OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science A (Twenty First Century)

General Certificate of Secondary Education **J631**

Report on the Units

June 2009

J631/MS/R/09

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

It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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 syllabus 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.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

GCSE Additional Science A 21st Century (J631)

REPORTS ON THE UNITS

Chief Examiner's Report

Ofqual produced a public report on GCSE Sciences in March 2009: 'Findings from the Monitoring of the new GCSE Science Specifications: 2007 and 2008'. This report (page 25) makes reference to an agreement between Ofqual and the Awarding Bodies 'to ensure that grade boundaries are set appropriately'. Part of this agreement required all the awarding committees to work towards a new national standard for this summer's series. This has had an impact on both the examined units and the coursework components awarded this summer, and has resulted in higher thresholds than might have been expected for a number of the key grade boundaries, across the 21st Century Science and Gateway Science suites of specifications.

Several examiners commented on the high standards which were shown across this suite of examination papers. Candidates appear to have been entered for the correct tier in most cases. However, there were also concerns that a number of candidates did not appear to be familiar with some of the areas covered by the specification document.

Most candidates correctly followed the instructions in the questions and made their responses appropriate to the number of marks available. Some, however, did not read the rubric for each question carefully enough.
In all cases, candidates appear to have had ample time to finish the paper, and also appeared to have used that time productively. The significant number of alterations to answers shows that many candidates were re-visiting questions and considering their responses carefully. In many cases, these alterations were clearly marked, but there were still occasions when examiners were concerned that a candidate's intentions may not have gained credit due to an unclear alteration. Candidates should never try to alter an answer, but should cross it out and replace it clearly with the new version. In general, the number of questions for which there was no response was very limited, showing that candidates managed to access the content of the questions.

Caution must be exercised when using published mark schemes to get an indication of the required depth of treatment. Centres should bear in mind that in one year a question may be used to differentiate at the low ability end of the range, whereas a very similar question another year may be used to differentiate the most able candidates, with a corresponding difference in what is required to gain the mark.

Centres are reminded that this is the last examination series in the current format for these papers. From January 2010, about one third of the marks from these papers will be awarded on open-ended questions. Please refer to the OCR website for further details, including specimen assessment materials. This change in the format of these papers will mean that candidates who are not able to express themselves well in free response questions are likely to do less well than in previous series. As the free response sections of Higher Tier papers will be more demanding than those in Foundation Tier, centres will need to consider carefully which paper to enter candidates for.

A215/01 – Twenty First Century Additional Science A (B4, C4, P4) Foundation Tier

General Comments

The paper was well attempted and produced a slightly lower mean mark than that of June 2008.

An overall impression is that candidates were generally clear about their subject knowledge.

Most candidates correctly followed the instructions in the questions and most made their responses appropriate to the number of marks available. Some, however, did not read the questions carefully enough. A small number failed to score marks because it was not clear what their response was.

Candidates should be aware that marking is carried out on scanned images of scripts and is online. Consequently, if candidates change their minds, any alterations must be made clearly and unambiguously. It is better if the candidates follow the instructions given as to how and where to answer the questions. However, any unambiguous indication of the correct answer gained credit.

Any marks that are ambiguous will ***not*** gain credit on this paper.

Questions usually indicate the number of responses required. It was noticeable that some candidates gave either more responses than needed (and consequently lost marks for correct answers) or fewer responses in which case they were depriving themselves of possible marks.

All candidates seemed to have made good use of their time. There was no evidence of candidates running out of time.

A few, lower attaining candidates did not complete the paper due to lack of knowledge, not lack of time. The number of "no response" answers was very small indeed.

Comments on Individual Questions

1 (a) In response to what happens to the core temperature when sitting in the sun, the majority of candidates gave the incorrect answer that core temperature increases.

(b) Control systems and changes in temperature were well known by all candidates.

(c) The symptoms of heat stroke and how it developed were well known.

2 (a) Few candidates did not know that maintaining an internal environment was called homeostasis.

(c) Most candidates knew the name of a gas that moves in and out of cells by diffusion, but few knew that osmosis is the diffusion of water.

3 (a) This question was designed to test if candidates could identify the symbols for the separate elements within a chemical formula. It was very pleasing to see that, while very low ability candidates struggled with the task, everybody else was able to complete it successfully.

(b) Although they were given information regarding silver iodide, candidates found it difficult to both write word equations and recognise symbol equations.

(c) Only more able candidates scored in this section about atomic structure.

4 This was answered well by all candidates.

5 (a) Candidates were divided as to what caesium is. Some knew it is a metal.

(b) Selecting group 1 elements was a relatively easy task for most candidates.

(c) Few candidates did not know work out the melting point of rubidium.

(d) The reaction of caesium with water was understood by the more able candidates.

6 This question was the lowest scoring question on the paper; even C grade candidates did not score well.

(d) The most common incorrect answer was B. The candidates had missed the information about 2 seconds in the question.

7 This was another low scoring question.

(d) Many candidates got the first two responses correct, but the common incorrect answer to the third blank was falling, instead of heating.

8 (a) Choosing the force arrows proved difficult for many candidates as did calculating the
(b) change in momentum.

(c) Alan was unhurt because the crumpling reduces Alan's momentum slowly. The common incorrect answer was that the seatbelt reduces his momentum quickly.

A215/02 – Twenty First Century Additional Science A (B4, C4, P4) Higher Tier

General Comments

There was a very strong performance from the candidates sitting this paper, with many of them scoring good marks in all sections of the paper. Some areas of factual recall, as with the effects of alcohol and ecstasy on ADH production, or the direction that friction acts in, might have been better answered. However the main areas of weakness seemed to lie in questions where candidates were asked to apply knowledge or show reasoning, for example, in the questions about ions and the electronic structure of ions. This type of question is covered under Assessment Objective 2 in the specification, for which some candidates might benefit from more thorough preparation.

Comments on Individual Questions

1 (a) This was generally well answered, the great majority getting the expected response of CBDAE.

(b) Part (i) was very well answered, but part (ii), where candidates were asked to recall the term osmosis without any prompting, was not so well answered .

(c) Part (i) was, again, much better answered than part (ii), where many candidates seemed to be unsure of the effects of different factors on the release of ADH. This is something candidates might expect to prepare for.

2 (a) Part (i) of this question was well answered by the most able candidates, but the term 'active site' is one which might be expected from any candidate entered for this paper. Part (ii) was better answered than part (i), perhaps suggesting that candidates have ideas about what is happening in enzyme catalysed reactions but are weaker on recalling the correct terms.

(b) Part (i) showed that not all candidates were familiar with the way that pH affects enzyme activity, and the slightly better response on part (ii) perhaps suggests that more candidates were better prepared to answer on the effects of temperature on enzymes. Both factors are important.

3 (a) This was disappointingly answered in the context of the overall performance of candidates on this paper. Few seemed capable of selecting the correct symbol equation to match the process described in words; this is an important skill for Higher Tier Candidates.

(b) Part (i) was well answered by many candidates who realised that the number of electrons is the same as the number of protons in the nucleus of an atom. Part (ii) was better answered than part (i), and called on candidates to show an understanding of how group 7 elements form ions. In the light of this response it was disappointing that around a third of candidates who got this definition correct, were unable to apply it in part (iii). This is, perhaps, a good example of candidates needing to be more confident in the application of definitions that they have been able to recall.
Part (iv) was much better answered than part (iii).

(c) The correct response of Owen giving the best explanation was not always selected by the more able candidates, possibly suggesting that they had not picked up on the theme of the whole question.

4 (a) These questions were all well answered, with candidates showing a good range of skills,
(b) from predicting the melting point of a metal in a sequence to balancing a symbol
(c) equation. This was particularly pleasing to see in part (c) after some indifferent performances on this skill in previous sessions.

5 (a) This was the best answered part of this question

(b) Many candidates also gave the correct response for this question.

(c) Part (i) was not well answered, especially in comparison with question 5 (a), and might show some weakness in working out ionic structures (as suggested for question 3). This is an area candidates would do well to ensure a firm grasp of.
Part (ii) had a symbol equation which was a little more challenging to balance than question 4 (c) and, correspondingly, both marks were given less often; many candidates still scored 1 mark here, hopefully pointing to real improvement in equation balancing skills.

6 (a) This showed that many, but not all, candidates were able to correctly substitute in to the equation given at the front of the examination paper.

(b) This was successfully completed only by the more able candidates, with many making one mistake in the three choices required for the mark. There was no clear pattern to these mistakes to suggest an underlying misconception, so perhaps more careful examination technique would benefit the majority of candidates.

(c) This was better answered with candidates mostly correctly substituting values into the equation for work done and carrying out a simple calculation.

(d) This challenged candidates to link a narrative to a speed-time graph, which many seemed to have difficulty in doing correctly.

7 (a) In contrast, this question asked about a distance-time graph, and was very well answered.

(b) The great majority of candidates recognised that balanced forces result in a constant speed.

(c) This was again a form of distance-time graph, which candidates handled much more successfully than the earlier speed-time graph.

(d) Part (i) was fairly well answered, showing many candidates were able to identify the correct equation and substitute appropriate values into it to arrive at the correct answer.
Part (ii) was very poorly answered; many candidates were unable to make the link between Gravitational Potential Energy and Kinetic Energy, and then use this to arrive at the velocity. Some candidates would benefit from more practice with multi-step calculations to be better prepared to tackle this type of problem.

8 (a) The responses to this question were disappointing due to the number of candidates who were unable to correctly identify the direction of the force of friction in a diagram. This weakness has been seen previously in some examination series.

