

**GCSE**

**Further Additional Science B**

Gateway Science Suite

General Certificate of Secondary Education **J266**

**OCR Report to Centres June 2015**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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

### **General Comments:**

- This is the second examination available for this specification. Again 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 more noticeable than in the previous cohort for this examination.
- Answers were appropriate to the question and there was little evidence of guessing taking place. On the contrary it seemed that candidates were prepared to leave the question unanswered rather than guess. 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. 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.
- Candidates were 'on task' throughout the session and there was little evidence to suggest that they had insufficient time.
- The rubric of most questions was interpreted correctly.
- Most candidates were able to describe how to do a titration but unfortunately did not recognise the real safety reason for using a pipette filler. Encouragingly, most candidates could correctly and accurately plot points on a graph.
- Candidates, as in the previous exam season 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(ai). This was well answered by most candidates. Some candidates, however, did incorrectly identify it as the gall bladder.

Q 1(aii). Unfortunately many candidates did not recognise the role the pancreas has in digestion. Many focused on its hormonal functions.

Q 1(b). It was rare to see candidates' that could describe both chemical and physical digestion. Some gave good descriptions of chemical digestion but then omitted to describe physical digestion.

Q 1(c). This was a question which highlighted a common misconception that still appears to exist. Most gave the incorrect response of excretion.

#### **Question No 2.**

Q 2(a). This was answered well by the majority of candidates.

Q 2(b). In the main, this was well answered with most scoring for describing the differences in the context of what was lacking such as muscles, blood vessels etc.

**Question No 3.**

Q 3. A significant number of candidates did not write specificity in their response about how the differences were linked to John and Patrick. As a result their marks were often limited to low level as they only made generalised suggestions for the differences.

**Question No 4.**

Q 4(ai). Most candidates scored this mark.

Q 4(aii). Many candidates failed to score here because they were not specific enough when they considered the range of data. Candidates often responded - no because 'the head size is in the healthy range' without identifying that this was mainly the case but not always or they went the other way and said yes because 'they are outside the healthy range' without identifying that it was only for one week.

Q 4(bi). Very few candidates referred specifically to amniocentesis and it seems they are unfamiliar with the word as there didn't appear to be any attempts at spelling it. Where candidates tried to describe the process they were too generalised e.g. take fluid from the foetus.

Q 4(bii). Candidates were successful in describing the ethical arguments for and against. Most aspects of the mark scheme were covered in the range of responses seen.

**Question No 5.**

Q 5(a). This was well answered by most candidates.

Q 5(b). Most scored at least one mark here for identifying an increase and many went on to choose two readings that described this change. Far fewer candidates identified the differences between am and pm.

Q 5(c). Few candidates identified these as intercostal muscles. The most common incorrect response was lungs.

**Question No 6.**

Q 6(a). Most candidates scored well here, although the construction of their description was often difficult to interpret as they tended to be poor at sequencing their description.

Q 6(b). No one seemed to be aware of the safety reasons for using a pipette filler. Candidates seemed unaware that it replaced the use of the mouth in sucking up the liquid into the pipette.

**Question No 7.**

Q 7(ai). No one knew that the raw material was air. Most answers, when present were oxygen or carbon dioxide.

Q 7(aii). Candidates can write the word equation when presented the information in the form the question was phrased. As a consequence a significant number got this question correct.

Q 7(b). A reasonably well answered question. Many candidates identified the decrease but surprisingly some said it increased.

**Question No 8.**

Q 8(a). Some candidates were able to do the calculation and, if so, most often scored 2 marks as they were able to use significant figures.

Q 8(b). A well answered question.

**Question No 9.**

Q 9(a). Many candidates scored by putting syringe, fewer put 'gas syringe'.

Q 9(bi). Very few candidates were specific about the calcium carbonate and as a consequence did not score.

Q 9(bii). A well answered question.

**Question No 10.**

Q 10(a). Many scored two. If they dropped a mark it was usually for not identifying the mass of anhydrous copper sulfate as 1.60g.

Q 10(b). Candidates often didn't score because they failed to use the data and describe the two possible different points of view supporting or disagreeing with the prediction. Candidates must get practice in extracting data and then using it in the responses they construct.

**Question No 11.**

Q 11. There were attempts at a correct equation but it was rare to see a complete one so Level 3 was only seen occasionally. Again, sequencing of their responses was questionable and made it difficult to identify marking points.

