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GCSE

Science A (Twenty First Century)

General Certificate of Secondary Education **J630**

Report on the Units

June 2009

J630/MS/R/09

Oxford Cambridge and RSA Examinations

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

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GCSE Science A (Twenty First Century) (J630)

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.

Most centres are now very familiar with the assessment structure of GCSE Science A and are clearly preparing their candidates very well. The general comments on this examination series are best divided into three sections:

- Objective-style papers, A211, A212 and A213
- 'Ideas in Context' papers, A214
- Skills Assessment, A219.

Objective-style papers (A211, A212 and A213)

Candidates should follow the instructions given as to how and where to answer the questions, even though any unambiguous indication of the correct answer always gains credit. Most candidates read question instructions carefully, but there were still a few who gave the incorrect number of answers even when that number was given. Candidates should be aware that the marking is done from scanned images of their scripts. A small number of candidates failed to score marks because it was not clear what their response was. Candidates should make alterations to answers as clear and unambiguous as possible. Additionally, many candidates failed to use a ruler to produce the straight lines required by the question; while this is not strictly necessary there is a danger candidates will not be credited if their answers are not clear. Lack of clarity can also be a problem if candidates have changed their minds and crossed ticks out or redrawn lines. Whilst examiners will try their best to understand the candidate's meaning, they should be made aware that if examiners cannot decide what the intended response is, no credit will be given.

In the three higher tier objective papers, A211/02, A212/02 and A213/02, the demand of some questions was increased by giving fewer marks on certain items, compared to similar items in previous examination series. This was in the light of evidence that higher tier candidates not only found some questions too straightforward, but were also completing them much more rapidly than had been assumed. As a consequence, for example, one question requiring the sequencing of four stages in a process might gain one mark, whereas on a foundation paper a similar task might attract 2 or 3 marks. In a similar way, choosing three appropriate words from a list to complete sentences was awarded one mark, not three.

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.

'Ideas in Context' papers (A214/01 and A214/02)

Candidates were generally very well prepared for this pair of examination papers, although some entered the higher tier paper to find the questions, which were based on the pre-release material, too demanding. For the foundation tier, questions frequently require little more than extracting the relevant information from a part of the pre-release material; for the higher tier, questions almost always require information from the pre-release material to be combined with candidates' own knowledge and understanding of science.

Concern has been expressed that the 'Ideas in Context' papers have given candidates too much to do in the available time. There was evidence that A214/02 proved too long for many candidates this year, although not to the degree of last summer's examination. Many of the candidates who had difficulty completing A214/02 were those who had difficulty with many of the questions; these candidates may have been more successful if entered for A214/01. However, the awarders did bear the time factor in mind when the UMS boundaries were decided, and the final grades on this paper, determined by the quality of the candidates' responses, were very much in line with those indicated by measures of prior achievement by the cohort.

Skills Assessment (A219)

The Principal Moderator's very detailed comments make it clear that many centres could benefit their candidates by certain changes in the way they allocate, supervise and assess the coursework tasks, and we strongly recommend that all science teachers at centres read these detailed comments carefully.

A211/01 – Twenty First Century Science A (B1, C1, P1) Foundation Tier

General Comments

The paper was well attempted and scored a good mean mark. Candidates are becoming more experienced at this style of paper and fewer are making basic errors such as ticking the wrong number of boxes or linking statements with more than 1 explanation etc.

Comments on Individual Questions

1 (a) Only the strongest candidates understood that for quadruplets to be identical there must be a single egg and a single sperm involved in the fertilisation. The most common distracter was 4 eggs fertilised by 4 sperm cells.

(b) Parts (i) and (ii) were not well answered other than by the higher attaining candidates. More candidates knew about the chromosomes. A good, but difficult, discriminator.

2 (a) Candidates were able to correctly identify the people holding the various viewpoints, although many chose James in part (ii).

(b) Many candidates thought that embryonic stem cells are specialised cells rather than unspecialised cells.

3 (a) Higher attaining candidates were able to identify that the statement claiming that Huntington's disorder only happens if both copies of the gene which code for the protein are defective, was not correct.

(b) Most candidates could correctly identify that a gene carries the instructions about how to make a protein but many reversed the explanations for the terms dominant and recessive.

(c) A very high proportion of candidates were able to correctly calculate that John had a 50% chance of inheriting Huntington's disease from his mother, with most being able to correctly complete the genetic diagram.

4 (a) Few candidates were unable to select the names of 2 crops from the list in the article. Some candidates were too vague with answers such as 'seeds' or 'trees' or 'plants'.

(b) A large number of candidates did not understand why biofuels are carbon neutral. A surprising number thought that they did not produce carbon dioxide when they are burned.