(b) This question was particularly poorly done, with very few candidates being able to identify the expected responses that the forces on the van cancel each other out, and that the reaction is at right angles to the road surface. Some were able to pick one of the correct responses, but there did seem to be a significant weakness in dealing with the directions of forces on an object at rest.

(c) This was better answered, with more able candidates correctly substituting values and carrying out a calculation.

(d) This was the best answered part of this question, with many candidates getting at least two of the expected three words correct. There was an encouraging understanding of the role of crumple zones in reducing the force on people in collisions.

A216/01 – Twenty First Century Additional Science A (B5, C5, P5) Foundation Tier

General Comments

Most candidates managed to complete the paper and there was no evidence that shortage of time was an issue.

The great majority of candidates seemed to understand the way the questions were designed to be answered, even if they did not produce the correct response – few responded in a way that was difficult to mark using the on-line marking system. Even where corrections had been made, the amendments generally allowed the response to be adequately judged.

The paper allowed candidates to perform well and the spread of marks was wide, showing good differentiation. The range was from low single figures to mid thirties, with the vast majority of candidates scoring over 15 marks.

In questions requiring candidates to link boxes with straight lines, a variety of responses were evident – very few candidates used straight lines as per the rubric, which made marking of these questions less straightforward.

The number of questions for which there was no response was very limited, showing that candidates managed to access the content of the questions. Question 4 (a) was the only question to which significant numbers of candidates failed to produce a response.

It would appear that the physics questions proved the most difficult on the paper, with concepts such as voltage and the working of transformers being less well understood.

Comments on Individual Questions

1 (a) In part (i), candidates were asked to identify the correct formulae for gases given off from volcanoes. The great majority of candidates were able to do this successfully. Part (ii) required candidates to select carbon dioxide as a normal constituent of the atmosphere and a still higher proportion were able to do this.

(b) Candidates across the board knew that gases in the air are made of particles which are molecules.

(c) This question, on the other hand, proved difficult – a minority of candidates selected the correct statement about sulfur in living things (living things contain small amounts). The most common wrong answer was that living things do not contain sulfur.

2 (a) The task here was to choose the correct letter for the structure of runny volcanic lava; this was well within the capability of most candidates.

(b) Part (i) was more of a challenge and fewer candidates knew that quartz was made of silicon dioxide.
Part (ii) drew a mixed response – the requirement was to select two properties of silicon dioxide (high melting point and insolubility) – the most common score was one of the two available marks.

3 This question was about the extraction of magnesium.

(a) This demanded that candidates use information in a table to give the element whose compounds make up the highest percentage of the earth's crust (silicon). This proved straightforward for most.

(b) In part (i), stating the formulae of two compounds in the equation for decomposition of magnesium carbonate which are a solid and a gas respectively was much more demanding – candidates often gave the name rather than the formulae, but were not penalised in this instance.
Part (ii) asked for the name for the removal of oxygen from a metal oxide – this was not well known and less than 30% of candidates understood the term reduction.

(c) Fewer than half of the candidates were able to identify that the high reactivity of magnesium is the reason why it cannot be extracted by reacting the ore with carbon.

(d) This involved drawing arrows on a diagram of electrolysis. Although many candidates could identify the electrolyte, very few correctly indicated the negative electrode as the place where the magnesium metal would be deposited. Some candidates drew the electrolyte arrow touching an electrode, and did not score. It was more common to see the positive electrode indicated as the site of magnesium deposition.

4 This question proved a difficult one for the candidates. It was a common question with the higher tier paper, and it would seem that the concept of voltage is one which is not easily understood.

(a) This asked candidates to draw the symbol for a voltmeter in the correct position in the circuit to measure the potential difference across a lamp. Both position and symbol were required for the mark, and very few candidates scored. Most knew the correct symbol but placed the voltmeter in series.

(b) This also proved a challenge – few candidates could correctly identify the definition of voltage of a lamp as the energy lost by charge on its way through a lamp.

(c) In part (i), fewer than half of the candidates could correctly place steps in order to explain the change of brightness of a lamp due to a variable resistor.
Selecting words to show how the voltage changes across the variable resistor and the battery was also difficult in part (ii), with only about a third of the candidates scoring.

5 (a) Although intended as a low demand question, this proved a challenge. Fewer than 30% of candidates realised that the core of a transformer is made of iron. Copper and plastic were common wrong answers.

(b) It was also rather surprising to see that fewer than half of the candidates realised that mains voltage is 230V.

(c) This tested candidates understanding of how transformers work. Few scored both marks, but the majority scored at least 1 mark. The most common wrongly selected alternative was 'an electric' field rather than 'a magnetic' field in the core.

(d) This was an opportunity for the vast majority of candidates to score by identifying the switch in the circuit.

6 (a) This required candidates to place steps in order to describe static charging; this was well handled by most.

(b) The requirement was to link boxes to explain how electrons had been transferred to cause charging. The great majority of candidates scored at least one of the two marks.

(c) Only about a third of candidates were able to give the statement correctly describing metals as having free-moving electrons.

7 (a) In parts (i) and (ii), most candidates could identify the nucleus and cytoplasm as the site of genetic code and protein synthesis respectively.

(b) The description of DNA as a double helix was well known.

8 (a) The requirement was to classify stages about the cell cycle as cell growth or mitosis. This produced a full range of combinations of letters with the most common score being 2 marks for correctly placing 3 or 4 of the statements.

(b) This question was common with the higher tier paper, asking candidates to decide whether statements were true for mitosis, meiosis or both. As expected, this proved a challenge, although the majority of candidates scored at least one mark out of the 4 available.

9 This question was about cuttings.

(a) Only a small majority of candidates realised that cuttings provide plants with known features

(b) Rather more candidates could state that unspecialised cells can develop into other plant cells.

(c) In part (i) the fact that rooting powder contains plant hormones was not well known – only about a third of candidates scored the mark
In part (ii), rather more than half knew that there are unspecialised cells in plants.

A216/02 – Twenty First Century Additional Science A (B5, C5, P5) Higher Tier

The examination appeared to work well; all candidates appeared to have enough time to complete the paper. The vast majority of candidates appear to have been entered for the correct tier, with only a small number earning total marks in single figures. As in previous years, such candidates would have fared much better had they been entered for the foundation tier.

It was apparent this year that some candidates lost marks by not using the correct number of ticks to answer a question, even when told how many ticks were needed. As always, candidates should read the instructions for each question very carefully.

1 This was well answered in general.

(a) Many candidates realised that living things contain small amounts of sulfur.

(b) They were also able to score at least one of the marks for the forces between and inside small molecules, though the most common mistake was to assume that the bonding within sulfur dioxide molecules is ionic.

(c) The sulfur cycle was well answered, with a minority of candidates reversing B and D.

(d) Many candidates could also interpret the percentage of sulfur in methionine correctly.

2 (a) Most candidates were aware that quartz is the mineral in granite which is mainly made of silicon dioxide, though biotite mica was often chosen, and feldspar sometimes.

(b) Candidates also showed a good understanding of the properties of silicon dioxide.

3 (a) The task of balancing the equation discriminated very well, with almost all the most able candidates gaining the mark.

(b) The reasons why magnesium cannot be extracted from its oxide in the same way were less well understood

(c) The understanding of electrolysis caused even more difficulty. One common mistake was to think that oxygen ions gain electrons as they are neutralised at the electrode.

4 (a) Able candidates had no difficulty in showing how to wire a voltmeter into the circuit. Lower attaining candidates usually put it in series.

(b) Far fewer candidates could identify the correct description of voltage, with many choosing the description of current instead.

(c) In part (i), many candidates could choose the sequence which best explained why the brightness of the lamp changes as the variable resistor is adjusted
In part (ii), fewer could state what happens to the different voltages.

5 (a) The majority of candidates felt that transformers should be rod- rather than ring-shaped.

(b) Candidates could often identify the correct calculation for determining the number of turns on the secondary.

(c) The sequencing exercise suggested that many candidates are not confident with the process of inducing a current. CBDEA was a common answer, as was ECBDA.

(d) Candidates had great difficulty in predicting the current readings in different parts of the circuit.

6 (a) Many candidates had enough understanding of how static electricity is generated to score one out of the two marks, with the most common mistake being to assume that objects must be conductors to acquire a charge.

(b) A similar mistake was evident here where many candidates thought that the floor must be made of a conducting material.

(c) Most candidates knew that a flow of charge an electric current, but one of the most common mistakes was to suggest that the conductors would have plastic coating around them.

Both 6 (b) and (c) were answered well by the more able candidates.

7 (a) Most candidates showed at least partial understanding of the cell cycle, and many went on to score full marks.

(b) This question on meiosis was common with the foundation tier, and was even better answered with the majority of candidates scoring at least than half the marks.

8 The question discriminated well. All the candidates felt able to attempt the question, and the more able clearly showed their level of understanding.

(a) Candidates who did not fully understand genes often suggested that hair does not produce haemoglobin because the keratin gene is more dominant, or because the cells do not contain the haemoglobin gene.

(b) This was felt to be more difficult, with many candidates choosing response H (A DNA molecule changes its base order in order to make different proteins).

9 (a) This question also discriminated well, with all candidates showing that they clearly
(b) understood the question and were interacting with it. Candidates were able to demonstrate that they understood the significance of the terms ‘unspecialised’ and ‘organ’, and that they were aware of the way in which hormones control phototropism. Weaker candidates would usually score several of these marks, while the more able candidates showed a clear understanding across the board.

A217/01 – Twenty First Century Additional Science A (B6, C6, P6) Foundation Tier

General Comments

The paper was accessible to the majority of candidates. No clear pattern emerged with regards to the presentation of the paper and most candidates were able to respond to most of the items. The candidates displayed a wide range of scores, from 3 to 38. In general, candidates showed a sound knowledge and understanding of X-rays within the electromagnetic spectrum, sound wave transfers, simple reflexes, the concepts of learning and memory, and were able to interpret graphical data. Candidates did, however, show least confidence in the areas of amplitude and frequency of radio waves, nerve impulse transmission, the interpretation of pie-chart data and the identification of alkali and salts.