**Question No 12.**

Q 12(a). Many candidates were successful in plotting accurately on the graph.

Q 12(b). A well answered question.

Q 12(c). A well answered question.

Q 12(d). This question was poorly answered with hardly any candidates getting both marks. Many candidates tried to draw a diagram but this was often unclear and in many cases unlabelled.

**Question No 13.**

Q 13(a). Many scored one mark for in Z cars are travelling in opposite directions. Some were able to calculate the speed in X, Y and Z and got both marks.

Q 13(b). Higher ability candidates scored this mark.

Q 13(c). Higher ability candidates scored this mark but in the main there were few that scored any marks on this question.

**Question No 14.**

Q 14(a). Most were able to score well on this question. Many scored from identifying the higher and lower definition pictures from the two types of orbit.

Q 14(b). A well answered question.

Q 14(c). Not many scored here. Often they put the Sun rather than the moon.

Q 14(d). A very poorly answered question. Very few could apply their knowledge of short and long waves.

**Question No 15.**

Q 15. Some candidates could describe the different types of interference but in the majority this was a poorly answered question.

**Question No 16.**

Q 16. High ability candidates scored well here and were able to gain 6 marks. They were able to calculate the speed and distance and use them to explain why the statements were incorrect. Lower ability candidates did not do the calculation and as a result gained 2 marks at level 1. Occasionally there were errors in the calculations but not the methodology.

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

### **General Comments:**

This is the second sitting of this new specification and 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 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 comparison of a new type of artificial heart with traditional artificial hearts and donor hearts. 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 two thirds gained level 2 (3 or 4 marks). The chemistry question concerned the preparation of insoluble barium sulfate. About a third of candidates scored level 3 (5-6 marks). The physics question concerned calculation of accelerations and travelling times for two cyclists. Again about a third of candidates scored level 3. 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:**

#### **Section A**

##### **Question 1**

- 1(a) Both parts of this question were well answered with candidates able to recall protease and understand that proteins form amino acids when digested.
- 1(b) Only the best candidates scored on this question for realising that the pH would increase and stating that the optimum pH for enzyme action was not present. Most answers stated that acid was necessary to break down food, so if there was less acid, there would be slower digestion, which was insufficient to score.
- 1(c) About a third of candidates scored 1 mark on this question with better candidates scoring 2 marks. Candidates were asked to describe an adaptation and explain why it was useful. Merely stating 'it has villi' was insufficient.

##### **Question 2**

- 2(a) Candidates struggled with both parts of this question. Very few stated that the blood type was A positive in part (i). Type A was the most common answer which allowed one mark to be scored if the candidate could explain why in terms of agglutination with antibody A or no agglutination with antibody B. In part (ii) most candidates just mentioned agglutination or clotting but did not relate it to B antibodies reacting with B antigens in the donor blood. Weaker candidates just stated that the patient would die.



- 2(b) Part (i) was well answered by the vast majority of candidates. Just under half realised that the atria were contracting in part (ii) or that impulses were being sent from the sino-atrial node. Weaker candidates just stated that the heart was contracting which did not score.

### Question 3

As stated previously, most candidates attempted this question with varying degrees of success. The best answers compared the new artificial heart with both existing artificial hearts and donor hearts and included correct references to the chance of rejection and the required use of immune-suppressive drugs. The idea of a long waiting list for a donor heart and the lack of mobility with existing artificial hearts were common comments. There were a number of incorrect references to the likelihood of rejection.

### Question 4

- 4(a) About a third of candidates could perform the calculation in part (i) with anything in the range 0.75 to 0.85 being acceptable. In part (ii) the idea of different rates of foetal head growth was only understood by better candidates. A common unacceptable answer was that the head grows at a different rate to other parts of the body.
- 4(b) In part (i) the technique of amniocentesis was described well by better candidates. They could name the technique, describe it and talk about chromosomal analysis and its results. Some candidates described the technique but could not name it. Weaker candidates suggested taking samples of foetal blood and failed to score. Part (ii) was well answered. Most candidates had their own opinions on foetal testing and could articulate them. The idea that parents have a right to know if their child has Down's syndrome so they could decide whether to have an abortion was a common correct answer.

## Section B

### Question 5

- 5(a) The majority of answers referred to calcium carbonate as the limiting reactant and gained 2 marks. One mark was gained for the idea that calcium carbonate runs out. Weaker candidates did not understand the idea of excess and thought that the hydrochloric acid runs out.
- 5(b) This question was well answered by the majority of candidates. They could read 0.36 g off the graph.
- 5(c) About a third of candidates correctly stated 0.005 moles. Some used 0.48 rather than 120, others divided 120 by 24.

