the many hours of work put into running the assessments, marking the assessments and preparing the sample for submission. In the majority of Centres this work resulted in a moderation process which was accomplished without too much trouble.

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