(c) The effect of increased production of biofuels on rainforest habitats was better understood than the effect on the amount of food grown. Lower attaining candidates often only made one choice here. Increasing air pollution was a common error.

(d) In part (i), most candidates were able to complete at least one of the sentences correctly. Some chose car instead of air as the source of the nitrogen and oxygen and others thought that the gases reacted in the car engine because it is dilute.
In part (ii), this question expected the candidates to be able to correctly show the atoms present in NO_2 and to understand that the total number of atoms would be the same

before and after the reaction. Candidates lost marks by not showing the atoms connected or by connecting more than 3 atoms into a nitrogen dioxide particle.

5 (a) Most candidates were able to successfully read the average nitrogen dioxide levels in 2000 from the graph. They found it much more difficult to extrapolate the graph with the low value of 35 being a common choice.

(b) A pleasingly high proportion of candidates were able to interpret the information from the graphs and correctly identify whether the statements were true or false. A significant number did not realise that both sets of data were taken over the same time period.

(c) Candidates showed a good understanding of ways to investigate the link between nitrogen dioxide pollution and asthma.

6 (a) An encouragingly high number of candidates were able to link the statements with the correct theory. Most obtained 3 marks with the higher attaining candidates obtaining 4 marks. The commonest error was that candidates thought that 'In the past all galaxies would have been closer together' agreed with neither theory.

(b) Many candidates struggled to correctly link the stages in accepting a scientific theory with the relevant development of the Big Bang theory. Quite a number achieved full marks but those who did not achieve 2 marks often got 0 by reversing the correct lines.

7 (a) In part (i), this question was well answered with the majority of candidates able to interpret and apply the data related to the magnitude of earthquakes from the table correctly.
Part (ii) proved too difficult for all but the most able candidates, with few understanding the cumulative nature of the data on frequency of noticeable earthquakes.

(b) In part (i), many candidates correctly spotted that the earthquakes were found where the tectonic plates meet. This could be the result of re-enforcement from candidates also taking Geography. Incorrect answers were equally spread between the two incorrect options.
In part (ii), almost all candidates gained at least one mark. The most common error was the linking of 'Educate all people about emergency procedures' with 'Trained staff go into action quickly'.

8 Although many candidates were able to place the statements about the formation of rocks in the correct order, a significant number had no idea, and just about every possible arrangement was seen. The most common error was to misplace the statement 'Clay, sand and mud are produced when mountains are worn down'.

A211/02 – Twenty First Century Science A (B1, C1, P1) Higher Tier

General Comments

The paper was well attempted and produced a satisfactory mark.
Candidates seem to have been well prepared for this objective style of questioning.

The level of difficulty was appropriate for the ability range and most questions were accessible to candidates across the ability range. The majority of candidates generally performed well and marks were awarded across a reasonable range, demonstrating satisfactory differentiation. Scores typically ranged from the low teens to the low thirties (out of 42 marks).

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.

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

Comments on Individual Questions

1 A minimum of 4 out of 6 correct (true/false) choices were needed for a candidate to score on part (a) of this question. Consequently, some weaker candidates failed to score here. In part (b) of the question, most candidates could successfully pick out the views opposing the creation of human-animal embryos, but were less sure about which were in favour or neutral.

2 This question was very well answered by the majority of candidates, although a significant number of lower ability candidates struggled to complete the genetic diagram in part (b). These candidates often did not differentiate between the upper and lower case letters correctly.

3 Part (a) of this question posed few problems to candidates. Part (b) required an open or free response. In (b) part:(i), most good candidates correctly identified 'Y' as the correct answer. Candidates who responded 'XY' were not credited with a mark. Part (b) (ii) proved very difficult for almost all candidates. The majority of candidates misinterpreted the question or did not respond. Common wrong responses were heart, lungs, brain etc.

4 Parts (a) and (b) were generally well answered. The most able candidates were able to draw suitable molecular diagrams to balance the equation in part (c). Lower attaining candidates often did not take care to ensure that the oxygen atoms did not touch each other in their carbon dioxide drawing, likewise for the hydrogen atoms in water.

5 This question was well answered by all but the lowest attaining candidates. Part (c) was rarely seen completely correct as most candidates did not get the first step (nitrogen and oxygen from the air react with each other). Many felt that the nitrogen came from the fuel instead of the air.

6 Part (a) was well answered by most candidates. Part (b) differentiated well on ability, with only the most able candidates scoring full marks.

7 This question was answered well overall. Part (a) (i) caused candidates some difficulty in interpreting the table. Many failed to recognise the need to add the totals for all except the first row to arrive at the required answer. In the final part of question 7, many candidates only linked 3 of the boxes on the left, therefore meaning they could not gain full marks.