With the exception of one or two items noted, the majority of items did not appear to generate errors due to the misinterpretation of instructions or rubric. Many candidates appear to have been well-prepared for this paper and they showed the confidence to complete all items.

Finally, there was little evidence that candidates ran out of time, the items located at the end of the paper were answered with an equal level of success to those positioned at the start of the paper.

Comments on Individual Questions

1 (a) Some candidates failed to recognise the importance of differential X-ray absorption for muscle and bone tissue.

(b) Most candidates realised that X-rays have a high frequency.

(c) The majority of candidates were aware of the location of X-rays within the electromagnetic spectrum.

(d) Although many candidates understood that infrared and ultraviolet waves must have a different wavelength, an equal number failed to recognise that such waves have the same speed through empty space.

2 (a) This item did not present a problem for many candidates. No clear pattern of alternatives appeared.

(b) Most realised that the wave pattern was not option B, but some were challenged by this item.

(c) This item presented problems for a number of candidates. Many identified ‘receiver’ but considered that the amplitude increases as waves travel.

(d) Many candidates failed to realise that disturbance of a transverse wave is at right angles to the direction of the wave energy flow.

3 (a) This was a new format for objective-style questions and some candidates appeared to have misread the instructions.

(b) This tended not to present a problem to many candidates.

(c) The transfer of energy via sound waves was understood by many candidates.

4 (a) This item was challenging to many candidates but did represent the typical series for a response. However, some candidates did obtain full marks.

(b) This did not present a problem to candidates who were clear that dark conditions are more favourable for woodlice.

(c) Although originally intended to assess specification statement B.6.3.3 for which a 'simple reflex' would have been the expected answer, the behaviour demonstrated is not strictly a reflex response. For this reason, the mark scheme was extended to permit the alternative answer of 'complex response'. This was answered well by many candidates.

5 (a) Although many candidates obtained all three marks, some surprisingly included 'chloroplast' in their response.

(b) This did not present a problem to many candidates.

6 (a) Again, many found this item to be straightforward. However, some candidates understood the concept of memory but struggled with the definition of learning.

(b) A wide range of responses were presented for this item. No clear alternative pattern emerged in relation to the expected series.

7 (a) Some candidates failed to interpret the pie chart data correctly. They often identified the 24% for pharmaceuticals (shown clearly in the pie chart) but struggled with the additions needed for the other two categories.

(b) Many candidates were able to identify the correct calculation; others tended to select the third option.

8 (a) It was noted that many candidates do not know about the acids in relation to their solid, liquid and gas states. However, some candidates did obtain full marks for this item.

(b) Although water was generally identified in the equation, candidates often mixed the alkali and salt options.

9 (a) A number of candidates incorrectly selected Jim or Su. The experimental set-up was not fully understood by a number of candidates.

(b) It was encouraging to note that many candidates were able to interpret graphical data without any difficulty. Some, however, were somewhat challenged by item (ii), the point of extra acid addition.

10 (a) Many candidates obtained one mark since they correctly linked washing with the top information box. The other boxes were often incorrectly linked, but no clear pattern of incorrect responses was seen.

(b) Relatively few candidates correctly identified option D. This may indicate that the candidates are unsure of the pH range values.

(c) Many correctly identified the 25.0 value and were able to use the data in the table to good effect.

A217/02 – Twenty First Century Additional Science A (B6, C6, P6) Higher Tier

General Comments

It was good to see that centres had done a good job of selecting the correct tier for their candidates, with very few candidates earning marks in single figures.

All of the questions proved to be accessible, with some candidates earning full marks and most candidates attempting every question. There was no evidence of time pressure.

Some questions deliberately did not tell candidates how many responses they had to select. This made the questions more challenging, but also led to a lot of changes of mind. Fortunately, most candidates are now aware that in such situations they need to indicate clearly to the examiner what their final decision is. The question which involved balancing a chemical equation proved to be an exception to this, with too many candidates rewriting the whole equation without crossing out the printed one which they had used for their working out, presenting the examiner with two (sometimes different) responses to mark.

Only one question had a significantly high number of 'no responses', question 8 (c) (iii). This required candidates to write down the chemical formula of a salt. The majority of the hard questions in all three sciences involved the use of specialist terms. Centres need to be aware that when these papers contain open-ended questions both of these skills are likely to be required of their candidates. They should adapt their teaching and testing accordingly.

Comments on Individual Questions

1 This question about waves appeared on both higher and foundation tier papers.

(a) This used a new question style which caused problems for lower attaining candidates who did not follow the instructions. Otherwise, most candidates earned both marks, showing that they knew their definitions of wave properties.

(b) These questions proved to be harder than expected, with even the highest attaining
(c) candidates answering incorrectly.

2 Although most candidates correctly identified the advantage of digital coding in part (c), only a minority made any progress at all with part (b) about the process of signal transfer. As expected, matching each waveform to its description was only done well by some strong candidates.

3 (a) Too many candidates thought that bone reflected X-rays instead of absorbing them.

(b) Most candidates were able to match the energy of X-ray photons to their energy

(c) The meaning of intensity was clearly a mystery to most candidates, with only a minority picking up even one mark. It was good to find that many candidates knew that X-rays and ultraviolet have different wavelengths but the same speed.

4 This was the first of the Biology questions.

(a) This proved difficult for many candidates, probably because they had to decide how many boxes to tick. Too often, they only identified "simple reflex", and so lost the mark.

(b) Many candidates lost a mark in this question because they thought that the brain should be involved in a simple reflex action.

(c) The vast majority of candidates correctly identified that the brain modified the reflex.

5 (a) This question also appeared on the foundation tier paper. It was unexpectedly difficult, although the majority of strong candidates earned all four marks. Most candidates clearly do not have a firm grasp of the vocabulary of neuron systems.

(b) This proved to be much easier, with only a minority of candidates finding it difficult to correctly match muscle cell to receptor.

6 Only part (c) of this question proved to be at all difficult for candidates, probably because many did not understand the difference between giving and retrieving. They could nearly all identify examples of the use of repetition and stimulus in the training of memory, and understood that electrical stimulation of the brain required physical contact.

7 This was the first question on Chemistry. It also appeared on the foundation tier paper.

(a) Many candidates had difficulty in matching the methods with their information - washing was rarely correctly linked.

(b) Litmus was a very popular incorrect answer in part (i), suggesting that many candidates either do not know the pH range for slightly alkaline or had not fully grasped the context of titration.
In part (ii) it was good to find that the majority of candidates of all abilities realised that outliers should be omitted when calculating averages..

8 (a) Candidates were required to write down the name of the salt (calcium sulfate) produced by a reaction. A surprising number of weak candidates wrote down nonsense, such as "sea salt", "carbon sulphide" and "sodium chloride". About 10% of candidates failed to provide a response at all.

(b) This question required candidates to interpret a graph, and all candidates scored highly.

(c) Most candidates could correctly calculate the relative formula masses in parts (i) and (ii). For (iii) most candidates added correct symbols for water and carbon dioxide as products,. Most of the strong candidates were also able to add the correct formula for calcium chloride and balance the equation.

(d) Few candidates earned both marks for part (i). This was not just because they did not know how many ticks were required.
In part (ii), only half of the strongest candidates correctly identified the statements required to explain the increased speed of the reaction.

A218/01 – Twenty First Century Additional Science A (Ideas in Context) Foundation Tier

General Comments

The examination discriminated well; all candidates appeared to have time to complete the paper and candidates were entered appropriately for this tier.

Comments on Individual Questions

1 (a) Almost all candidates could extract information from the text to identify two problems caused by excess acidity in the body. The few who did not gain credit tended to discuss problems caused by too much sodium hydrogencarbonate, or gave a more general statement as one of their examples, eg "the waste acid causes blood to become acidic".

(b) Part (i) was common with the higher tier paper and so was aimed at more able candidates. These candidates realised that their answer needed two components: the direction of the change in rate and the direction of the change in concentration. Candidates could equally have answered this question by linking time of reaction to concentration, though those candidates who did so sometimes appeared to get confused and lost the mark.
Many candidates had a partial understanding and stated "the rate increases when the concentration changes"; this was not enough to gain credit. The lowest attaining candidates interpreted the table as a purely linear sequence, saying that 'the time went up, then down, then up again'.
Part (ii) was also common with the higher tier paper. The most able candidates went beyond the simplistic argument "to make it a fair test" and identified the particular reason in this case – that temperature affects the rate of reaction – and so gained credit.
Part (iii) addressed the same problem at a much lower level, so here examiners were able to give credit for unqualified "fair test" statements.

(c) In part (i), the question asked what happens to the pH when an acid is neutralised, so candidates could only gain credit for answers which implied an understanding of the numbers involved, e.g. "it decreased" or "it went to 7". Lower attaining candidates suggested that the pH would increase, or gave more gave descriptive responses, e.g. becomes alkaline.
Part (ii) discriminated well; able candidates were much more likely to know a technique for measuring pH. At the lower levels answers such as 'indicator' or 'thermometer' were common. More candidates left this part blank than for any other question on the paper. Disturbingly, though this question was answered much better by the more able candidates, a large minority of that ability group showed considerable confusion.
Many candidates scored well on part (iii) of this question. The main mistake was to write a superscript '2' in the formula of carbon dioxide.
In part (iv), most candidates correctly realised that the bubbles indicated gas evolution or the existence of a chemical reaction.