### Question 6

- 6(a) Most candidates could write the correct equation for this unfamiliar reaction. Where a mark was dropped, it was usually for omitting the 5 on  $5\text{H}_2\text{O}$  on the right hand side of the equation.
- 6(b) Again most candidates scored the marks for filling in the correct masses in the table.
- 6(c) Again the majority of candidates quoted appropriate values to illustrate their conclusions. Those who just stated that the results supported Peter's prediction for copper sulfate but not for sodium carbonate failed to score.

### Question 7

- 7(a) Just over half of candidates understood the concept of empirical formula, correctly quoting 'CH'. Weaker candidates wrote such things as  $6C + 6H$  or calculated the molar mass and failed to score.
- 7(b) In part (i) just over a third of candidates correctly calculated the empirical formula gaining 2 marks. A small number knew how to approach the calculation but could not manipulate the ratio correctly and gained 1 mark. The difficult step for many was getting from the initial calculations to the ratio and then the empirical formula. A number of those who correctly determined the empirical formula in part (i) could not then go on and work out the molecular formula in part (ii). There was a number of options given with any combination of atoms whose molar mass worked out as 62 g/mol offered.

### Question 8

- 8(a) Better candidates stated correct pressures. A number stated 'high pressure' or just 'pressure' and failed to score.
- 8(b) About two thirds of candidates scored 1 or both marks on this question. The most frequently seen idea was that  $450^{\circ}\text{C}$  was a compromise temperature. Better candidates discussed the impact of the other temperatures on rate of reaction and percentage yield gaining both marks. A number of candidates referred to the cost of generating a temperature of  $550^{\circ}\text{C}$  which was not creditworthy.
- 8(c) Over half of candidates scored this mark. The most common error is to think that a catalyst improves the percentage yield.

### Question 9

This question discriminated well across the ability range although was omitted by about a sixth of candidates. Most scoring answers included mixing the two solutions and filtering them. Many understood how to purify and dry the barium sulfate precipitate and then the need to dry it. Better candidates could write the ionic equation. There was a number of candidates who attempted the full equation which was also worthy of credit. The weakest candidates suggested the use of electrolysis to prepare barium sulfate.

## Section C

### Question 10

- 10(a) Under half of candidates scored a mark on this question. Better candidates could draw diagrams of waves in phase and out of phase and quoted the terms constructive and destructive interference. Weaker candidates drew diagrams of two wave sources and said that they produced large waves and calm water.
- 10(b) This 'How Science Works' question was well answered by the majority of candidates. Most quoted conferences or papers as methods of communication and the idea of peer review was common. A few candidates quoted the internet and lost the first mark.

### Question 11

- 11(a) Those better candidates who scored on this question usually scored 2 marks for correctly calculating the force as 500N. Very few candidates showed the direction of the force on the diagram losing the third mark. Weaker candidates added 300 and 400 and stated that the resultant force was 700 and failed to score.

11(b) Most candidates realised that velocity has magnitude and direction scoring 1 mark.

11(c) Just under two thirds of candidates carried out the calculation correctly. Those who failed to score usually did not take the initial speed of 6m/s into account and stated 8m/s.

### **Question 12**

12(a) Most candidates managed to score on this question with about a third of candidates scoring all 3 marks. The most common answers referred to the lack of definition of Meteosat pictures and the high definition of POES pictures. Other common marks referred to the large area covered by the Meteosat and limited coverage of area by the POES.

12(b) Most candidates correctly identified gravity as the force involved.

12(c) Again the majority of candidates understood the idea of greater gravitational force.

12(d) This question was poorly answered. Few candidates had the ideas of same distance above Earth, same force, same speed or satellite staying above the same area of the Earth. Many answers referred to elliptical orbits resulting in the satellite 'flying off into space'.

### **Question 13**

This question discriminated well across the ability range. Better candidates frequently calculated both accelerations and both times and made a correct comment gaining level 3. If only correct times or correct accelerations were calculated then level 2 was gained. Incorrect calculations could gain some credit at level 1.

## **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. Most candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. Some aspects of the paper were challenging but this enabled candidates of higher ability to demonstrate their understanding of the subject. Most candidates had attempted all three levels of response questions. Candidates found the physics level of response difficult. Section D was answered well by most candidates.

