OCR
Oxford Cambridge and RSA

GCSE

Further Additional Science B

Gateway Science Suite

General Certificate of Secondary Education **J266**

OCR Report to Centres June 2016

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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.

CONTENTS

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 third examination available for this specification. As previously, there was a small cohort for the foundation level paper. In general the paper was balanced and accessible to all candidates. There were, however, a significant number of candidates who had no responses, even to multiple choice type questions, and this was a continuation of that seen in the previous cohort for this examination. Candidates must be encouraged to attempt all the questions.
- Answers were appropriate to the question and there was little evidence of guessing taking place. Questions which tested the quality of written communication were affected by a lack of literacy skills. Many were unable to express answers clearly and were unable to construct meaningful sentences. Candidates should be encouraged to break down the question into appropriate steps and respond accordingly. This may avoid the rather haphazard approach that some take, leading to either key features being missed through repetition or confusion of ideas. This often limited the access to the higher marks in this type of question. Some of these questions were no response answers but in the main candidates did have an attempt.
- 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 single digits to high-fifties and it is encouraging to see higher marks are now being obtained by the more able candidates.
- Many candidates were able to calculate the molar mass of copper carbonate. However, many candidates struggled to use data to calculate speed and breaking distance. Also there are significant misconceptions about waves and interference.
- Candidates, as in previous exam seasons 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 1.
Q 1(a). Candidates were generally able to select the correct blood groups. A common misconception was to write down blood group C.
Q 1(bi). Many candidates were able to calculate the number of days.
Q 1(bi). Again this question was well answered.
Q 1(c). Many candidates referred to operations and scored but some responses just referred to 'if they didn't have enough blood' which was insufficient to gain credit.
Q 1(d). Very few candidates knew the difference between open and closed circulatory systems. Where they did score it was with reference to blood vessels or blood pressure differences.

Question No 2.
Q 2(a). Surprisingly few candidates could identify the humerus. Many put tibia.
Q 2(b). Candidates often identified the fracture as a compound fracture, although some said it was complex and did not score. Many recognised this was because of piercing the skin.

Question No 3.
Q 3(a). There were very few examples of level 3 responses as not many candidates commented on the molecular size and either diffusion or the role of carbohydrase collectively. Given the nature of the experiment described in the question it was concerning that very few candidates ever mentioned diffusion. There was a lot of confusion over the movement of starch and sugar

mainly due to a number of candidates who did not recognise the presence of sugar was coming from the breakdown of starch.
Q 3(b). Some candidates recognised the specificity of enzymes but in general this question was not very well answered.

Question No 4.
Q 4(ai). Most candidates calculated the water lost.
Q 4(aii). Candidates usually identified that water loss would increase and a few went on to link this with more sweating.
Q 4(b). Very few candidates could make the link between faeces and egestion and so could not work out the water lost as part of egestion.
Q 4(ci). Although candidates in the main were able to name the kidney a significant number did put either bladder or liver.
Q 4(cii). Many candidates scored these marks. Usually they were scored for 'saving lives' and for 'ethical reasons'.

Question No 5.
Q 5(a). Most candidates answered this well. Most put burette but pipette was also seen.
Q 5(bi). A well answered question.
Q 5(bii). Again another well answered question.
Q 5(biii). Most were able to double their answer to the previous question. Unfortunately, some candidates halved their answer to the previous question.

Question No 6.
Q 6(a). If candidates scored it was usually for responses linked to the speed of the reaction. Few commented on the gradients of the graphs.
Q 6(b). Many candidates referred to reactants being used up or running out.
Q 6(c). A reasonable number of candidates got the correct formulae but few were able to balance the equation.
Q 6(d). Many candidates got the first marking point with ideas on checking. Fewer mentioned replicating or improving work.

Question No 7.
Q 7(a). Very few candidates scored this mark as they didn't identify it was a gas being released that caused the decrease in mass. Many just mentioned thermal decomposition.
Q 7(b). Generally this was well answered.
Q 7(ci). A reasonably well answered question. Where incorrect, 92 was often given.
Q 7(cii). Usually if the previous answer was correct they scored this mark. Occasionally an error carried forward mark was able to be applied.