A212/01 – Twenty First Century Science A (B2, C2, P2) Foundation Tier

General Comments

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

The full range of marks was seen (0 – 42)

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, as the crossing out and change of lines on a scanned script can make it difficult to be certain what the answer was intended to be.

Any marks that are ambiguous – possibly made with the intention that the examiner could give credit for either of two possible responses, where only one is correct – will **not** gain credit.

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 [especially question 7 (c)] 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) The sandbags are heavy was the most popular, and correct, answer.

(b) Candidates were not quite so sure about the properties of natural fibre ropes but still scored well for flexibility.

1 (c) When comparing types of ropes, candidates scored one of the two marks available for either stronger or do not rot.

2 (a) The idea of reliability was not so well known. About half the candidates opted for a fair test as the reason why five bags were tested.

(b) Many candidates correctly circled 95 as the outlier. However, some circled the material, others circled the mean and some circled many numbers. Some candidates did not answer this question.

(c) Ideas about sustainable resources were not so well known. New cotton plants can be grown and nylon is made from a non-renewable resource were the correct answers.

(d) Most answers scored one mark for correctly ticking one or two correct comparisons. Few candidates correctly ticked all three. In some answers the ticks were in the cotton or nylon boxes. Some candidates did not answer this question.

3 (a) Both answers were required for one mark and many candidates correctly wrote stop and flexible.

(b) Candidates scored well across all three parts. The first part was answered correctly (Usha) most often.

4 (a) Most candidates scored one or two of the available marks for the reasons why ultraviolet rays are harmful. The loss of a mark was sometimes due to only one box being ticked instead of two.

(b) In part (i), ideas concerning risk of a thin ozone layer often scored two marks.
Part (ii) was the most poorly answered question on the paper. Very few candidates correctly answered Shaun.
In part (iii), more candidates knew that Omar was giving an incorrect statement.

5 (a) The correct answer of Professor Morgan was given by many candidates.

(b) The correct statements about rainfall and floods were identified by many candidates.

(c) The way in which global warming happens was not so clear in candidates' minds. The type of radiation and what happened to it were not well known and consequently candidates did not score in the first part, but most candidates could name a greenhouse gas and knew where this gas came from. Some candidates did not answer this question.

6 (a) Food and oxygen were the correct answers, but candidates tended to score only one of the marks. A common incorrect answer was carbon dioxide.

(b) Regular exercise was the correct answer but often candidates gave one of the other three answers.

(c) In part (i), Peru was given as the answer by almost all of the candidates.
In part (ii), many candidates worked out the correlation between eating animal fat and death from heart disease.

(d) Most candidates scored one of the two marks.

7 (a) Candidates did not always follow instructions here. They were asked to write down the sentence number that includes a symptom. There were a significant number of other answers.

(b) The correct sequence of (B) A D C was identified by many candidates, to score 2 marks.

(c) This is a good example of a situation where candidates did not follow instructions. They were asked to draw one line. The majority of scripts had many lines drawn and these scored no marks.

8 (a) Julian gave the best explanation and many candidates correctly identified him.

(b) This proved to be a difficult question for many candidates. Some drew two lines from the type of trial boxes and consequently could not score for that type of trial.

A212/02 – Twenty First Century Science A (B2, C2, P2) Higher Tier

General Comments

This paper was well attempted with a high mean mark. It differentiated effectively allowing higher attaining candidates to show their knowledge and understanding of the subject. Almost all candidates made good use of their time. The number of 'no response' answers was very small, but a very few, lower attaining candidates did run out of time on this paper with 'no response' on the last one or two whole questions.

Comments on Individual Questions

1 (a) Many candidates knew that repeat testing makes results reliable. Wrong answers to this question were evenly divided between making the test fair and making readings accurate. Candidates need to be able to clarify the difference between these three important aspects of designing an investigation.

(b) In parts (i) and (ii) almost all candidates were able to identify an outlier and calculate a mean. Part (iii) was more discriminating but most good candidates were also able to identify the two correct statements about the data.

(c) Most candidates could identify two comparisons to explain the difference in Life Cycle Assessments but fewer could identify three. The most common wrong answer was to tick the property comparison rather than the lifetime comparison.

2 (a) Almost all candidates could correctly identify a hydrocarbon from the representations of five molecules.

(b) Fewer candidates were able to show the molecules that represented polymerisation. A few incorrectly showed the polymer being broken up into a small molecule. Others thought that the long hydrocarbon was used directly to form the polymer.