### **Comments on Individual Questions:**

#### **Question No.1**

Q1(a) Most candidates could recall that biological washing powders contain enzymes.

Q1(b)(i) Few candidates were able to explain the term genetic engineering. Many confused the process with selective breeding.

Q1(b) (ii) Most candidates understood that the bacteria would reproduce but very few could recall the term fermenter.

#### **Question No.2**

Q2 (a) Most candidates gained at least one mark for this question. This was normally for identifying the stage where an antibiotic was used.

Q2(b) Most candidates understood the need for publishing work in a scientific journal.

#### **Question No.3**

Q3(a)(i) Most candidates correctly identified methane as the main gas in biogas. Hydrogen tended to be the most common incorrect answer.

Q3(a)(ii) Very few candidates understood that conditions would become aerobic on the top of the liquid. Many just repeated the stem by saying the manure would not digest because it was at the top of the digester.

Q3(b) Most candidates were able to interpret the data to gain at least one mark.

Q3(c)(i) Few candidates could describe decomposition in terms of the breakdown of waste by bacteria or fungi. Many incorrectly thought worms or insects were involved.

Q3(c)(ii) Most candidates were able to interpret the graph. Some incorrectly thought the bars represented the amount of manure made by the animals rather than the mass of crops.

Q3(d) Many candidates were able to use the information from the entire question to give the correct response.

#### **Question No.4**

Q4 Candidates were able to successfully interpret the data and the information given them. Many produced a level 3 answer that included explanations as to why the numbers of cholera cases had increased. This was normally linked to flooding and the spread of contaminated water. Candidates failing to reach level 3 did so because they neglected to mention bacteria.

#### **Question No.5**

Q5(a) Most candidates identified sodium hydroxide as the chemical used to make soap.

Q5(b) Most candidates correctly identified oil as a liquid and fat as a solid.

Q5(c) Very few candidates recalled the term biodiesel. Most candidates gave biofuel as the answer.

#### **Question No.6**

Q6(a) Many candidates answered correctly using the reactivity series. Some however just repeated the stem by saying 'because iron reacts with copper sulfate'.

Q6(b) Most candidates could explain why magnesium was oxidised but few could explain why iron was reduced. Most referred to the oxide moving from the iron to the magnesium but only the more able referred to oxygen being lost or gained. Some candidates mentioned electrons but this could not be awarded a mark as they were not using the equation.

Q6(c) Candidates were able to place metal M in the correct position but few could explain their answer. Some candidates referred to M reacting with iron instead of iron sulfate so could not be awarded the mark.

Q6(d) Most candidates were able answer this question correctly.

#### **Question No.7**

Q7(a) Many candidates knew that the waste product was water. Some incorrectly thought it was carbon dioxide.

Q7(b) Most candidates were able to identify carbon monoxide or carbon dioxide. Those that lost the second mark tended to refer to ozone.

#### **Question No.8**

Q8(a) Candidates were able to choose the correct washing powder and give one reason. Few candidates could describe the job of each active ingredient. Many thought detergent simply made the clothing smell nice. Very few recalled that optical brighteners were linked to whiteness, instead they simply stated it made the clothes brighter. Most knew that enzymes removed stains but not that these were food stains so did not link this to the tomato stain. Some candidates incorrectly chose extra bright because they thought enzymes would damage the shirt or that enzymes needed high temperatures to work.

#### **Question No.9**

Q9(a) Most candidates could plot the points but few could draw a single curve through the points.

Q9(b) Very few candidates could evaluate the claim. Many just described the pattern in the results. Only one or two understood that the level of ozone continued to go down because the CFCs remained in the atmosphere. Some thought the line represented the amount of CFCs and referred to them being used again after 2005.

#### **Question No.10**

Q10(a)(i) Many candidates identified the symbol for a diode.

Q10(a)(ii) Most candidates identified the LDR.

Q10(a)(iii) Most candidates identified the capacitor.

Q10(b) Most candidates could complete at least one of the truth tables correctly. Some got the numbers the wrong way round putting 0 when they should have put 1. Few got all three tables correct. The most common way of scoring one mark was to complete the NOT gate correctly.

#### **Question No.11**

Q11(a) Most candidates correctly calculated the total resistance.

Q11(b) Very few candidates understood that the total resistance would be less.

Q11(b)(c) Most candidates could calculate the resistance of the resistor. A few candidates failed to answer the last part of the question.