(d) In part (i), the hazard symbol was correctly identified by many candidates, with 'irritant' being the most common wrong answer.
In part (ii), the majority of candidates could give at least one safety precaution when handling acid.

(e) Able candidates correctly identified from the text the advantage of using sodium hydrogencarbonate. Lower attaining candidates often answered in terms of reactivity, or merely re-stated the question stem, "it is better at neutralising acids".

2 (a) Almost all candidates could use the text to identify two factors that affect the kidney's ability to deal with changes in water levels in the body. A few suggested factors not considered by the article, e.g. the use of ecstasy, and so were not able to gain credit.

(b) The article made specific reference to alcohol as one factor which affects the function of the kidneys. However, many candidates seemed unfamiliar with this effect and suggested that drinking alcohol increases water levels in the body. Many candidates effectively re-worded the stem of the question and talked about increased production of urine.

(c) In parts (i) and (ii), the weakest candidates found it difficult to use the table to correctly identify two substances filtered out of blood plasma, and to explain why red cells are not filtered from the blood, but the majority performed these tasks well.
In part (iii), able candidates could also go on to identify why sugar is not normally found in urine.

(d) Part (i) was common with the higher tier paper. Many candidates copied out fairly lengthy sections from the article, and so were often able to include enough relevant information to gain a mark for difference in concentration. More able candidates also discussed the movement of molecules, and so gained the second mark. Examiners were impressed by the care that was taken to correctly copy the spelling of technical terms.
Part (ii) was also common with the higher tier paper. Candidates experienced difficulty in describing the events at a partially permeable membrane, though a significant proportion of the more able candidates were able to show their understanding here.

(e) Many candidates were able to correctly calculate the number of hours spent each week on dialysis. Incorrect answers were often in the hundreds of thousands, suggesting the candidate had difficulty in relating the numbers to reality.

3 (a) Most candidates realised that amplitude related to the vertical aspect of the diagram and wavelength related to the horizontal, but did not understand the terms well enough to then score any marks. It was common to see diagrams with the axes labelled 'amplitude' and 'wavelength' but no other indication.
Candidates appeared to have great difficulty in showing their ideas in a meaningful fashion. Amplitude was often indicated by a single arrow pointing to the top of a peak, which suggested at least partial understanding. Dimension lines were often drawn so imprecisely that it was impossible to give credit.
Where lines were drawn clearly, amplitude lines commonly indicated the vertical distance from the top of a peak to the bottom of a trough.

(b) In part (i), many of the more able candidates knew which colour of light is refracted most. Weaker candidates either got them the wrong way round or suggested other colours entirely, such as green.
In part (ii), very few candidates realised that waves change in speed as they enter the glass prism, though many gave the next best answer and named the process, i.e. refraction.

(c) Interference did not seem to be well known. A wide range of answers were circled.

(d) In part (i), most candidates could state that the name required was 'photon' though a significant proportion of weaker candidates suggested 'battery'.
In part (ii), most candidates could state that speed was the constant feature of different types of electromagnetic radiation. Many copied out the actual value.

In part (iii), few candidates could give the names of two types of electromagnetic radiation. While more able candidates performed a lot better, it was still an area where they had some problems. Answers such as sound, heat, bluetooth and lightning were not uncommon.

(e) This question was common with the higher tier paper. While examiners expected candidates to have difficulty in describing a longitudinal wave, a surprising number of candidates were unable to gain any credit at all.

(f) This question was common with the higher tier paper, and was much better answered than the previous overlap question.

A218/02 – Twenty First Century Additional Science A (Ideas in Context) Higher Tier

General Comments

Examiners commented that, in general, candidates were better prepared this year than in 2008, which was the first year this paper was offered. Candidates made good use of the pre-release material, referring to it in their answers. There were few unanswered questions; most candidates making an attempt at every question on the paper.

Some candidates gained only very low scores. The higher tier paper is designed to discriminate between higher grades. Candidates who are predicted grades at D or those who are working in the lower ranges of a C grade would be better served entering the foundation tier paper.

In general, candidates performed better in the short answer question parts. Questions with two or three marks often only scored a single mark. Many candidates do not make enough clear points to access all the marks in multi-mark questions. The exception to this was in question 2, where it was common to see high marks scored across the longer answer questions. This is an important skill for the 'Ideas in Context' papers and candidates would do well to practise answering longer answer questions to ensure that they structure their answers to access every mark.

Comments on Individual Questions

1 (a) Part (i) was a straightforward introduction to the paper and most candidates gained a mark for a statement that 'the higher the concentration, the faster the rate of reaction'. Those who failed to score did so because they did not link concentration with rate. 'The rate increases' did not answer the question because the question only identified a *change* in concentration. Candidates needed to identify a *direction* of that change to score.
In part (ii), few candidates could discuss collision theory in a precise enough manner to score. The mark scheme demanded that candidates discuss the *frequency* of collisions and the *closeness* of the particles. Answers such as 'more collisions' were not given credit.
Candidates found part (iii) of this question surprisingly difficult. Many gave low level responses such as 'to make a fair test'. Less than half correctly stated that temperature affects reaction rate and so must be controlled.

(b) Most candidates named calcium carbonate in the equation, but fewer knew that carbon dioxide and water were the other products. Very few gave the correct formula for hydrochloric acid.

(c) The general equation for neutralisation was not well known. Some candidates gained a mark for stating that water was produced, but many talked about oxygen and hydrogen as reactants. Very few correctly named the hydrogen and hydroxide ions.

(d) Most candidates gained an easy mark for finding the formula for sodium hydrogencarbonate in the pre-release material, but very few knew, or could deduce, the formula and charge for a carbonate ion.

(e) This question was a direct interpretation of the pre-release material. Those candidates who had read and studied the material gained an easy two marks here, but it was clear that many candidates did not make the link with the pre-release material and tried to answer using their own ideas. Answers such as 'calcium carbonate does not neutralise acids' were common.

2 (a) In part (i), most candidates gained at least two marks. This was very pleasing to see in a three mark question. The Quality of Written Communication mark was awarded for the correct spelling and use of scientific terms. Clearly, a reference to the pre-release material helps here, and almost all candidates included relevant terms and managed to spell them correctly. The description of diffusion was also well done, although some candidates confused the direction of the concentration gradient and it was common to see answers that referred to just 'urea' moving rather than 'particles' moving.
In part (ii), the key idea here was that selectivity depends on particle size. Candidates who realised this gained marks, but answers that stated merely 'allows some substances through but not others' did not gain any credit.
Part (iii) was intended to differentiate at A grade, and most candidates found the reasoning very difficult and did not score.

(b) The pre-release material gave the population of the UK in words (60 million). Many candidates could not convert this into figures to use in their calculation (60 000 000). The second most common error was to divide 60 000 000 by 5000 rather than the other way around.

(c) This question was about balanced water levels in cells. Most candidates missed the importance of the word 'cells' in the question, and talked in general about the importance of control of water in the body, e.g. 'you would dehydrate'. Better answers discussed cell function and cell concentration or the effects on cells of an imbalance of water, e.g. bursting.

(d) The effects of drinking alcohol on urine production were very well known. Many candidates gained two of the available three marks for discussing the effect of alcohol on urine concentration and volume and output of ADH.

(e) This question was a good indicator of candidates who had prepared the pre-release material properly. Many 'word perfect' definitions of homeostasis were seen.

3 This question proved to be the most demanding of the three questions for candidates. Most parts of the question showed less than half the candidates scoring full marks.

(a) Candidates struggled to draw longitudinal waves or to discriminate between transverse and longitudinal waves by explanation. Most picked up one or two marks from their drawing or description of a transverse wave.

(b) Most candidates knew at least one difference between electromagnetic and sound waves. A relatively common incorrect answer was that 'you can see one and hear the other'.

(c) Few candidates scored two marks for differences between colours of light. A very common incorrect answer was that 'they have different speeds'. Some candidates gave excellent responses that discussed the relative frequencies or wavelengths of the colours of light.

(d) Intensity in terms of photons was not well known; very few candidates gained both marks for discussing both the distribution and the energy of the photons in the light beam.

(e) Almost half the candidates gained all three marks here. One common error was to write the correct method but fail to process the numbers to reach the correct answer. Many candidates did not know the unit of frequency.

(f) Most candidates knew that the wavelength changes, but most stated that the frequency also changes when light is refracted.

A219, A220, A229, A230, A329, A330, A339, A340 – Skills Assessment

Specification	Unit Code	Skills Assessment
Science A	A219/01	Practical Data Analysis and Case Study
Additional Science A	A220/01	Practical Investigation
Biology A	Either A229/01	Practical Data Analysis and Case Study
	or A230/01	Practical Investigation
Chemistry A	Either A329/01	Practical Data Analysis and Case Study
	or A330/01	Practical Investigation
Physics A	Either A339/01	Practical Data Analysis and Case Study
	or A340/01	Practical Investigation

Introduction

The scale of the moderation operation continued to be very large this year with 1000 different Centres submitting work for more than 225 000 candidate entries across all specifications. It appears from discussions with people attending INSET that the Principal Moderator's Report for 2008 has not always been seen and read. This report will still be available online at www.ocr.org.uk and some of the comments and guidance have been repeated again in this report. The Skills Assessment component of each of the above specifications is weighted at 33%. With this in mind it did appear on occasions that Centres were not always giving sufficient time for their candidates to develop the necessary skills, knowledge and understanding of Ideas about Science to show what they could do under assessment conditions.

Structure of the Report

Vertical black lines in the margin throughout this report highlight important areas of concern, advice and guidance by the moderating team.

