OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology A (Twenty First Century)

Report on the Units

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GCSE Biology A (Twenty First Century) (J633)

REPORTS ON THE UNITS

Introduction from the Chief Examiner

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.

Overall, the candidates taking the Biology papers in this session performed extremely well. The papers were constructed to allow candidates to feel that they had every opportunity to demonstrate their knowledge and understanding while at the same time discrimination between candidates of differing abilities. It was intended that candidates should feel that they had a positive experience in taking the examinations.

Most candidates found the papers accessible and demonstrated sound knowledge and understanding of the course content. Most candidates had been well prepared by their centres and due to the fact that questions towards the end of the papers were answered equally as well as questions at the beginning of the paper, there was no evidence that candidates ran out of time.

As always, there are lessons to be learned and specific points relating to each paper are picked up in the individual reports from each Principal Examiner. Some issues however occurred across the suite of papers and these are detailed below.

Candidates are well advised to read questions carefully. Each year a number of candidates lose marks unnecessarily because in their haste to complete the paper before they run out of time, they fail to read the question carefully. It cannot be stressed too strongly that reading and re-reading the question is time well spent. Candidates would also be advised to pay similar attention to their answers. Answers should always be re-read to ensure that they do indeed answer the question.

When answering questions that include numerical calculations, candidates are always asked to show their working. It is vital that they do this. Candidates are very good at answering calculation questions intuitively or performing simple mental arithmetic and then writing down the answer. Providing the answer is correct, this is not a problem as they will gain full marks. However it is a very risky strategy. A simple mistake in their mental calculations will lose them all of the marks. If they had written down their working, the chances are that they would have salvaged at least one of the marks available for the question.

The word 'energy' often causes problems for biologists. Candidates must never answer a question indicating that energy is 'produced' or 'made'. This will lose the candidate marks. Candidates would be well advised to write about the 'transfer of energy'. This simple phrase is easy to use and is always correct when energy is converted from one form to another, for example in a food chain. All too often we see phrases such as "....the energy made in the Sun......."

Using chemical equations is another area when candidates can lose marks. When candidates are asked for a word equation, it is surprising the number of candidates who write down the chemical equation. This is a risky strategy as to score the marks, the chemical equation must be given correctly. Candidates would be well advised to give word equations when they are asked for them in a question.

Centres will be well aware that many of the questions in these papers consist of "Put ticks (✓) in the boxes next to the correct answers." Although from 2011 onwards there will be more extended answers required, tick-box questions will still be used. In order to extend the degree of difficulty with these questions, particularly on higher tier papers, candidates are not always told how many correct responses are required. The more astute candidate may well look to see how many marks the question is worth and then assume that the number of marks available for the question, must match the number of correct responses required. This is not necessarily the case. Some questions will award one mark for two correct responses. Some may award two marks for three correct responses. Candidates must be advised to answer each of these questions on their merit and place ticks next to those answers that they think are correct.

The Skills assessment component of each of the Biology 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.

There was a general feeling that more errors seen in the transcription of marks when assessing coursework. More care is necessary in this important area. Attendance at cluster group meetings and OCR INSET meetings both in- and out-of house, using the OCR consultancy service for checking marked scripts, 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.

Finally centres must realise that B7 is not just another unit of equal comparability with B1 to B6. It is in fact three times larger than the other units and centres are well advised to regard it notionally as B7, B8 and B9, rather than just B7. This does of course mean that it requires three times the amount of teaching time given to the other six units.

> 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.

The following reports provide more detail on how candidates performed on specific questions, highlighting areas of concern and applauding improvements from previous years.

Please ensure that your staff are encouraged to read these reports.

A221/01 – Twenty First Century Science
Biology A
(B1, B2, B3) Foundation Tier

General Comments

There was a pleasing response to this paper, with many candidates scoring high marks. In general there were few rubric errors, although a significant number of candidates might have done even better had they paid closer attention to instructions on how many lines to draw in questions where they are asked to join boxes. It was notable that there were fewer errors in terms of the numbers of boxes ticked than in some previous papers, giving some indication that candidates are becoming better at following instructions. Very few candidates left any questions unanswered, and so perhaps most have heeded advice to make some sort of response rather than to leave blank spaces.

The questions which candidates answered least well included some which involved factual recall, but more of these were ones which called for some reasoning or interpretation of data (Assessment Objective 2 in the specification). Some candidates might benefit from more practice on this style of question.

Comments on Individual Questions

1 (a) This question was generally well answered, with most candidates recognising that the embryo separated into two groups.