Question No 8.
Q 8. Although candidates were able to describe differences, most identifying the speed of the reactions, very few candidates described similarities. This limited their access to higher marks.

Question No 9.
Q 9(a). A well answered question.
Q 9(b). Another well answered question.

Question No 10.
Q 10(a). Although the correct answer was often seen, altitude and distance were also seen.
Q 10(b). Candidates often scored the first marking point but often did not describe the effect on horizontal distance above 45º.
Q 10(c). Again, many candidates identified the angle as 45^0, but were unable to suggest appropriate improvements, many just stating change the measurements to every 5^0.
Q 10(d). If candidates scored, it was often for the first horizontal distance, rarely were both marks scored.

Question No 11.
Q 11(a). Most candidates did not score here. Many diagrams of curved waves overlapping were seen.
Q 11(b). Again very few correct answers were seen and this is clearly an area of misconceptions.

Question No 12.
Q 12(a). Few calculated speed to be zero.
Q 12(b). Where candidates did score it was often for a part calculation.
Q 12(c). A well answered question.

Question No 13.
Q 13. There were candidates scoring L3 here for 6 marks, as they were able to link increasing temperature affecting particles to both higher kinetic energy and more collisions leading to increased pressure.

Question No 14.
Q 14(a). Candidates had difficulty in describing the image as real. Some responses referred to 'digital' images. Also many candidates' responses indicated they are under the misconception that the image forms in the lens.
Q 14(b). Some candidates were able to show the line cutting the principal axis but fewer were able to show that the thicker lens had a shorter focal length.

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

General Comments:

This is the third sitting of this specification and the majority of candidates were well prepared. About 100 candidates would have been better entered for the foundation tier having scored less than 20 marks. Most candidates attempted all three of 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 interpreting a spirometer trace to describe what is happening in the lungs and to explain the role of the diaphragm and intercostal muscle during this process. It was targeted at all grades up to and including grade B. About a quarter of candidates gained level 3 (5 or 6 marks) and about half gained level 2 (3 or 4 marks). The chemistry question concerned strong and weak acids, their pH, reaction with magnesium and an ionic equation. It was targeted at all grades up to and including grade A/A*. About a sixth of candidates scored level 3 (5-6 marks). The physics question asked candidates to explain how gas particles create pressure and to include ideas about momentum in their answer. It was targeted at all grades up to and including grade A/A*. Again about a sixth of candidates scored level 3 (5-6 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 the additional answer space at the end of the paper before asking for extra paper. Careful numbering of answers in this space is essential. 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:

Section A

Question 1

This question was about water loss from the body.

(a)(i) Most candidates were able to calculate the percentage water loss.
(a)(ii) The majority of answers included the idea that the percentage loss of urine produced increases. Fewer answers referred to the idea that less ADH was released from the pituitary gland and there were many confused answers about the role of the kidney in this process. The majority of candidates referred to less water being reabsorbed by the kidney.
(b) This 'How Science Works' question was well answered by the majority of candidates. Most gave the answer in favour of organ donation as being the idea that someone will benefit from the death of a person. The answers against organ donation were much more varied but included ideas about religion, difficulty in deciding who gets the organ and the wishes of family members.

Question 2

This question was about blood and blood donors.

(a) Most candidates were able to conclude that the demand for A positive blood was greater than A negative blood.
(b) Over half of candidates scored two marks for this question. Good answers included the use of data in the two charts. Most candidates were able to explain that O negative can be used to

donate blood to any blood type but fewer wrote about O negative having no antigens. Very few gave the idea that O negative could only receive O negative in their answers.

Question 3

This question was about the model gut.

(a) Candidates struggled with this question and many gave the answer as glucose. Candidates that named the sugar as maltose usually went on to explain that starch is broken down in two stages.
(b) Better candidates were able to explain that lipase breaks down lipids and so will not break down starch. Many of these candidates also described the specific nature of enzymes. Other candidates only scored one mark for stating that lipase digests fats but failed to explain why lipase does not also break down starch.