#### **Question No.12**

Q12 Candidates found it very difficult to use kinetic theory to explain how current affects temperature and resistance. Most candidates described current as a flow of electricity rather than electrons. Very few candidates referred to vibrations. However a few were able to mention the idea of increased collisions causing an increase in temperature or resistance.

#### **Question No.13**

Q13 Most candidates made a good attempt to answer this question. Answers tended to be linked to observing the crops or the cows suggesting they had used the visual information in the question.

#### **Question No.14**

Q14(a) Very few candidates understood what would happen when the switch was closed. Many referred to the compasses pointing at the battery or the wire. Few mentioned magnetic field and some thought closing the switch would stop the current flow.

Q14(b) Most candidates were able to explain how the power was used and why it was wasted. Some candidates gave vague answers such as 'to run the lawnmower'. Some candidates thought the power was wasted if the lawnmower was left on when not cutting the grass.

Q14(c) Most candidates identified the motor with the greatest output power. Some candidates incorrectly chose 'Whizzer' because it had the lowest wasted power. They had not taken into account that the input power was lower to start with.

**Question No.15**

Q15(a) (i) Most candidates interpreted the bar chart correctly.

Q15(a)(ii) Candidates were able to identify the three correct countries. Some failed to give a comparison when explaining their choice.

Q15(b)(i) Most candidates correctly identified the pancreas.

Q15(b)(ii) Most candidates made reference to the second statement being incorrect and provided the reason. Only the more able candidates identified the first statement as correct. This was because they understood the idea of total number and in some cases actually calculated the total. Those that thought the statement was incorrect assumed the statement was referring to each individual organ total increasing.

Q15(c)(i) Many candidates misinterpreted the question and answered in terms of the number of people needing transplants being less than the number of donors. This meant they referred to ideas about not enough donors. Only a few suggested that donors could donate more than one organ.

Q15(c)(ii) Most candidates were able to make at least one suggestion. This was normally the idea that at the moment there are not enough donors.

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

### **General Comments:**

This is the second time that papers in this new specification have been offered and the number of candidates has increased by about 50%. The candidates performed well on some of the more challenging topics from the Gateway course and there appeared to be few candidates that were entered for the wrong tier. The standard of numeracy was particularly good and chemical equations were well handled. The most challenging topic seemed to be electromagnetic induction and there was confusion between the terms charge, current and voltage in a number of questions.

### **Comments on Individual Questions:**

#### **Question No.**

- Q1(a) This was a well answered question to start the paper. The majority of candidates could identify two or three of the stages.
- (b) This question also scored highly with candidates appreciating the importance of the peer review process.
- Q2(a) Some candidates confused enzymes with detergents but most appreciated that enzymes digest the chemicals in stains. A number, however, did not state which enzyme digests which chemical.
- (b)(i) This was probably the most challenging question on the paper with very few candidates appreciating the importance of the genetic code being universal. Many candidates simply stated that it was the same gene.
- (ii) This question was quite well answered but some candidates did not make it clear which group of people they were referring to.
- Q3(a)(i) The main source of confusion here was that some candidates thought that the floating manure would stop gas leaving the mixture. They therefore correctly stated that the amount of gas would decrease but for the wrong reason.
- (ii) Slightly more than half of the candidates could correctly identify the composition of biogas.
- (b) This question was well answered with candidates making the link between the nitrogen content of the manure and the growth of duckweed.
- (c) There were some good references to aeration and neutralisation of the soil but there was also confusion between the role of decomposers and detritivores. Many candidates thought that the earthworms decayed the manure or implied this by saying that they break down the manure.
- (d) Generally well answered with candidates drawing together information from the whole question.