(c) Most candidates could correctly complete one of these sentences but fewer scored two marks on this question. Common mistakes were to put 'chemicals' or 'molecules' instead of 'products', and 'higher' or 'different' instead of 'unchanged'.

3 (a) Most candidates scored a mark here. Almost all knew that higher melting points meant larger forces but not all could identify what the larger forces were between.

(b) This proved more difficult. The most common mistake was that cross links increased the polymer chain length.

(c) Both parts of this Life Cycle Assessment question discriminated with higher attaining candidates giving correct answers. Weaker candidates showed lack of understanding with all incorrect combinations of names being seen.

4 (a) This question was well answered with most candidates scoring two marks.

(b) All parts of this question were done well. In part (i), a few candidates incorrectly chose Robert. In part (ii), most candidates could find one correct answer and many found two. Most could identify the incorrect statement in part (iii). In part (iii), the common error

was to choose Iris or Shaun, both of whom made statements relating to increased skin cancer. Part (iv) was more difficult as there was no indication of the number of ticks needed. Many candidates ticked only one of the two correct answers and failed to score.

5 (a) There was a good range of answers on this three mark question. Most candidates were able to score 2 or 3 marks. The most common wrong answer was that Professor Morgan thought that global warming definitely caused the floods.

(b) Almost all candidates scored at least one mark for this question. Most understood that the positive correlation suggested Professor Morgan was right, but some mistakenly thought that lack of correlation meant that he was neither right nor wrong.

(c) Most candidates scored at least one mark. They knew that methane in the air would increase global warming, but fewer could correctly identify water vapour as another greenhouse gas.

6 (a) In part (i), many candidates confused the type of blood vessel which carries blood to the heart muscle with that which carries blood to the heart and gave the wrong answer, vein. There were very few incorrect answers in either part (ii) or part (iii). Part (iv) showed candidates to be less clear about cause than correlation. All combinations of wrong answers were seen. In part (v), most candidates knew the risk factors for heart disease but fewer could identify the reason for the difference in risk factor.

(b) Most candidates showed some knowledge of the scientific community by choosing one correct explanation, but fewer could give both.

7 (a) Part (i) was a discriminating question but it also had the highest number of 'no responses' on the paper. Higher attaining candidates successfully recognised the description of mutations. In part (ii), it was good to see that more candidates are following instructions in this style of question. However, there were still about 1 in 5 candidates who answered with multiple lines when asked to draw only one. High attaining candidates again scored well in this part of the question.

(b) The calculation discriminated well though there was no common mistake amongst the wrong answers.

8 (a) About half of all candidates correctly answered this. Common wrong answers were to believe that 100% of the population needs to be vaccinated to prevent an epidemic and that vaccination reduces the chance of an immune individual being infected.

(b) It was difficult to score the mark on this question as both correct statements had to be recognised. Many candidates knew that flu viruses change quickly but few knew that these mutations give a different type of microorganism which needs to be recognised by a different antibody.

(c) This was even more difficult as all three improvements had to be recognised to score the mark. Many candidates missed not letting the scientists know who had taken the drug – part of a double-blind trial. The most common incorrect tick was to choose volunteers given the drug by tossing a coin.

A213/01 – Twenty First Century Science A (B3, C3, P3) Foundation Tier

General Comments

This paper proved to be more difficult than the June 2008 paper. However, there was no evidence that the candidates were short of time.

Although candidates had clearly been well prepared for the exam and the style of paper there were a higher proportion of 'no responses' to some questions than in previous papers. Candidates should appreciate that it is in their interest to attempt every question.

Comments on Individual Questions

1 Part (a) was well answered and the majority of candidates who showed an understanding of efficiency were able to identify arguments that described sustainable development.

2 Very few candidates could order the procedure for using gamma radiation to preserve soft fruit, often suggesting that packaging in an airtight bag should take place after irradiation. In part (b), candidates were good at identifying statements that showed people to be unhappy about eating fruit preserved by irradiation but, disappointingly, often failed to identify that gamma radiation would not be present in irradiated fruit when it is eaten.

3 Many candidates scored a mark in part (a), but very few correctly identified all three types of radiation from the descriptions, suggesting these were incompletely known. Part (b) was generally well answered with candidates recognising the value of official safety regulations and of risk benefit analysis. A common incorrect response was the idea that people who work close to the tester are at great risk, showing an understanding of the effect of distance from the source on radiation dose.

4 There were many completely correct responses to part (a). The function of preservatives was well known and where candidates lost a mark it was for linking artificial sweeteners or flavourings to the third choice box, "preventing the beans and sauce from separating", perhaps because they were reluctant to have no line to the third box. In part (b), very few candidates scored all three marks. Most knew that starch was a carbohydrate and that muscle is mainly protein. However, few candidates knew the elements present in protein and that fatty acids are not found in carbohydrates or proteins.