Question 4

This question was about the spirometer and the role of the lungs and internal skeleton.

(a) About two thirds of candidates were able to calculate the tidal volume from the trace.
(b)(i) Fewer candidates recognised that the volume of gas between X and Y is the vital capacity.
(b)(ii) As stated previously, most candidates attempted this question with varying degrees of success. The best answers recognised that the spirometer trace showed expiration and explained that the decrease in the volume of the thorax and an increase in the pressure in the thorax forces the air out of the lungs. The idea of muscles relaxing and diaphragm moving up were common comment. There were a number of incorrect references to breathing in.
(c) This question was well answered by candidates. The majority understood the role of the internal skeleton in terms of providing a framework and the allowing flexibility.

Section B

Question 5

This question was about acid-base titrations.

(a) This question was well answered by the majority of candidates. They could read pH 2.5 off the graph.
(b)(i) This question was also well answered by the majority of candidates. They were able to give the answer of 30 cm^3 as the volume required to exactly neutralise the nitric acid.
(b)(ii) About half the candidates were able to show that 25 cm^3 of the solution contains 0.005 moles of nitric acid. Some only completed part of the explanation and gave just 0.025 X 0.20 as their explanation.
(b)(iii) Candidates struggled with this question with a quarter of candidates not attempting an answer. Better candidates clearly understood how to calculate the concentration of sodium hydroxide and gave clear steps in their calculations.

Question 6

This question was about an investigating the reaction between dilute hydrochloric acid and calcium carbonate.

(a) The majority of answers referred to hydrochloric acid as the limiting reactant because it ran out first. Weaker candidates either did not understand the idea of ‘not in excess’ or thought that the calcium carbonate was the limiting reactant or that it was a product that was limiting.

(b) About a third of candidates were able to interpret the graph and usually gave the reason that a smaller volume of hydrochloric acid was been used in the second experiment. Fewer were able to link the graph to the idea that the reaction took longer.
(c) The majority of candidates were able to write a balanced equation for this reaction. Where a mark was dropped, it was usually for omitting the 2 on 2 HC*l*.
(d) This 'How Science Works' question was well answered by the majority of candidates. Most gave answers about the advantages of checking outcomes and obtaining the results faster.

Question 7

This question was about heating copper carbonate.

(a) Just over a third of candidates gained both marks for this question, giving the answer of 1.60 g on the answer line.
(b) About the same number of candidates were also able to calculate the percentage by mass of copper in copper carbonate.

Question 8

This question was about strong and weak acids.

This question discriminated well across the ability range although it was omitted or gained no credit for about a fifth of candidates. Most scoring answers included the idea that acids produce H^+ and that acids dissociate completely. Fewer candidates included information about there being a lower frequency of collisions and fewer still were able to include an equation for the ionisation of one of the acids. The weakest candidates only wrote about a strong acid have a low pH and a weak acid having a slightly higher pH.

Question 9

This question was about ethanol being made in an industrial process.

(a) The majority of candidates were able to use the information in the table to describe that the percentage of ethanol in the equilibrium mixture decreases.
(b) About half the candidates gained one mark for this answer. They were able to explain that the forward and back reactions were equal, but only the better candidates were able to explain that the concentration of ethene was constant. Many thought that the concentration of ethene would change.

Section C

Question 10

This question was about speed, velocity, braking distance and resultant forces.

(a) Just under two thirds of candidates were able to calculate the initial speed on Jenny. Weaker candidates tended to just multiplied 0.4 x 12 and not then subtract this answer from 4.8.
(b) About a quarter of candidates correctly calculated her braking distance but, again, weaker candidates stopped hallway through the calculation and only gave the answer of 14.4.
(c) The majority of candidates were able to recognise that the resultant force was 20N.
(d) Many candidates gave a full description of a vector and a full description of a scalar, with most candidates realising that vector quantities have magnitude and direction but scalar quantities only have magnitude.

Question 11

This question was about an interference pattern on a pond.