This report is divided into the following sections:

- Administrative Aspects
  - General Comments
  - Type and Context of Work appropriate for the Separate Sciences
  - Practical Work
  - Supervision and Management of Coursework
  - Assessment and Marking Framework
  - Marking Strands B and C in Case Studies
  - Marking Strands I and P in Data Analyses and Investigations
  - OCR Cover Sheet for Candidates' Work
- Data Analyses
- Case Studies
- Practical Investigations
- Final Comments

Administrative Aspects

General Comments

Communication between moderator and Centre is a very important part of the moderation process. This year, moderators sent an early introductory letter to Centres to establish an e-mail contact between the person responsible for the coursework sample and the moderator. A simple checklist was also provided to help Centres ensure that everything that was needed was included in the coursework package. These extra measures helped to improve the efficiency and effectiveness of the whole process for those Centres who responded appropriately. However, there were still a significant number of Centres who did not send the mark lists and the samples promptly, therefore slowing up the moderation procedure.

The best Centres followed this checklist but too many Centres still did not include any supporting material that had been given to candidates. In particular, details of how each of the tasks used for assessment had been introduced and presented to candidates were often not provided. This lack of information did, on occasions, have a significant effect on the marks that moderators could support, leading to mark adjustments in some cases.

A significant minority of Centres did not appear to give enough care and attention to administrative aspects to ensure that their candidates received the correct total marks and for the moderation to proceed smoothly. This caused numerous problems for the moderating team given the short timescale for the completion of the moderation process. For example, transcription errors, mark changes after internal moderation not being carried forward to the MS1 sheets, misunderstanding of how to calculate the Strand mark, poor annotation showing where the marks were awarded, and provision of little information about internal moderation procedures. Too often there was little or no indication of how marks had been awarded. The minimum notation acceptable is to use the assessment criteria codes, e.g. I(b)6, at the appropriate point in candidates' work. For Case Studies, the better Centres provided further commentary. Suitable annotation makes it more likely that the moderator will be able to support the mark awarded. Effective internal moderation ensures that candidates are placed in the appropriate order of merit. If the order is felt to be unsound because marking is erratic, the Centre may be required to re-mark all of the work.

Type and Context of Work appropriate for the Separate Sciences

Following guidance from the Joint Council for Qualifications (JCQ), coursework can be submitted for as many specifications as it is valid for. This means that it has to match both type (e.g. Data Analysis and Case Study or Practical Investigation) and context (i.e. Biology, Chemistry or Physics) as appropriate for the specification concerned. A 'Notice to Centres' was sent to all Centres in January 2008 and again in November 2008 explaining these requirements. It was disappointing that a number of Centres did not meet these requirements and alternative coursework had to be requested. If there was none available then a downward adjustment to the marks was applied. If the same piece of coursework is submitted for more than one specification then it must be photocopied and put into the appropriate coursework sample package to the moderator. Many Centres did not help the moderation process work efficiently in this way.

Practical Work

The Data Analysis and Investigation must involve candidates having personal first hand experience of collecting data in a practical experiment. Computer simulations or sole use of teacher demonstrations are not acceptable substitutes. **Coursework which does not fulfil this requirement cannot be submitted for assessment**.

In the Investigation, marks awarded for Strategy (S) and Collecting Evidence (C) Strands must be based on an individual's contribution and not on a shared approach or shared class data or data from other secondary sources. Those few Centres who did not follow these requirements put the marks of their candidates at severe risk.

In the Data Analysis, an individuals' data can be supplemented with additional data from secondary sources to enable assessment of Strands I and E.

Supervision and Administration of Coursework
There was evidence that some coursework from a minority of Centres had been reviewed and annotated by teachers giving candidates specific guidance about how to improve their marks. This is not acceptable practice. The Joint Council for Qualifications (JCQ) have published appropriate guidelines which are available in all schools

www.jcq.org.uk/attachments/published/315/ICE%20Coursework%202007%20FINAL.pdf

The following quotes are from this document:

"Teachers may review coursework before it is handed in for final assessment. Provided that advice remains at the general level, enabling the candidate to take the initiative in making amendments, there is no need to record this advice as assistance or to deduct marks. Generally one review would be expected to be sufficient to enable candidates to understand the demands of the assessment criteria."

"Having reviewed the candidate's coursework it is not acceptable for teachers to give, either to individual candidates or to groups, detailed advice and suggestions as to how the work may be improved in order to meet the assessment criteria. Examples of unacceptable assistance include detailed indication of errors or omissions, advice on specific improvements needed to meet the criteria, the provision of outlines, paragraph or section headings, or writing frames specific to the coursework task(s)."

"Once work is submitted for final assessment it may not be revised: in no circumstances are 'fair copies' of marked work allowed".

Those Centres who used detailed writing frames, whilst helpful for lower achieving candidates, appeared to restrict the opportunities for those higher achieving candidates.

Assessment and Marking Framework
The assessment framework is the same whether marking the Data Analysis, Case Study or Investigation. Skill areas are divided into Strands; within each Strand there are either two or three Aspects of performance represented as rows in the coursework cover sheet. Each Aspect of performance should be considered in turn, comparing the piece of work first against the lowest performance description, then each subsequent higher one in a **hierarchical** manner until the work no longer matches the performance description. Where performance significantly exceeds that required by one description, but does not sufficiently match the next higher one, the intermediate whole number mark should be given if available. Thus, the level of performance in each Aspect is decided.

For example in Strand E

Strand E				
Aspect of performance	**Marks**			
	2	**4**	**6**	**8**
(a) evaluation of procedures	Performance descriptions			
(b) reliability of evidence				
(c) reliability of conclusion				

There was a tendency for some Centres to award marks on the basis of candidates matching one high level performance description without ensuring that the underpinning descriptions had also been matched. A few Centres just counted the highest match for any Aspect to arrive at the

strand mark. Intermediate Aspect marks of 1, 3, 5 and 7 are awarded where performance exceeds that required by one statement, but does not adequately match that required by the next. Where it is not possible to support marks in a particular Aspect, a mark of zero must be awarded.

The Strand mark is determined by averaging the Aspect marks (including any zeros) and rounding to the nearest integer. A number of Centres are still not following this procedure and are being required to re-mark all their candidates' work.

E.g.

Marks for the three aspects in a strand	Formula to be applied	Mark to be awarded for the strand
(a) = 4, (b) = 4, (c) = 3	[(a)+(b)+(c)] / 3	= 3.66 round up = 4
(a) = 3, (b) = 4, (c) = 3	[(a)+(b)+(c)] / 3	= 3.33 round down = 3
(a) = 4, (b) = 3, (c) = 1	[(a)+(b)+(c)] / 3	= 2.66 round up = 3
(a) = 3, (b) = 3, (c) = 0	[(a)+(b)+(c)] / 3	= 2.0 = 2
(a) = 2, (b) = 3, (c) = 0	[(a)+(b)+(c)] / 3	=1.66 round up = 2

This approach provides a balanced consideration of each aspect of performance involved in each Strand and allows the marker to build up a profile of strengths and weaknesses in the work. Comparison of teacher and moderator judgements in each Aspect allows easy identification of where a Centre marks too severely, too leniently or where marking is inconsistent. This allows moderators to make far more constructive reports back to Centres.

Marking Strands B and C in Case Studies

There are only two Aspects in Strands B and C in the Case Studies and, in some cases, a professional judgement has to be made when arriving at the Strand mark, for example if 4 marks are awarded for B(a) and 3 marks for B(b). From experience in these cases, it is often best to consider both Strands B and C together when arriving at the final Strand mark for each. For example, if B(a) = 4, B(b) = 3 and C(a) = 4, C(b) = 3 are awarded, then it would be appropriate to award B = 4 by rounding up and C= 3 by rounding down (or vice vers(a) for a total of 7 marks for these two Strands taken together.

Marking strands I and P in Data Analyses and Investigations

In a few instances, dotted lines on the assessment scheme are used to indicate alternative ways of obtaining credit and a number of Centres, although fewer than last year, did not seem to appreciate what to do in these circumstances. Aspect (a) of Strand I and Aspect (b) of Strand P are sub-divided in this way. This has been done to allow increased flexibility, so that the scheme can be applied to a wider variety of different types of activity.

Strand I Aspect (a) involves awarding credit for processing the data which has been collected to display any patterns. This may be done either graphically or by numerical processing, whichever is most appropriate in a particular Data Analysis or Investigation. If there is some evidence for both approaches, then both should be marked and **the better of the two is counted but not both marks**. Some Centres counted both marks which produced an incorrect aggregate for the Strand.

E.g.

Strand	Aspect of performance	0	1	2	3	4	5	6	7	8	Strand mark
I	Graphical processing of data **or** Numerical processing data								✓		6
	Summary of evidence							✓			
	Explanations suggested							✓			

Strand P Aspect (b)

Strand P in Investigations is made up of three Aspects:

P(a) describing the work planned and carried out
P(b) recording of data
P(c) general quality of communication.

Aspect (b) is sub-divided into three sections to cover a variety of types of investigation.

	2	4	6	8
P(b)	Major experimental parameters are not recorded. Some data may be missing.	Most relevant data is recorded, but where repeats have been used, average values rather than raw data may be recorded.	All raw data, including repeat values, are recorded.	All relevant parameters and raw data including repeat values are recorded to an appropriate degree of accuracy.
	Labelling of tables is inadequate. Most units are absent or incorrect.	Labelling is unclear or incomplete. Some units may be absent or incorrect.	All quantities are identified, but some units may be omitted.	A substantial body of information is correctly recorded to an appropriate level of accuracy in well-organised ways.
	Observations are incomplete or sketchily recorded.	Recording of observations is adequate but lacks detail.	Observations are adequate and clearly recorded.	Observations are thorough and recorded in full detail.