5 In part (a), a common wrong response here was 95% rather than the correct 5%. Most candidates correctly picked the components of diets linked to increased cases of diabetes. Part (b) was also well answered by most candidates. However, part (c) proved difficult for most candidates with many thinking that type 2 diabetes is caused by the blood being unable to carry sugar round the body.

6 Most candidates showed good understanding of the article and answered both parts of (a) correctly. Most candidates scored at least one mark in part (b) but only the higher attaining candidates showed knowledge of aflatoxins.

7 Part (a) had many good answers with species evolving from simple living things being recognised by most candidates. Molecules growing, instead of copying themselves, was a common wrong answer and some candidates lost marks for writing 350 (not one of the choices) rather than 3500. That DNA and fossils provide evidence for evolution was well known. Part (c) was also well answered although "variable selection" did prove to be an effective distracter for some candidates.

8 The term competition was not well known with many candidates answering "survival of the fittest" or "natural selection". Many candidates failed to answer part (a) or, surprisingly, part (b) where adding parasitic wasps to the food web proved difficult. The effect of a decline in the population of British ladybirds on other species was not well understood at this level.

A213/02 – Twenty First Century Science A (B3, C3, P3) Higher Tier

General Comments

The increased demand of this paper, as described in the Chief Examiner's introduction, resulted in a slightly lower performance overall, but the spread of marks has increased, which helps in discriminating candidates at the A*/A end of the spectrum. As in previous examinations, it was noticeable in places that candidates were competent in dealing with the issues of *Ideas about Science* (which is good), but were less comfortable with Science *Explanations*, i.e. the science content itself.

Comments on Individual Questions

1 The block diagram was successfully completed by the higher attaining candidates only, although most gained at least 1 of the 3 marks. The energy-flow diagram, with 3 correct responses for 2 marks, was also demanding , with only the most able candidates identifying all 3; many candidates gained 1 mark for two correct ticks. Better candidates could calculate the efficiency of the power station, while most identified the correct two 'talking heads' in part (b) (ii).

2 About half the candidates correctly completed the sequence of operations in sterilising fruit, and most were able to identify correctly one or two of the three 'talking heads' tasks in part (b).

3 Surprisingly few candidates were able to assign the nuclear radiations to their penetrating properties in part (a), but the majority were well able to deal with the *Risk* issues in part (b).

4 Candidates were more familiar with the risk factors for type 2 diabetes in parts (a) and (c) than with the organic causes of the disease in part (b).

5 Part (a) proved harder than expected in this question; this is possibly because of the inherent difficulty of risk-benefit analysis. The 'join the boxes' task on toxins in food was well done by most candidates.

6 Most candidates could identify at least one of the two methods used to maintain soil fertility in part (a) (i), but the 'join the box' exercise in part (a) (ii) often proved difficult; many candidates produced a story which was consistent, but which did not address the question of the article. In part (b), most candidates correctly chose the higher crop yield given by artificial fertilizers, but only the best candidates coupled this with food shortages in developing countries; many assumed a profit motive, or the need to reduce the number of workers.

7 Only better candidates could supply the word 'competition' (or related terms, such as 'compete', or 'competing') for part (a), but most could complete the food web and identify the changes occurring should harlequin ladybirds replace British ladybirds.

8 Few candidates could identify the three statements containing data, but the difficulty in identifying the three statements containing explanations – the answers were 2, 4 and 6 – prompted the examiners to allow any two of the three (as well as all three) for the mark here.

9 Many candidates recognised the significance of the increasing percentage of males with the suppressor gene in part (a), but answers to part (b) often revealed a lack of clear thinking about the differences between Lamarckism and Darwinism.

10 The free response parts (a) and (c) were poorly done and often omitted; candidates need warning that free response is going to be a larger fraction of the paper than previously. The other parts were done incorrectly by candidates who had not carried through the context – playing basketball makes you hot – which underpinned the question, often answering part (b) in terms of being heated by the Sun, and part (d) in terms of slow, long-lasting hormonal responses.

A214/01 – Twenty First Century Science A (Ideas in Context) Foundation Tier

General Comments

Most candidates performed quite well on this paper and had been well prepared for the examination. Most Centres had clearly used the pre-release material to their full advantage and had prepared their students to answer the questions. Most candidates were very good at referring to the pre-release material in their answers. There was no evidence that candidates ran out of time.