(a)(i) Over half of candidates knew that light diffracts as it passes through each gap.
(a)(ii) Many candidates only gave one property that light must have to produce the interference pattern. Where the answer was 'coherent' the candidate gained the mark but if they wrote about same frequency or same amplitude or same wavelength these on their own were not sufficient.
(a)(iii) About a third of candidates were able to explain how dark bands are produced by recognising that destructive interference had taken place. A significant number of candidates explained constructive interferences and so did not score any marks. Weaker candidates thought the dark bands were caused by shadows.
(b) Again, about a third of candidates stated that light is a wave. Others thought that the experiment shows that the nature of light was that it was part of the electromagnetic spectrum rather than mentioning it was a wave.

Question 12

This question momentum and pressure.

This question discriminated well across the ability range. Better candidates wrote about faster particles having more frequent collisions but rarely mentioned the greater change in momentum causing a greater force. At level 2 the candidates linked faster particles to more collisions or more kinetic energy and at level 1 the candidates only realised that warmer lemonade has faster particles of more created more pressure.

Question 13

This question was about magnetic toy trucks and momentum.

(a) Candidates struggled with this question and found it difficult to suggest why both trucks moved apart at the same speed. A few candidates did realise that the trucks have the same mass or that there were equal and opposite forces on each truck. Very few linked their explanation to momentum being conserved.
(b) Again, candidates struggled with this question with only the better candidates being about to use the idea that momentum is conserved to calculate the speed as 0.3 m/s.

Question 14

This question was about satellites in different orbits.

(a) Almost two thirds of candidates were able to explain that there is a greater gravitational attraction.
(b) Most candidates were able to use the data to estimate the height of the geostationary satellite. Many set out clear calculations as gave a very accurate estimate. Weaker candidates scored one mark for the 1440 calculation but were not warded the second mark as they gave the final answer of 40 000, reasoning that 1440 was closer to the time for 40 000 rather than 30 000.

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. Candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. Candidates had attempted all three level of response questions.

Comments on Individual Questions:

Question No.1
Q1(ai) Most candidates identified the correct units used to measure the size of the bacterium.
Q1(aii) Very few candidates got this question wrong if they did it is because they thought budding was involved.
Q1(b) Few candidates understood that genetic engineering involved transferring genes. Many incorrectly stated that the human growth hormone would be put into the bacterium and not the gene for the hormone.

Question No.2
Q2(a) Most candidates understood that the volume of water in Calumet river was less but few could do the calculations required to show that Fox river caused the most pollution.
Q2(bi) Most candidates recalled that decomposition is the term used to describe rotting.
Q2(bii) The majority of candidates identified methane or carbon dioxide as one of the gases being released.
Q2(biii) Few candidates linked the increase in growth of phytoplankton to more light or higher temperature. Many suggested the heat was causing the smell but did not gain marks as no comparison of temperature was made.
Q2b(iv) Most candidates incorrectly answered in terms of greenhouse gases rather than explosions.

Question No.3
Q3(a) Most candidates matched the feature to the correct advantage.
Q3(b) Few candidates knew that enzymes are immobilised in beads or on reagent sticks or that this means they can be reused.

Question No.4
Q4(a) Candidates were usually able to describe some of the changes in the graph although they found it more difficult to compare the two sets of data. Few candidates explained the changes in terms of transfer of bacteria some made an attempt but talked about germs rather than bacteria.
Q4(b) Very few candidates made the link to Pasteur and the Germ theory.

Question No.5
Q5(a) The majority of candidates understood that a compound contains more than one element but few stated that these elements were chemically joined.
Q5(b) Candidates could identify the number of elements in the compound but found the number of atoms more challenging some tried to calculate the relative formula mass.

Question No.6
Q6(a) Most candidates correctly explained why the ethanol was not a hydrocarbon.
Q6(b) Few candidates could provide two conditions needed for fermentation, many gave vague answers such as heat and moisture.

Question No.7
Q7(a) Few candidates identified the area with the softest tap water. There was no real pattern to the incorrect answers.
Q7(b) Very few candidates gained all three marks, many talked about mass of calcium and magnesium ions without showing any real understanding of temporary hardness.