The first row is concerned with recording quantitative data (e.g. times, voltages, volumes). The second row deals with the use of conventions and rules for showing units or for labelling in tables etc. The third row deals with the recording of qualitative data (e.g. colours, smells). Most investigations are of a quantitative nature and will provide evidence for the first and second rows. In these cases, the Aspect mark will be determined by averaging the mark in these two rows only, ignoring the third row completely. For those rare investigations which include qualitative evidence but no quantitative evidence, the mark for Aspect b should be based on the average of the second and third rows only. Where averaging results in half marks, professional judgement should be used to determine the best fit mark of the two alternatives. Once the mark for Aspect (b) has been decided, it can be combined with the marks for (a) and (c) to provide the average and so the best fit mark for the Strand.

For example, in an Investigation providing **quantitative** evidence

Aspect of performance			**Strand P mark**
P(a)	7	7	**6**
P(b)	(i) 6 (ii) 4 (iii) n/a	5	
P(c)	7	7	

Sub-dividing Aspect (b) in this way allows flexibility in marking the recording of data without allowing Aspect (b) to dominate the mark for the whole strand.

All marks are recorded on the OCR cover sheet which is attached to candidates' work. A number of Centres did not use the latest format of the OCR cover sheet or in a very few cases did not use a cover sheet at all. An example is shown below:

GCSE

Additional Science A

OCR GCSE J631 Twenty First Century Science Unit A220

Coursework Cover Sheet for Investigation

Centre No:		Centre Name:	
Candidate No:		Candidate Name:	

Put ticks in the boxes (one per row) to indicate the mark matched by the candidate's work for each aspect of performance. Record the mark awarded for each Strand and the final total mark. The remaining columns should be left blank.

	Title (as shown on work): Rate of reaction thiosulfate and acid												
Strand	**Aspect**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Strand Mark**	**Leave these columns blank for the moderator**	
												Mod	**T/L**	**Moderator comment**
S	**a**								✓		**6**			
	b							✓						
	c						✓							
C	**a**								✓		**7**			
	b								✓					
	c									✓				
I	**a**									✓	**5**			
	b					✓								
	c					✓								
E	**a**						✓				**4**			
	b							✓						
	c	✓												
P	**a**							✓			**6**			
	b	n/a							✓					
	c							✓						
Total mark for the Investigation											**28**			***A completed copy of this form must be attached to the work of each candidate in the sample requested by the moderator.***
Mark difference (Moderator Total – Centre Total)														

Data Analysis

General Comments

The Data Analysis task provides the opportunity to assess candidates' understanding of Ideas about Science, particularly IaS 1, 2, and 3. Those candidates who understood and used the language and concepts related to IaS, such as 'correlation and cause', 'outliers', 'reliability', 'accuracy', 'best estimate', and 'real difference' found it easier to match the performance descriptions of the criteria and so gain higher marks.

The majority of Centres clearly understood that in the Data Analysis task **candidates must have personal firsthand experience of collecting data by performing a practical experiment.** The data that candidates collect can be supplemented by further data from, for example, incorporating a class set of results. Work which is based purely on teacher demonstrations, computer simulations, given sets of results etc. is not acceptable. Many Centres used whole class practical activities as a basis for Data Analysis exercises and this clearly worked well. Therefore it is very important that Centres include details of how the task was presented to their candidates, e.g. briefing sheets etc. The higher attaining candidates included a description of their experimental method, their own results table and the class data set which made the marks awarded for evaluation easier to support. It is most important that candidates record and present the data that they have collected and not just plot a graph or do numerical calculations without any reference to the original data.

The same Strand I and E assessment criteria are used in Investigations and the same marks for I and E from Investigations can be submitted for Data Analysis in another specification providing that the context is appropriate. If this is the case, Centres are required to indicate this on the appropriate coversheet and also include copies of the work in both samples which are sent to the moderator, if the same candidate is selected. Many Centres used this opportunity to obtain the best marks for their candidates.

Data Analysis Tasks

There was a continuing variety of Data Analysis tasks seen by moderators which was very encouraging. These included:

monitoring pollution;	pulse rates and exercise;
osmosis;	enzyme studies;
stopping distances of bicycles;	breaking strength of hair;
stretching materials under load;	impact strength of plastic bags;
comparing thermal insulators;	resistance of a wire;
viscosity experiments;	voltage of different batteries;
rates of reaction;	objects rolling down slopes

Centres are encouraged to be innovative but must consider the science that might be required to explain any conclusion drawn by the candidates. As in all assessments of this type, Centres should match the task to the ability and expectations of the candidates involved.

Strand I: Interpreting Data

I(a): Most candidates analysed their data using bar charts or graphs to illustrate and process the data that they had collected, rather than carry out a numerical analysis. Centres must recognise that to award 7 or 8 marks, an indication of the spread of data must be shown **in addition** to the requirements for 6 marks. Candidates generally either plotted the averages with the appropriate range bars, or plotted all their raw data with a suitable key.

The following guidelines might help to clarify the assessment of Aspect (a) but it is not intended to be comprehensive and to cover all eventualities.

- I(a) 4 simple charts, bar charts
- I(a) 5 a dot-to-dot graph, or axes not labelled, or incorrectly plotted point(s), or poor quality line of best fit

- I(a) 6 graph with a line of best fit, correctly plotted points, correctly labelled and scaled axes.
- I(a) 7/8 accurately plotted graph including a line of best fit and evidence of awareness of uncertainty in data, e.g. range bars or scatter graphs.

It was pleasing to see that the majority of candidates repeated their measurements and included range bars on their graphs. However, in many cases graphical work was not of suitable quality for the marks awarded. For example, poor care in general presentation, incorrectly labelled or scaled axes, incorrectly plotted points and poor accuracy of the best fit line. Some candidates included range bars when plotting bar charts and were wrongly awarded 8 marks. At best, this approach might merit 5 marks. The same standards apply when marking computer-generated graphs, e.g. they must be correctly sized and scaled with appropriately sized plotting points. It is generally better for candidates to hand draw their own line of best fit.

Centres are reminded that only one single mark must be used for I(a), either that for graphical or that for numerical work (not both), when determining the overall Strand I mark. Further information about the award of marks for numerical approaches is contained in the 2008 Report.

I(b): The match to I(b)4, 'identifying trends or general correlations in the data', was well appreciated and most candidates could summarise the patterns in their data with a suitable qualitative statement. However, candidates were often given 6 marks with little evidence to support this award. Many candidates referred to 'positive correlation' (this only merits 4 marks) when they should have said 'Y is directly proportional to X'. Candidates should describe a quantitative relationship to ensure a secure match with I(b)6. For example, using and quoting the data to show, 'as the concentration is doubled the rate doubles', 'double the length of wire double the resistance', or the candidate calculates slopes/gradients and then states some formal or quantitative relationship between them and the variable studied. In some experiments this might not be so easy because relationships are changing. For example, in a study of the effect of temperature on the enzyme-catalysed decomposition of hydrogen peroxide, candidates might record the amount of oxygen produced at different temperatures in a given time, convert the data into rates and make appropriate comparisons before and after the optimum temperature.

Very few candidates matched the requirements for I(b)8. Candidates should review any limitations to their conclusions by considering such things as the scatter in the data, overlapping range bars between data points, 'real differences' and values of the best estimate and whether the best fit line can be accurately defined. Candidates who have derived a quantitative relationship should consider what effect the position of the best fit line might have if the scatter in the data is taken into account.

I(c): Many candidates introduced their experiment by describing all aspects of the background theory even if it was not all relevant to the particular experiment they were doing. Candidates are better served if they connect their conclusion directly with their scientific explanation. Most candidates could secure a match to I(c)4 by explaining their conclusion using scientific ideas. However, there was some very generous marking when matching to I(c)6 and I(c)8 in terms of the detail and quality of the scientific knowledge and understanding shown. In general terms, 5/6 marks would be expected to be awarded to an explanation at about the grade C standard and that at 7/8 marks of the grade A standard. Those candidates who used diagrams to supplement their explanation found it easier to access the higher marks.

Strand E: Evaluation

An essential feature of this course is to encourage candidates to consider the accuracy and reliability of the data that they collect. However, the majority of candidates only achieved between 3 or 5 marks for this Strand. Those candidates who used the appropriate IaS vocabulary and the knowledge and understanding of IaS 1 invariably achieved higher marks. Those candidates who used sub-headings such as 'Evaluation of Procedures', 'Evaluation of

Data' and 'Confidence Level of Conclusion' were more likely to focus on each area in turn and be more successful in their overall evaluation.

E(a): Candidates are expected to comment on any limitations or problems in their procedures that they encountered during their practical work and to describe improvements or alternative ways to collect their data. In many cases, comments were limited to human error rather than systemic experimental ones. The E(a)4 performance description is really the 'gatekeeper' to access the higher marks. Many candidates suggested possible improvements although they were not always of sufficient quality to be creditworthy, e.g. 'do it with a computer', 'repeat my measurements more times' and 'be more careful next time I do the experiment', without any justification or explanation. References to such things as better temperature control using a thermostat-controlled water bath in a rates experiment, or including a variable resistor in the circuit to keep the current constant in an electrolysis experiment, were more suitable and creditable suggestions.

E(b): Some candidates mentioned outliers without any direct reference to what particular result they were referring to. However, the majority of candidates generally identified a data point as an outlier either in the table of results or on the graph, although it was not always clear why a candidate had selected a particular result as an outlier. More candidates this year considered the range in their repeat measurements to give an estimate of reliability but few considered the general pattern in their results and closeness of their data to the best fit line, for example, as a basis for assessing accuracy. Candidates' attempts to explain anomalous results were often generously marked and it is important to mark the **quality** of what has been written and not the fact that just **something** has been written.