Comments on Individual Questions

1 This question was based on the pre-release material, "Does homeopathy really work?"

(a) Those candidates that used the pre-release material effectively scored this mark. Any answers that included using a substance that caused similar symptoms to the disease,were credited. A common incorrect response was using the substance that caused the disease.

(b) Part (i) should have been a straight forward question if candidates had returned to the pre-release material and examined the data in the table. However the correct answer of 5 was not always given. Answers ranged from tens, to hundreds, to millions. Only the most able candidates realised that all they needed to do was count the number of steps in the table.
Part (ii) was not well answered and candidates struggled to get a clear understanding of what was happening as the solutions were diluted. Good answers referred to the fact that the 10 molecules had to go somewhere so there was an outside chance that they would be in one of the solutions. Common incorrect responses stated errors when the solutions were diluted, measurements were imprecise or they were there but could not be detected.

(c) In part (i), most candidates managed to score one of the two marks but failed to realise that a two mark question required a two mark answer. 'It retains the memory of the substance' and 'it stimulates the body's own healing powers' were both credited. Only the most able candidates gave both answers to score both marks.
Part (ii) was once again, a two mark question that required a two mark answer. Good answers included a description of how the placebo effect works and stated that the body's own immune system would ensure that the person got better anyway. Most candidates only gave one of these answers.

(d) Part (i) was well answered with most candidates giving Stella as the correct response. The most common incorrect response was Ranjit.
In part (ii), although most candidates gave Ranjit as the correct response, Peter was often given as an incorrect response. This was possibly due to the fact that Peter's comment was neutral rather than supportive of homeopathic doctors.
Part (iii) was an easier question and most candidates correctly gave Jane as the answer.

(e) Marks were awarded here for safety and effectiveness. Candidates who said in stage 3, 'to check if it will affect the patient', did not score. Candidates had to clearly indicate the

idea of harm or side effects to the volunteer. In stage 4, any reference to side effects was ignored but did not prevent the candidate scoring if the correct answer was given.

(f) Credit was given for any idea that the patient would be given false hope, or that they may be denied a conventional treatment that had been proven to be effective. Candidates who went down the other route, that conventional doctors believe that homeopathy does not work, were also credited.

2 This question was based on the pre-release material, "Carbon monoxide – the invisible killer".

(a) Part (i) proved to be an easy start to this question. Credit was given to any answers that stated the gas was poisonous or that it combined with haemoglobin. Credit was also given for stating that we could not see it or smell it, and this made it more dangerous. Part (ii) was well answered with most candidates giving the correct answer of 30 minutes.

(b) This question also tested spelling. Candidates were awarded a mark if less than one word in ten was spelt incorrectly; most candidates were awarded this mark.
Few candidates scored full marks on this question. Most were able to gain the first mark by stating that more cars were found in cities, or less in the countryside, but few went on to gain the second mark by stating that buildings tend to trap the gas and prevent it from being blown away. Those candidates who did gain this mark often failed to gain the first mark about more cars in cities.

(c) In part (i), most candidates failed to score this mark as they failed to make the correlation clear. Credit was given for stating that as catalytic converters were introduced, the amount of carbon monoxide decreased.
Most candidates scored 0 or 1 mark for part (ii) of this question. Good answers included the use of coal had decreased and that the use of gas or oil had increased. Credit was also given for the greater use of electricity or alternative forms of energy generation, such as solar or wind power.

(d) Few candidates gained both marks for this question. Considerable leeway was given to candidates in terms of interpreting the degree of shading given to the molecules but, even so, only the most able scored marks on this question. Monotomic diagrams for nitrogen were credited providing two atoms were drawn.

(e) From looking at part (i), it is clear that candidates struggle with the ideas of risk and benefit. This is one area of the specification that would pay dividends by having more study time. Good answers were few and far between. Credit was given for stating a good reason for using cars, such as "get to where you want to go more quickly" but candidates then failed to score the second mark by saying that the risk from carbon monoxide was very small and insignificant when compared to the advantage of using a car.
Part (ii) was better approached, but still not well answered. Credit was not given for stating that people did not use the fire very often. Good answers stated that people were not aware of the risk or could not afford to get the fire serviced.

3 This question was based on the pre-release material, "The risk from microwave radiation".

(a) This proved to be an easy start to the question and most candidates managed to state a harmful effect by extracting the answer from the pre-release material.

(b) Part (i) should have been an easy two marks. However, too many candidates were unable to multiply 0.2 by 10 and gave answers that ranged from 0.20 to 20. Candidates who gave the answer 2 were credited with two marks. Candidates who failed to give this answer were credited with 1 mark if they demonstrated that they had multiplied 0.2 by 10. This is a very good reason why candidates should always clearly show their working.
Most candidates scored at least 1 mark for part (ii). Credit was given for any positive point about using mobile phones, such as: they only affect you when using it, they could be switched off, or they are helpful in an emergency. Credit was also given for any negative point about the school network, such as it could not be switched off, it affects everyone, or lack of choice about it being used. Most candidates scored the first but not the second mark.