Question No.8
Q8(a) All the candidates could identify sodium and magnesium but a few lost the second mark because they did not change ide into ine.
Q8(b) Most of the candidates managed to calculate the mean as 5 but only a few realised they needed to divide this by 10 to get the value per minute.

Question No.9
Q9(ai) Few candidates knew that the fuel used in a fuel cell is hydrogen.
Q9(aii) More candidates were able to write the word equation although some incorrectly added the word heat to the equation.
Q9(b) Most candidates could describe at least one advantage this was normally the fact that water was made.

Question No.10
Candidates struggled to provide a level three description of why painting and galvanising is used. Many did not refer to oxygen and water and even less mentioned zinc. When asked to write about two processes in this way candidates should be encourages to separate their descriptions and not talk about both at the same time.

Question No.11
Q11(a) Very few candidates understood that current is the flow of electrons..
Q11(b) Most candidates identified the variable resistor.
Q11(ci) Most candidates knew that current is measured in amps, incorrect answers included joules or volts.
Q11(cii) The majority of candidates were able to show how resistance is calculated.
Q11(ciii) Most candidates identified the relationship between current and resistance but very few could explain it in terms of temperature change or collisions.

Question No.12
Q12(a) The most common error here was to mention light but not light intensity.
Q12(bi) Although a few candidates could identify the not gate they could not suggest a use for the circuit.
Q12(bii) About half the candidates correctly completed the truth table.
Q12(c) Many candidates suggested that the diode was placed the wrong way round but they did not explain why this would be a problem in that a diode only allows current to flow one way.
Q12(d) Few candidates understood that a relay is a kind of switch but even they could not explain what the relay did.

Question No.13
Q13(a) Most candidates correctly added up the total resistance to find the one with the lowest.
Q13(b) The majority of candidates also identified the two circuits with the same total resistance.

Question No.14
Q14(a) Many candidates failed explain why the coil started to move. They did not realise that the coil itself had become magnetic and only mentioned the force from the magnets themselves.
Q14(b) Few candidates grasped the concept of the speed staying the same because the current had been reduced. Many suggested the magnets had been changed instead of explaining that the number of coils and the current had affected the speed.

Question No.15
Q15(ai) Most candidates correctly identified North America.
Q15(aii) Many candidates failed to calculate the answer correctly and a number of them were out by a multiple of a thousand. In some cases they calculated 3.449 then incorrectly rounded it to 3.5.
Q15(aiii) Although candidates could use the data to support the statement made by Garry they found it difficult to calculate the percentages required to support the statement made by Susie.
Q15(b) Most candidates gave the incorrect answer of 60 as they failed to realise the field was $10km^2$ which meant they did not multiply their answer by 10.
Q15(ci) Those candidates that correctly identified sugar beet also tended to give the correct explanation. Some candidates failed to read the whole question and chose neither sugar beet or grassland.
Q15(cii) The majority of candidates failed to use the data as requested and just answered in terms of global warming and the greenhouse effect.

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

General Comments:

This is the third time that papers in this new specification have been offered. As before, the cohort was relatively small but candidates performed well on some of the more challenging topics from the course. They appeared to be few candidates that were entered for the wrong tier and the standard of numeracy is continuing to improve. In a few cases candidates were let down by the incorrect rounding of decimals.
Question 10 (b) highlighted two reoccurring issues. Candidates need to pay attention to the instruction given in the question and not simply describe when they are asked to explain. They also need to make comparative statements when asked to explain trends or explain changes.

Comments on Individual Questions:

Q.1(a)i This was answered correctly by most candidates.

ii Few candidates scored full marks here, with the enzyme responsible for producing sticky ends causing the most problems.

(b)i&iiThe most common errors here were to incorrectly convert between kg and g or to fail to appreciate that a batch takes two days to make. However in part ii many candidates appreciated the massive increase of insulin made by genetic engineering and often calculated that one gig would only supply 20 people with insulin for a day.

(c) This was not answered well with few candidates picking up on the information provided in the stem of the question.

Q.2(a) A large number of candidates used the information in the table to calculate the actual mass of PCBs supplied by each river per second and appreciated that the Fox river caused the most pollution.