- Q4 Most candidates could make the link between earthquakes, floods and contaminated water supplies. A small minority simply stated that living closer together caused the increase in cholera cases.
- Q5(a) The majority of candidates correctly referred to the presence of double bonds in their answers although a number did not make it clear which double bond they were referring to. This was not penalised, unless the wrong double bond was specifically stated.
- (b) This was well answered although there are candidates who are still confusing colourless with clear.
- (c) Many candidates could identify the double bond as the site that is attacked by the bromine however fewer stated that the dibromo compound formed is colourless.
- Q6(a) Well answered with the most common mistake being  $2\text{MgCl}$ .
- (b) There were a range of answers to this question. Some candidates thought that magnesium was gaining electrons and so being reduced. They could score one mark for the correct idea of OILRIG. Others correctly identified magnesium as losing electrons and being oxidised. However, they referred to zinc as gaining electrons not  $\text{Zn}^{2+}$  or zinc ions. Few candidates therefore scored full marks.
- Q7(a) Answers here were split between C and D.
- (b) Again, the equation was accurately written by most candidates.
- (c) A number of candidates referred to the pollution produced in making the fuel but did not specify the reason for this being the burning of fossil fuels.
- (d) Again candidates often lost marks by vague references to the pollution caused by burning petrol rather than specific pollutants.
- 8(a) Candidates had little problem plotting the points but the curves of best fit still cause difficulties with double lines and sketchy lines being drawn.
- (b) Some candidates seemed to confuse changes in ozone levels with changes in CFC levels. Others lost marks by simply describing the graph rather than trying to explain the changes. The best answers referred to the prediction for 2020 made by the line of best fit.
- Q9 Most candidates discussed the enzymes when giving reasons for the low temperature wash. Although some also said that the enzymes had hydrophobic and hydrophilic properties, most candidates wrote accurately about the detergents and scored highly.
- Q10(a) The majority of candidates correctly stated that the resistance would be lower but unfortunately failed to take the reciprocal of the resistances and so came up with the answer of 0.95 rather than 1.05.
- (b) Well answered with most candidates scoring at least one mark.
- (c)(i) Many candidates could complete the truth table in part (ii) but the diagrams in part (i) were often incorrect.

- Q11 Most candidates could give one argument for and one against although a minority did give a list of arguments against only.
- Q12(a) Many candidates correctly used Ohm's Law to calculate the resistance at 4V and 12V and the majority then correctly stated the range.
- (b) There were good references to kinetic theory here but a number of candidates were sidetracked into writing about the length of the wire changing or changes in temperature.
- Q13(a) Electromagnetic induction again proved to be a challenging topic with many candidates confusing the generator with a motor. They therefore claimed that the current was making the coil spin.
- (b) Although most candidates could state that the voltage increases, they could not explain it in terms of the rate of cutting of the magnetic field. Changes to frequency were seldom commented upon.
- Q14(a) Generally well answered although there were vague references to 'the countries having less people'.
- (b)(i) Well answered with more than half the candidates correctly calculating the percentage change.
- (ii) Most candidates here could correctly make the distinction between the percentage changes and changes in raw numbers.
- (c)(i) The cohort was rather split here. About half the candidates realised that donors could give more than one organ.
- (iii) There were plenty of good references here to the data.

## B763 Further Additional Science controlled assessment

### General Comments:

Overall, centres are coping well with the controlled assessment process and some excellent work with good clear marking has been submitted.

Most centres submitted work that was well organised and easy to follow with all of the appropriate documents enclosed and clear annotations explaining why particular marks had been awarded. This aided the process of moderation and centres are thanked for the effort involved.

Some centres, however, are still submitting work with errors of various kinds:

- There have been a number of clerical errors where marks submitted to OCR differ from those on the work sent to the moderator. Centres are advised to double check the marks on scripts before sending them to the moderator. In particular, if internal moderation has taken place and marks are changed, it needs to be clear which mark is being submitted.
- Tasks are only valid for one year and it is not permissible for centres to submit work either using tasks from previous years or from the next year.
- No form of writing frame, table grid or guidance notes, other than those provided as part of the task, are allowed to be given to the candidates.
- Centres are reminded that in signing the CCS160 (Centre Authentication) form they are guaranteeing that the work submitted is each candidate's own unaided work.

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 the reports written in 2012, 2013 and 2014 in addition to the notes given below.

### Comments on each Skill quality:

**Research:** Work submitted was generally of a high standard. Candidates frequently demonstrated that they were aware of the need to produce a full bibliography with full URLs when referencing internet sites. Few candidates made use of resources other than those on the internet, but when a text book is referenced then page numbers should be given. The range of sources used was generally suitable and relevant to the tasks.

Some candidates put a lot of effort into an analysis of the sources commenting on their likely reliability and accuracy and giving reasons for their decisions. This is not a requirement of the marking criteria and candidates could be advised to use their time to better effect. The main issue for the award of high marks lies in the candidate's ability to "select" relevant information from the sources. This needs to be specific to the bullet points in part one and to be scientifically correct. It is rarely possible to effectively fulfil this requirement by simply cutting and pasting from web sites as it usually means that irrelevant material is copied alongside relevant material.