(c) Part (i) was not well answered. Credit was given for any answers that related to the fact that the evidence was anecdotal. Credit was not given for repeating the question by stating that the evidence was not convincing.
Only the most able candidates scored the mark for part (ii). Good answers included using very large samples or blind or double-blind trials. Candidates who simply stated "put someone in a room with microwave radiation and then switch it off" did not score.
In part (iii), most candidates scored the first mark and examiners were lenient in terms of what they would accept. Any factor that could be linked to an outcome scored the mark. However, to score the second mark candidates had to clearly identify the correlation. There did not have to be a causal link for the marks to be awarded.

(d) In part (i), candidates were awarded two marks for giving the answer 4.4 or 4.386. 4.3 did not score. Candidates who gave the wrong answer were credited with the first mark if they gave 5/114 x 100. An extremely large number of candidates gave the sum 5/144 x 100. It is most unclear where these candidates obtained the number 144 from.
Part (ii) should have been straightforward. However, although most candidates obtained the second mark for explaining what was meant by a review, many failed to obtain the first mark for stating that experts or fellow scientists should be the ones to carry out the review. This resulted in many candidates only scoring one mark for this question.

A214/02 – Twenty First Century Science A (Ideas in Context) Higher Tier

General Comments

The performance of candidates was similar to that in June 2008. They generally wrote more this year than last, reflecting good preparation with the pre-release materials by Centres. As last year, a minority of candidates gave superficial and inaccurate responses, showing that they did not understand what the questions were asking, often answering one part of a question with the response needed for another part or simply repeating the question itself in the answer space. These candidates would have been more successful had they been entered for the foundation tier examination.

A number of weaker responses also did not use the pre-release material so much as simply quote it: although this is often appropriate in the foundation tier paper, higher tier candidates must expect to extend the ideas in the articles using their knowledge and understanding of science.

A significant number of candidates clearly did not have enough time to complete the paper, although the first of the two parts omitted – principally the last two parts of question 3 – was more difficult and candidates may well have given up there on those grounds. Candidates do need to be guided by the mark allocations for questions and to manage their time efficiently in this paper.

This paper lays considerable emphasis on 'Ideas about Science', and candidates responded well to question parts assessing IaS 2 (Correlation and Cause), IaS 3 (Developing Explanations), IaS 5 (Risk) and IaS 6 (Making Decisions). However, questions directed at more demanding aspects of Ideas about Science, such as risk/benefit analysis in 1 (d) (iv) or experimental design in 3 (e), rarely received the detailed and considered response needed for full marks.

Comments on Individual Questions

1 (a) Part (a), identifying the appropriate 'talking heads', was correctly answered by most candidates.

(b) This required candidates to identify the shortcomings of the small, unrepresentative sample as scientific evidence and to suggest how a good study might have been done. Relatively few answered the first aspect, but most were able to suggest a way to improve it.

(c) This required candidates to calculate the number of molecules present in the final sample (0.2) and to realise that this meant that there would most probably be none present. This was correctly answered by very few candidates.

(d) This question was about the procedures in testing drugs. Part (i), identifying the main functions of stages 3 and 4, was well answered by most candidates, but the other parts were much less successfully completed.
In part (ii), *reliable data* was rarely well explained, with many vague answers given, e.g. 'data you can trust'.
In part (iii), most candidates explained that scientists gained confidence in results by replicating the findings, but credit was also given for explaining that peer review involved

independent experts.
The reasons for taking a drug with unpleasant side effects in part (iv) was partially done by most, who would state that the benefit outweighs the risk, but the further detail needed for the second mark, either in terms of the potential seriousness of the disease or of the control of side effects, was rarely included.

(e) Candidates needed to state clearly that a placebo has no clinical effect and to produce an ethical reason why doctors do not prescribe them; the latter point was often clearly made, but the former less frequently seen. A significant number of candidates misunderstood the question and wrote about the role of placebos in trials, while some suggested that placebos would be appropriate treatment for hypochondriacs.

2 (a) In this question, most candidates were able to quote the appropriate part of the article to explain the effect of carbon monoxide on haemoglobin, but a number were unsure what the word 'mechanism' meant.

(b) Many candidates were able to reason that electric cars do not produce carbon monoxide (although quite a number did not mention this key fact), but very few considered the possible carbon monoxide produced in the generation of electricity for those cars.