(b)i Various pollutants were named here, sometimes in a list containing correct and incorrect answers.

ii Many candidates had learnt this specification statement and answered correctly. A number simply referred to the energy content of the mixture.

iii This proved to be a challenging question with ideas of persistence and bioaccumulation only appearing in a small number of answers.

Q.3(a) This question proved to be a good discriminator with some candidates only describing the patterns in the graph and obtaining level 1. Others linked the changes in practice to death rates and scored level 2. Including references to bacterial transmission scored level 3.

(b)i A number of weaker answers here simply ran through each of the scientists and their contributions.

ii Generally well answered.

Q.4(a) Many candidates failed to focus on the provision of sugar for the process and discussed yeast and water saying that they are reusable.

(b) This question was well answered although there were occasional references to enzymes being killed or yeast being denatured.

Q.5(a) Many candidates correctly stated HFCs but other combinations of the letters did appear.

(b) There were many vague references to CFCs just remaining in the air for a long time but better answers concentrated on the presence of a regenerating chain reaction or the fact that CFCs are still released from old fridges.

Q.6(a)&(b) If candidates understood the nature of temporary hardness and they scored quite highly on this question. A number thought that London produced the most limescale because it had the highest levels in the table.

Q7(a) C was correctly identified by most candidates with a logical reason.

(b) Some candidates concentrated on the design of the study in their answer but more commonly the references were to the lack of softness and the economy figure.

Qu8(a) All too often, $+4e^-$ was written on the left hand side of the equation.

(b) Most candidates could calculate the volume correctly.

Qu9 There was some confusion in many answers between the action of galvanising and tin plating. The use of the term 'tin' as in 'tin can' also made answers confusing to read. The best answers clearly described the process of sacrificial protection and compared it to the lack of reactivity of tin.

Qu10(a) Most candidates answered correctly.

(b) This question clearly required a higher level explanation in terms of kinetic theory. Many candidates failed to score as they simply described the trends rather than explain them. Others lost marks by failing to use comparative terms such as 'increased collisions' and 'more vibrations'.

(c)i There were come very good answers here in terms of the voltage and current being proportional. However, some candidates thought that the resistance varied or simply that it was an ohmic resistor because it was measured in Ohms.

ii A number of candidates correctly calculated the two resistances but some incorrectly stated that X was larger than Y.

Qu11(a) This question was clearly too challenging for many candidates. Some answered in terms of a generator whilst others simply referred to preventing the wires tangling and so failed to score.

(b) A significant number of candidates seemed to think that increasing the number of coils would increase the resistance so the current has to be increased to compensate. The best answers referred to doubling the coils doubling the speed so the current needed to be halved in order to compensate.

Qu12(a) A number of the candidates calculated one of the voltages incorrectly but still gained credit for the range of values.

(b) There were many references to using a LDR but only the better answers stated or drew where it should be located and stated the effect that light intensity would have on resistance and voltage.

(c) This question produced a wide spread of marks.

Qu13(a)i Most candidates undertook correct calculations to back up the conclusion although there were errors in rounding and incorrect use of reoccurring dots.

ii Most candidates could correctly compare the data.

(b) This was well answered by most candidates.

(c)i Again many candidates correctly compared the two sets of data to come to the conclusion that growing sugar beet is better.

ii Less candidates could correctly use the figures to back up the scientists' ideas, sometimes being side-tracked by the data from the fields rather than comparing forests to biofuels.

B763 Further Additional Science controlled assessment

General Comments:

Overall centres have shown a good understanding of the requirements of the controlled assessments in the science subjects. The marking criteria have been mostly applied appropriately and it is good to see a large number of centres putting annotations on the scripts in the appropriate places to show how and why they have awarded the marks. Work submitted for moderation was generally well organised with all of the required paperwork submitted by the centres for the moderators' consideration.

However, a minority of centres are still submitting work that does not meet the full requirements of the courses. In particular;

- It is very important that marks are carefully checked before they are submitted. Moderators have noted a number of clerical errors this year where the marks submitted are not the same as those on the scripts sent to the moderator. This not only causes delays in the process but, if not corrected can result in incorrect marks being awarded to candidates.