Higher attaining candidates made a decision about whether unexplained outliers should be included in the data and in ranges of repeat readings by simple numerical calculations. Some candidates used simple statistics such as variations of the Q test procedure to try and be more objective when rejecting suspect observations and relating to confidence levels.

E(c): Marks were often rather generously awarded and this aspect was poorly addressed by many candidates, although there was perhaps a slight improvement on last year. Candidates often just discussed the reliability of their data without really linking it to their conclusion and saying whether the uncertainty in their data is sufficient to have any significant effect on the conclusion that they have made.
For the award of 6 marks, candidates should bring together a discussion of the accuracy and reliability of their data and the precision of the apparatus they have used to establish a level of confidence in their conclusion. Further support for this can come from awareness in I(b) about the limitations in the conclusion. In addition for 8 marks, weaknesses in the data should be identified (e.g. a limited range or not enough readings at certain values, or degree of scatter too large or variable) and suggestions made indicating what further data could be collected to make the conclusions more secure for the particular variable under investigation. Some candidates used other data from secondary sources to support (or challenge) their conclusion.

Case Studies

General Comments
The purpose of the Case Study is to encourage candidates to use their knowledge and understanding of the Ideas about Science, particularly IaS 4, 5 and 6, to make judgements when presented with controversial issues which have claims and opinions for both sides of the case. There is still a great deal of evidence that many candidates are not being taught to use these skills when approaching their Case Studies. Where candidates were able to use the language and concepts related to IaS, such as 'peer review', 'replication of evidence', 'correlation and cause' 'reasons why scientists disagree', 'precautionary principle', 'ALARA', 'risks and benefits', 'technical feasibility and values', they found it much easier to match the performance descriptions of the criteria and so gain higher marks.

Case Studies are always best formulated in terms of a question to provide a focus in an area of controversy. For example, 'is nuclear power the fuel of the future?' rather than just 'nuclear power'. A question will encourage candidates to look for different opinions and views, and to consider the evidence base for the various claims and the reliability of sources of information that are used. There were many examples of candidates presenting a report describing a topic which was not controversial, or at least was not phrased in such a way that there were two sides to consider and compare. For example, what was apparently a debate regarding whether the use of nuclear power should be expanded sometimes resulted in a simple review of methods of alternative energy generation. This severely limited the number of marks available. The Case Study is a critical analysis of a controversial issue firmly embedded in a scientific context so that candidates can use their scientific knowledge and understanding and their understanding of IaS to produce a balanced account.

Many Centres provided a short list of Case Study titles for their candidates to choose from, thus allowing them to select one which is the most appealing on an individual basis. Some more unusual and inappropriate titles were also seen, e.g. 'do ghosts exist?, 'is it ethical to clone cyborgs?' and 'should football goal mouths have video cameras?'. Teachers must closely monitor their candidates' choice to ensure that it is appropriate and firmly embedded in a scientific context. This was often not the case for some of the lower achieving candidates in particular. Surprisingly, many candidates did not make full use of the relevant information and material in textbooks, often preferring to use material from the internet only.

Some examples of Case Study titles included this year included:

Aspects of diet e.g. Is obesity inherited?
Food additives – are they good or bad?
Should GM crops be allowed?
Should human cloning be allowed?
Are mobile phones bad for your health?
Is nuclear power the answer to our energy needs?
Should we spend more on developing alternative energy resources?
Is the MMR jab safe?
Is global warming natural or man-made?
Could life exist on other planets?
Does motor traffic cause asthma?
Should animal testing be allowed?
What killed the dinosaurs?

Assessment

In general, candidates continued to perform better in Strands A and D compared to B and C. Higher achieving candidates described the relevant science needed to understand their chosen topics and produced high quality, clearly structured, well resourced and illustrated reports involving critical analysis and individual thought with considerable personal input. It was this latter aspect of personal analysis and evaluation which often differentiated candidates in terms of level of performance. Lower achieving candidates relied too heavily on copying and pasting information from sources without the appropriate level of individual analysis and evaluation. Those reports, which were often presented simply as PowerPoint printouts, almost always lacked sufficient detail to access the higher marks.

It would be most helpful for moderation if more annotation or commentary was provided for each candidate in the sample selected so that the moderator could more easily identify the evidence to support the Centre's marks. In many cases, only the final mark awarded was recorded.

Strand A: Quality of Selection and Use of Information

There was some evidence of improvement in the marks awarded for this Strand compared to last year.

A(a): Candidates must use sources of information to provide sufficient evidence for **both sides** of their Case Study. They must select relevant extracts to quote directly and then, in their own words, explain what its relevance and importance is to the developing arguments in the report. If no sources are credited then a maximum of 1 mark will be allowed by moderators, unless annotation confirms that a suitable range of sources were used. Higher marks require that sources represent a variety of different views or opinions, but there is not a 'magic number' of sources which distinguishes 3 marks from 2; relevance and quality is more important than quantity. Many candidates who were awarded 4 marks often made reference to reliability but did not explain why they thought their sources were reliable. There were far too many references just to the 'BBC or Wikipedia so it must be reliable'. Those candidates who used the language and ideas from IaS 4, e.g. ideas about peer review, the nature of the source or the status of the author, invariably achieved higher marks.

A(b): The majority of candidates included a bibliography of sources at the end of their reports. Candidates who identified their sources using incomplete references, e.g. website homepages such as www.bbc.co.uk, could be awarded 2 marks. If only one or two incomplete references were given then one mark could be awarded and, of course, if no references were given then zero marks were appropriate. For 3 marks, candidates should include complete references to the exact url address of the webpage and, when referencing books, the title, author and page references should be provided. For 4 marks, it is expected that candidates include some information about the nature, purpose or sponsorship of the site.

A(c): Candidates were still not very good at clearly showing where sections of text were directly quoted. The fact that this acknowledgement is missing does amount to malpractice. Quoting from the JCQ document, 'candidates must not include work copied directly from books, the internet or other sources without acknowledgement or attribution'. Use of quotation marks, use of a different font, or colour highlighting were some of the methods used by the higher attaining candidates for this purpose. The higher attaining candidates also included references or specific links within the text to show the source of particular information or opinions by using, for example, numerical superscripts linking to references in the bibliography. Credit is given, not so much for the quotation, as for the editorial comment to explain why it was chosen, and how the candidate thinks it contributes to the arguments being compared in the study.

Failure to discuss reliability of the sources, failure to fully indicate and reference quotations and failure to indicate the relevance of the quotations selected in the study prevented many candidates from being awarded 4 marks in this Strand.

Strand B: Quality of Understanding of the Case

B(a): This aspect assesses candidates' ability to describe and explain the underlying relevant science and to recognise and evaluate the scientific evidence on which any claims are based (IaS 1, 2 and 3). The majority of candidates in the introduction to their Case Studies described the relevant background science. However, it was only the most able who could either link their scientific knowledge and understanding to the claims and opinions reported in their studies or extend the scientific knowledge base to more advanced concepts. Reporting was too often still at the 'headline level', simply repeating claims without looking behind the headline for the underlying science. From an assessment point of view it is useful to look at the appropriate pages in supporting textbooks, including the specifications, about Science Explanations and Ideas about Science, to give an indication as to what to expect before marking candidates' work. The most successful Case Studies are usually closely related to topics in the course and it can be taken as a general guide that 6 marks requires all of the relevant science covered in the specification. The 7^{th} and 8^{th} marks will come either for applying and integrating this correctly to the case, or for finding and explaining some additional science related to their Case Study.

B(b): This Aspect focuses on candidates' ability to recognise and evaluate the scientific evidence that any claims and opinions are based on. Most candidates were able to recognise and extract relevant scientific content and data in their sources and were awarded 4 marks.

Candidates who were awarded 6 marks referred to the evidence base of the various claims and opinions, e.g. an experiment, a collection and review of existing data, a computer simulation etc. Candidates obtaining 7 or 8 marks looked more critically at the quality of the evidence. They used terms like 'reliability' and 'accuracy' when considering data, they looked at the design of experiments and the issue of sample size and they also compared the reliability of data between sources.

Strand C: Quality of Conclusions

Where Strand A allows credit for finding information and Strand B for describing the relevant science and the evidence base, Strand C awards credit for candidates who provide individual input comparing and evaluating the evidence, considering its significance, importance and reliability and using their own judgement to arrive at a suitable conclusion on a controversial issue. There was evidence that many candidates were not using and applying their Ideas about Science, particularly IaS 5, sufficiently to warrant the higher marks in this strand.

Most candidates could sort the information that they had gathered into views 'for and against' and were awarded 4 marks. Higher attaining candidates started to compare similar aspects in both their 'for and against' list and were awarded 6 marks. The best candidates began to analyse, compare and evaluate the claims and opinions, describing their own viewpoint or position in relation to the original question and justifying this by reference to the sources and to the evidence that the claims were based on. Far too often the conclusion was limited and too brief. Alternative conclusions should be considered where appropriate and recommendations for action in the future should also be included.

Several candidates scored less marks than they were probably capable of, particularly in Strand C, because they simply chose to report information about their topic, without any real analysis of the scientific evidence and incorporation of personal decision making.

Strand D: Quality of Presentation

D(a): The majority of reports included headings and/or sub-headings (2 marks) to provide the necessary structure. There was a definite improvement in this Aspect and the higher attaining candidates included a table of contents and numbered the pages in their report (3 marks) to help guide readers quickly to particular sections. Those candidates who, in addition, presented a report which had a coherent, logical and consistent style were awarded 4 marks.