(c) Candidates also had some misunderstanding of 'mechanism' in part (i)
Answers to part (ii) were sometimes affected by confusion in the article between the text, 'The main source of carbon monoxide pollution is exhaust gas from motor vehicles' and the graph, which incorrectly showed the emissions from houses to be greater. The original graph had been a stacked area graph, and this distinction was lost in copying. To avoid any possibility of candidates being disadvantaged, any candidates who used this incorrect data, e.g. in stating, 'reducing CO production by cars is not a major factor as houses give off more CO', were given credit.

(d) This question, requiring the completion of a balanced equation in 'blob' form, was answered correctly by many candidates. However, the drawings were often so untidy as to be unclear whether the atoms were joined together in molecules or whether the shape of the molecules was correct.

(e) In this part of the question, two of the four marks proved much harder to obtain. In part (i), candidates needed to state an advantage to driving cars in cities and also to explain why many people did not consider the health risks; few candidates gained the second mark.
In part (ii), the need to service gas fires should have been justified by the fact that, even though the chance of CO emission is very low, the consequence is too serious to ignore; most candidates got the second of these points only. Lower attaining candidates were confused by the contexts in these two parts, often referring to gas fires in part (i).

3 (a) Many candidates realised that anecdotal evidence is not enough to be considered as scientific evidence, although they often failed to express this clearly. The way to improve the study, with blind trials, larger numbers and balanced groups was usually well described, although weaker responses suggested doing actual experiments on microwave damage.
Part (iii) required candidates to give an everyday example of a correlation. Very many examples were seen by examiners, and a successful response required not just a direction to the correlation but also indication of the relative effect, e.g. 'the higher the temperature of a summer's day, the greater the number of ice-creams that will be sold'. Some candidates unwisely chose to give as a correlation microwave radiation and illness, which contradicts the evidence in the article.

(b) Many candidates were able to explain the difference between correlation and cause, and most were clear and accurate enough to gain the Quality of Written Communication mark also.

(c) This required candidates to extract the power of mobile phones and wi-fi transmitters from the pre-release material, and to argue that the phone was much closer to the user. Many candidates did this well. Candidates who could not extract the appropriate data were those who found the paper as a whole too demanding.

(d) This was disappointingly answered. Only a minority of candidates could calculate the percentages of numbers correctly judging whether the transmitter was on or not. However, a number of candidates did gain 1 of the 2 available marks for reasoning that the ratios, or fractions, in the two cases were similar.

(e) This was often done well, with many candidates getting 2 of the 3 available marks for identifying aspects of good design in the study on electrosensitivity.

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				
b) reliability of evidence		Performance descriptions		
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 versa) 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 7th and 8th 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.

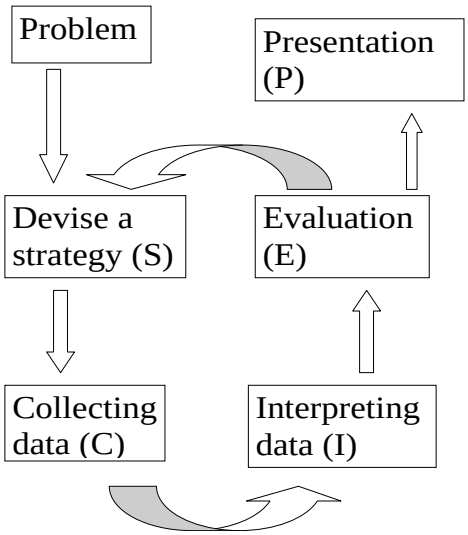
D(b): This aspect assesses candidates' ability to include suitable diagrams and graphics to clarify difficult scientific ideas and improve effective communication. However, too often the images were decorative rather than informative. If there are no decorative or informative images included, then zero 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
GCSE Science A (Twenty First Century) (J630)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A211/01	Raw	42	N/A	N/A	N/A	30	25	21	17	13	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A211/02	Raw	42	33	28	23	19	15	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A212/01	Raw	42	N/A	N/A	N/A	33	28	24	20	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A212/02	Raw	42	34	29	24	20	16	14	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A213/01	Raw	42	N/A	N/A	N/A	28	24	21	18	15	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A213/02	Raw	42	33	28	23	19	15	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A214/01	Raw	40	N/A	N/A	N/A	24	20	16	12	8	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A214/02	Raw	40	27	22	17	13	10	8	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A219	Raw	40	33	30	26	23	19	15	12	9	0
	UMS	100	90	80	70	60	50	40	30	20	0

A219 (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
J630	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
J630	3.7	15.4	36.8	64.2	81.5	92.1	97.6	99.7	100	107 803

108 084 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.

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