- It is important that centres send the marks to OCR and the work to the moderators within the time frame set by the board. Unfortunately some centres are failing to meet these deadlines.

- It is important that the cover sheet for the work is completed correctly and, in particular, that correct candidate numbers are shown on scripts.

- All controlled assessments are valid for one year only. This is clearly indicated on the tasks that can be downloaded from the OCR web site. Some centres have submitted tasks for the wrong year. Some have submitted work from a previous year and others from next year's tasks. It is important that all centres make sure that the tasks they are undertaking are for the current year. The only tasks that are valid for 2017 are available on the website and clearly marked.

- All centres need to provide a copy of the CCS 160 Centre Authentication form with the candidates' work. On this staff are declaring that they have conducted the tasks under the required conditions as laid down by the specification. Controlled assessments require candidates to research, plan, carry out and review the tasks set and, other than for the practical work itself, this needs to be done independently. Even if candidates work in groups for the practical task they must complete their written work on their own and not work collaboratively.

- The amount of support that can be offered to candidates by the centre is the same regardless of the specification, the type of centre or the ability level of the candidates. Writing frames of any kind are not permitted and there should be no opportunity for candidates to produce a draft for review followed by a final piece of work for submission.

Previous reports have given considerable guidance on the application of the marking criteria, how to avoid common errors and the requirements for the award of high marks. Centres are advised to consult previous reports in addition to the notes given below as many of the comments below repeat advice that has been given previously and which is still being overlooked by a few centres.

Comments on specific Skill qualities:

Researching: Candidates generally scored well on this Skill quality and the marking criteria were usually well applied. In the main candidates have used a wide range of sources in their research although, not surprisingly, the majority of these are from internet sources and few references are given from books. If web sources are used then full URLs need to be provided so that these sources can be checked. If books are used then page numbers should be given as well as title and author.

In previous coursework, before controlled assessments were introduced, there was a requirement for candidates to consider the validity of sources. This **is not** part of the current marking criteria. Candidates are required to select information from their sources that is correct and relevant to the specific bullet points in task one that they are addressing and do not need to spend time considering where the information has come from. They should not use wholesale cut and paste from the sites although they may quote specific points, if referenced appropriately in the text. The inclusion of irrelevant material will reduce the mark available. For high marks candidates are also required to show which sources are relevant to the different parts of their notes. The easiest way to show this is by numbering the sources and putting numbers in the appropriate places within the text.

Planning: This Skill quality often begins with a hypothesis, except in the science specification, together with supporting science to explain and justify the hypothesis. This is only one part of the marking criteria and centres need to bear in mind that the marking is best fit not hierarchical. However, for high marks it is expected that candidates will demonstrate a suitably high level of understanding of the underlying science behind the task. This year there was a significant amount of misunderstanding of the science associated with the cold packs task for additional science, further additional science and chemistry.

Candidates sometimes find it difficult to obtain high marks when they do not address the task set. For example in the aerobic exercise task candidates will clearly obtain lower marks if they plan a task involving anaerobic exercise.

The method's written by candidates are now often of a high quality and frequently contain diagrams to support them. However, an appreciation of possible sources of error and how to control variables is still a weak area for many candidates. This is particularly true in biology tasks where there are many variables to control, for example how to maintain a constant pace in an exercise task.

Many candidates also do not consider the resolution of the equipment they choose to use, as is required in the marking criteria for 5-6 marks.

Collecting Data:

This is often a high scoring Skill quality but some centres are still awarding high marks when there are errors in headings and units. In particular, for full marks, candidates should not put units next to each data point in the table but should include these in the headings. For the purpose of this Skill quality, the level of precision is taken to be an appropriate and consistent number of decimal places for the recorded data.

Occasionally there has still been evidence of centres penalising candidates for failing to present processed data correctly, for example, averages being shown to a varying number of decimal p-laces. Also some centres have awarded high marks when not all raw data has been included, for example, failure to record initial and final temperatures and only recording temperature change.