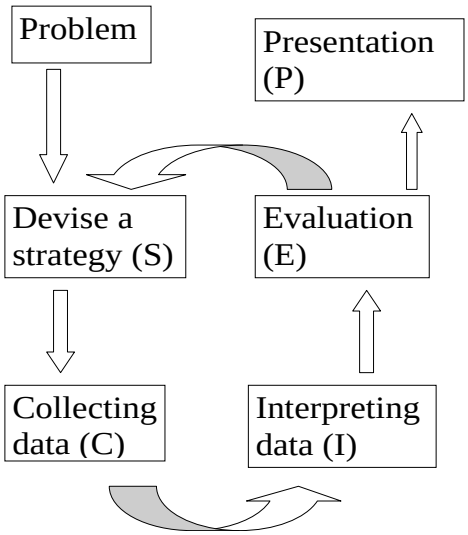
D(b): This aspect assesses candidates' ability to include suitable diagrams and graphics to clarify difficult scientific ideas and improve effective communication. However, too often the images were decorative rather than informative. If there are no decorative or informative images included, then zero marks is awarded. If one image is included, a decorative front cover or other low level attempt to add interest then 1 mark is appropriate. Two marks would be awarded for the inclusion of decorative images only or perhaps for the minimal use of informative images. Three marks would be given for including a variety of informative illustration, e.g. charts, tables, graphs, or schematic diagrams and 4 marks if this is fully integrated into the text, referred to and used. Too often downloaded images from the internet were not clear, too small and not referred to in the text.

D(c): The assessment of the use of scientific terminology and the level of spelling, punctuation and grammar was generally very fairly assessed by Centres.

Practical Investigations

There was more evidence this year that Centres were beginning to move away from the Sc1 approach to Investigations and develop a more open ended exploratory approach. The importance of candidates doing preliminary work was clearly being recognised and encouraged. However, information from Centres about how each investigation was introduced to candidates was very rarely provided in sufficient detail. This meant that moderators could not support some of the marks awarded leading to adjustments, particularly in Strands S and C.

A number of candidates, however, still followed the Sc1 Sc1 approach and used scientific knowledge to make predictions about the outcome of the investigation. The Twenty First Century Science model aims to give credit to candidates who process their results, look for patterns and then suggest explanations using their scientific knowledge and understanding. Very often candidates did not link their conclusions with their scientific explanations. Detailed explanations using relevant scientific theory are best left until they are needed in Strand I.



From an assessment point of view the 'performance descriptions' should be used to reflect the quality and performance of candidates' work rather than a formal/legalistic interpretation of particular words and phrases.

Rates of reaction, resistance of a wire and osmosis were still the most common investigations seen from Centres. However, there was evidence that other topics were beginning to be developed by the more innovative Centres, for example, stretching of plastics and other materials, exercise and fitness routines, efficiency of wind turbines, objects rolling down slopes or ski jumps, electrolysis and electromagnets.

Strand S: Strategy

Centres were generally matching candidates' work correctly up to the 6 mark performance description but higher marks were being very generously awarded.

The intention is to encourage a more independent approach to investigations and the mark awarded for the aspect, S(c), should reflect the 'value added' by the candidate, beyond the initial teacher stimulus. To justify high marks in S(c), candidates should show independent thinking in reviewing factors which might affect the investigation. Where candidates succeed in designing their own investigation, high marks can be awarded. Where some additional guidance is necessary, this should be annotated on the candidate's script and reflected in a lower mark. High marks cannot be supported by moderators unless the Centre has provided details of how the task was presented to candidates (e.g. copies of briefing sheets etc.) or comparison of different scripts in the sample shows clearly that candidates had freedom of choice between different approaches and apparatus. In too many cases moderators noted that candidates had identical ranges and values of the same variables, e.g. in the osmosis and resistance of a wire investigations the whole class used exactly the same number and values of concentration of solution or lengths of wire, without any further discussion or justification indicating that limited individual decision making had occurred, yet high marks were still being awarded. This necessitated a downward adjustment to the marks for S(c) in a number of Centres. If, for example, candidates were shown how to change the concentration of a solution they could then make up their own values rather than use the stock solutions which were often provided. Where candidates had been given the opportunity to show autonomy they performed well across many of the Strands. Some Centres opened up the rates of reaction investigation by allowing candidates freedom of choice between, for example, magnesium and acid, marble chips and acid, thiosulfate and acid, and, for methodology, collecting gases or measuring mass loss.

The importance of preliminary work cannot be over emphasised in the introductory phase of an Investigation and the appropriate amount of time must be given to this aspect. It is important for candidates to record their preliminary data and to use it to inform and develop the main experiment. Often preliminary work appeared to provide just a limited extra set of results and did not shape the Investigation in any way. Sometimes preliminary work was done but it was clear that candidates had not really understood why they were doing it.

Many candidates provided a list of appropriate apparatus for their Investigations but had not linked it to their preliminary work or indicated why it had been selected in preference to alternative apparatus. Those candidates who exerted some choice over the apparatus they used were in a better position to achieve higher marks in S(b) and also when evaluating their procedures and methods in E(a). Some candidates provided very simplistic explanations and Centres are reminded that it is quality of thought and response that is being rewarded and not just the fact that something has been written. Many Centres had provided a fixed, limited set of apparatus for candidates to choose from and this did not allow candidates the flexibility to try various approaches to obtain the best quality data set.

The complexity of a task, S(a), represents an overall judgement about the way a candidate has approached the task. Therefore two candidates doing the same Investigation might approach it differently and therefore achieve different marks. Complexity depends on such things such as the familiarity of the activity and method, the ease of observation or measurement (single or multi-step), the nature of the factors which are varied, controlled or taken into account, the precision of the measurements made and the range, accuracy and reliability of the data collected. Too often 7 or 8 marks were awarded for straightforward approaches to the task

Strand C: Collecting Data

It was pleasing to see that the majority of candidates used suitable ranges of the appropriate variable to study and appreciated the need to repeat their measurements to obtain a wide range of data. However, a discussion of the factors to control was often rather limited and only by inspection of the results table could any evidence be found. Higher attaining candidates described in detail how the factors had been controlled and monitored during the experiment. Weaker candidates often stated factors such as pH, surface area, current or temperature were kept the same but failed to explain how this was actually achieved or monitored.

Preliminary work is essential because if done properly it can allow candidates' access to the higher marks of 7 or 8 in Aspects (b) and (c). There was more evidence this year that candidates were doing preliminary work to establish the range of values of the appropriate variable to be used. However, some candidates did perform preliminary work but did not use the results to explain how it informed their main method. Centres are reminded again that it is the quality of response and its relevance that is rewarded and not just that preliminary work has been done, so 'jumping through hoops' is not sufficient criteria for success. Too often, candidates did not consider their results as they were being collected so that obvious outliers were either ignored, or included without comment in calculating average values. It was very rare to see a test repeated to check and obtain a more reliable result (C(b)).

From inspection of results tables and graphical work it was pleasing to see that candidates were taking more care and data was generally of good quality. There was little evidence of candidates performing preliminary work which involved making decisions about the type of apparatus, equipment and method to choose, to ensure the collection of the most accurate and reliable data (C(c)).

Strands I and E

In general candidates achieved their poorest marks in these two strands. There was a great deal of evidence to show that candidates did not link their conclusions sufficiently with their scientific explanations in I(c). For more details, see the comments in the Data Analysis section.

Strand P: Presentation

This Strand was generally fairly and accurately marked by Centres. Spelling, punctuation and grammar were sound and the majority of candidates' reports were well structured and organised. However, experimental methods were rather briefly described and lacked sufficient detail. Diagrams of apparatus were not always included and although data was generally accurately recorded and presented in appropriate tabular form, units were occasionally incorrect or missing.

The method of arriving at the mark for P(b) was often variable; more details can be found in the administrative section of this report.

Final Comments

All members of the moderating team recognise the considerable effort needed by Centres in assessing and presenting candidates' work for moderation. We would like to record our thanks and appreciation for a good job, thoroughly well done. However, there was a general feeling that there was an increase in errors seen in the transcription of marks and more care is necessary in this important area. Attending cluster group meetings and OCR INSET meetings both in- and out-of house, using the OCR consultancy service for checking marked scripts, and consulting and using the teacher guidance booklets on www.ocr.org.uk are all available methods to improve the awareness and understanding of the assessment procedure. It is highly advisable that staff have time during the year for internal standardisation meetings to share and develop expertise in the Science Department.

Grade Thresholds

General Certificate of Secondary Education
Additional Science A (Specification Code J631)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A215/01	Raw	42	N/A	N/A	N/A	25	21	17	14	11	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A215/02	Raw	42	35	30	24	18	14	12	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A216/01	Raw	42	N/A	N/A	N/A	25	22	19	16	13	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A216/02	Raw	42	31	26	20	14	10	8	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A217/01	Raw	42	N/A	N/A	N/A	25	21	17	14	11	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A217/02	Raw	42	35	30	24	18	11	7	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A218/01	Raw	40	N/A	N/A	N/A	23	18	14	10	6	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A218/02	Raw	40	27	23	16	10	7	5	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A220	Raw	40	33	31	28	25	21	18	15	12	0
	UMS	100	90	80	70	60	50	40	30	20	0

A220 (Coursework) - The grade thresholds have been determined on the basis of the work that was presented for award in June 2009. The threshold marks will not necessarily be the same in subsequent awards.

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J631	300	270	240	210	180	150	120	90	60	0

The cumulative percentage of candidates awarded each grade was as follows:

	A*	A	B	C	D	E	F	G	U	Total No. of Cands
J631	5.6	18.8	43.7	73.9	90.6	97.0	99.3	99.9	100	66 391

66 565 candidates were entered for aggregation this series.

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553