**Planning:** This was also generally tackled effectively by the candidates. The methods now often include a diagram which helps to explain the plan and detailed information that can easily be followed by someone else. The most common weakness in this skill quality is an insufficient consideration of how errors can be minimised. This is required at all marking points above 2 with the difference between 3 and 6 being in the depth and detail given by the candidates.

In all but the science specification, candidates need to produce a suitable hypothesis. This should be based on the information given in part 2. Candidates make it more difficult for themselves when they choose to investigate something which is not really what the task was asking for. For higher marks candidates need to provide a detailed scientific justification for their hypothesis.

Candidates should clearly indicate any changes they might have made to their plan. For example, candidates need to select a suitable number and range of data points as part of their plan. If the number in the plan differs from the number used in the actual experiment then an explanation of the change should be given.

**Collecting:** This was one of the highest scoring of the Skill qualities. Candidates generally produced clear tables with full headings and units and quoted data to an appropriate and consistent number of decimal places in line with the equipment they had chosen. Some centres penalised candidates for inconsistency or errors in processed data such as averages. Marking in this Skill quality needs only be applied to raw data. Some centres over marked by giving high marks when all of the raw data had not been recorded and processed data was shown instead. For example, initial and final temperatures should be recorded and not just temperature change.

Candidates are not allowed templates to use in these tasks. If candidates have been given a table to complete then it is unlikely that they would be able to get many, if any, marks for this Skill quality.

**Managing Risk:** This was also a high scoring Skill quality but some centres are still being too generous. The following comment was made on last year's report and bears repeating, as some centres are still failing to take it into account when giving high marks.

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.

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

**Processing data:** Graphs were well drawn by most candidates. However, some centres are still giving high marks when candidates have inappropriate scales on one or more axes. A graph does not need to have the point (0,0) on the scale in all cases. As a general rule the data points should cover at least half of the available space.

Some of the tasks have been designed with the opportunity for more able candidates to use more complex mathematical techniques that are relevant to the task, for example, calculating an energy change. However, candidates do not need to carry out an additional complex mathematical technique in order to get high marks if there is not a process which is relevant and adds to the understanding of the task. For example, calculating a gradient may be irrelevant and provide no additional useful information, particularly when candidates do not understand what the gradient shows.

Without some form of processing of uncertainty then full marks are not available in this Skill quality. Range bars are generally the most accessible method for candidates to use.

**Analysing & Interpreting:** There were some tasks this year in which candidates failed to obtain data that supported their hypothesis or the hypothesis given. For example, in those who undertook the portable stoves experiment, some candidates failed to control the amount of fuel used in each experiment, by either burning a fixed mass of fuel or calculating a temperature change per gram, and obtained data which showed no real trend at all. Candidates should not try to force their hypothesis on to the data. There were some candidates who were given high

marks for stating that a trend was supported when only 2 out of four data points followed this trend. They may then have commented that the other two data points were anomalies. This is not good science and is not worthy of high marks. Candidates may obtain high marks by pointing out that the data does not show a clear trend, comparing this to data from secondary sources and making appropriate comments to explain the differences.

**Evaluating:** Although often marked well by the centres this continues to be a Skill quality that candidates find difficult. Candidates may need more space to answer question 4 of part 3 than is available on the standard version. Centres can 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.

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.

To obtain high marks candidates need to make a “detailed and critical consideration” of the data. This is rarely seen. Although range bars are often included as part of processing, many candidates do not understand the significance of them and how they relate to the quality of the data. Where data is of poor quality, candidates need to try to link this to their method and explain why their plan gave rise to data that did not match their expectations or where there were a number of anomalies. Suggestions for improvement should ideally be derived from this rather than chosen almost at random.

Comments about risk do not contribute significantly to the mark for analysis but can be used to further support the mark awarded in the risk Skill quality.

**Conclusion:** As with analysis and evaluating, the conclusion should be based on the actual data obtained. In most cases candidates are justified in saying the data supports the hypothesis but in some cases this is not the case and candidates should say so and go on to explain why.

There is also the requirement in this Skill quality for candidates to clearly link their research to their own experiment and to appropriate scientific knowledge and understanding. Question 6 of part 3 provides an opportunity for this but it is to be remembered that evidence for any of the marking criteria can be obtained from any part of the candidates’ work. Annotation helps considerably if marks awarded are related to work from elsewhere in the task.

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