As mentioned above, writing frames must not be provided and, if provide, can result in only very low marks being available to candidates as they have not constructed their own data table.

Managing Risk:

Most candidates now appreciate what is involved in carrying out and recording a risk assessment for an experiment. The weakest aspect remains their ability to evaluate the risk associated with a task, as required in the 5-6 marking criteria. This is particularly the case when a task is very low risk. Candidates vary from writing virtually nothing to coming up with a range of highly unlikely risk scenarios. It was surprising to see a number of candidates referring to the risk of mercury from the use of a thermometer when most modern thermometers do not contain mercury.

In order to score highly need to identify some hazards that are specific to the task and not just generic, they then need to identify the risk associated with these hazards and suggest way to both avoid and deal with these if they occur. These suggestions need to be specific and appropriate for high marks and not just comments such as "tell the teacher". The likelihood and severity of these risks should also be identified and. If a numbering system is given to the risks, then some key to explain what the numbers mean should be given. An overall comment about the level of risk for the whole task is important particularly for a very low risk experiment.

The level of risk should be realistic for example, not all risks should be graded as high otherwise the experiment would be too dangerous to do in a school context.

Processing data

Most candidates obtain averages for their data and produce graphs of varying quality. For high marks candidates need to produce a line of best fit and show a quantitative consideration of uncertainty. Although not penalised by the marking criteria, centres are encouraged to talk about range bars rather than error bars as error bars require a much higher level of processing than simply looking at the range of repeat values.

As mentioned in previous reports the marking criteria relating to scale in the graphs includes choosing a scale that maximises the size of the graph paper. Plotted points should occupy at least 50% of the graph paper. Candidates should be taught that graphs do not have to go through (0, 0) if is not appropriate.

With regard to the use of complex mathematical techniques these are only part of the marking criteria "where appropriate". For example, calculation of an energy change is an appropriate complex mathematical technique in cold packs but calculating a gradient in the cheese making task is not.

Analysing and interpreting

Most candidates were able to identify trends effectively and to link these both to their own data and data from a secondary source. Anomalous points were usually identified if present although few candidates used levels of uncertainty to explain why they classified points as anomalous. For high marks candidates analyse the level of uncertainty and this should be linked to the trend, for example discussing whether the line of best fit (trend) goes through all range bars.

In some tasks the trend was not well linked to relevant scientific understanding, particularly in the cold packs task where there was often confusion between the temperature change and the energy change. The science needed to explain the trends must be of a high level to support the award of high marks.

Evaluation

Again this was well marked by most centres but overall tends to be a lower scoring Skill quality.

Candidates often need more space to answer question 4 of part 3 than is available on the standard part 3. Centres may provide candidates with a reworked version of part 3 with more space available for answers if they choose to, as long as the wording is identical to that provided in part 3. This can be easier for candidates than using additional paper.

The marking criteria require candidates to consider both the data and the method and for high marks these ideas should be linked. Suggested improvements to the method should be explained in terms of how they would provide better quality data.

Question 4 of the task requires candidates to evaluate their method, their data and to make comments about risk. Many candidates fill the space available but focus primarily on just one of these issues and consequently can only score low marks.

Although most candidates have learnt how to produce range bars from their data few understand what these range bars represent and how they relate to an evaluation of the data.

The marking criteria require candidates to consider both the data and the method and for high marks these ideas should be linked. Suggested improvements to the method should be explained in terms of how they would provide better quality data.

Comments about risk do not contribute significantly to the mark for evaluation but can be used to further support the mark awarded in the risk Skill quality but as a general rule it would be unlikely for a candidate to obtain more than two marks for the risk Skill quality if their only consideration of risk was in part 3.

Conclusion.

Question five of part 3 requires candidates to link their data to their hypothesis, or the hypothesis given in a science task. Few candidates complete the question by explaining their answer. For high marks this should also show appropriate scientific knowledge and understanding.

Question 6 provides the opportunity for candidates to link their experiment to their research and a demonstration of this is required for high marks in this Skill quality.

Evidence for this Skill quality can be obtained from any part of the task. Centres are encouraged to clearly annotate the text to show where evidence is used from other sections.

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