(b) This was better answered than (a), with most candidates correctly selecting the environmental differences as the cause of the differences in the twins.

(c) This question was correctly answered by virtually every candidate, with the first option being selected. It was on this style of question that there were fewer rubric errors than in previous sessions.

2 (a) This was generally well done, although there were some surprising responses in which Candidates drew a line from the nucleus in the diagram to a label of their own devising – these responses were not deemed worthy of credit although the candidates did perhaps have some inkling of what was being asked for.

(b) Part (i) was correctly answered by less than half of the candidates, so perhaps more stress could be laid on the teaching of cystic fibrosis as an example of a recessive condition.
Part (ii) was well answered, with over three quarters of candidates correctly spotting the answer was 1.
Part (iii) seemed to prompt some guessing from the more able candidates, who did not always correctly identify the chance of Mary being a carrier as 50%. This is an area where more confidence on the part of the candidates would be good.

3 (a) This question was very well done, most correctly picked Jane and Peter.

(b) This was just as well done, most choosing Peter yet again with confidence.

(c) Again, this was very well done, even more picking Stella.

4 This question was fairly well done, with no clear pattern of errors in those who did drop marks. Huntington's and sex were seen to be genetic while heart disease was both – some who dropped a mark here thought heart disease was wholly environmental.

5 (a) This was very well answered, with both the second and fifth boxes ticked. Very few picked only one of the factors correctly without picking the other one as well.

(b) This was very poorly answered however – the expected answer was to link the build up of fatty deposits to the fact that Dave's heart did not get enough oxygen. A great number of candidates penalised themselves by joining four pairs of boxes, so scoring 0 marks even if the correct pairing was included in the response. It may be worth stressing to candidates that if they do insert too many lines on this type of question they will not score even if they have included a "correct" response.

(c) This was much better answered, most spotting "food" was the expected response. Some responses which included "countryside" may suggest a poor grasp of what was meant by a non-industrialised country, which may be a matter for cross-curricular cooperation.

6 (a) Generally scored one mark for most candidates, but on the whole there seemed to be a poor appreciation that antibiotics do not act against viruses and that bacteria can become resistant to antibiotics; these are key ideas about antibiotics with such consequences for their use that it may be a good area to stress with future candidates.

(b) This was generally very well done, most scoring 2 for DEBAC.

7 (a) This question was surprisingly poorly answered for a graph interpretation question, with many of the incorrect responses being well wide of the expected range of 0 to 1.5 – even allowing responses in months did not significantly help candidates.

(b) This was particularly poorly answered suggesting that candidates were not carefully reading the captions to the right of the graph.

(c) This was very well answered with virtually all giving the expected response of 4 and 15.

(d) This was relatively well answered, but a significant number of candidates did not realise that people's bodies did not have time to make enough antibodies. This perhaps shows that more candidates need to concentrate on the topic of antibodies in their revision in future.

(e) Part (i) was correctly answered by nearly all giving the correct response of Jane.

(e) Part (ii) was disappointingly answered, perhaps surprisingly in view of the strong response to part (i). The expected response was Stella, but nearly half the candidates did not seem to think the force of law behind vaccination was hard to justify.

8 (a) was correctly answered by many who gave the expected response of 3500 million years, but almost no candidates lost the mark through giving too many responses, in contrast to the other style in Q5b.

(b) Many candidates scored 1 mark for 'could copy themselves', again with nearly all giving just one tick as instructed.

(c) & (d) These parts were also correctly answered by the majority of candidates.

9 (a) Most candidates scored at least 1 mark from Ranjit and Peter making statements which include data.

(b) This also saw most score a mark for Jane including an agreed scientific explanation.

(c) This was however very poorly answered with few spotting that Peter suggests why scientists disagree, so this aspect of Ideas about Science would appear to be less well embedded than the aspects tested in parts (a) and (b).

10 (a) The great majority of candidates scored 0 or 1 mark, very few were able to identify both cells that contract in muscles and cells in glands found in the body as examples of effectors. There was perhaps a slight tendency for those scoring 1 mark to gain it for the muscle cells, but this was by no means an overwhelming tendency.

(b) This saw more gain both marks for brain and spinal cord. This suggests that candidates had a stronger grasp of the organisation of the central nervous system than they had of the effectors in part a, which might be an aspect worth stressing to future candidates.

(c) Many candidates struggled with the distinction between the nervous system as electrical, fast and short acting, while the hormonal system is electrical, slow and long lasting. This has been a weakness in previous sessions, and candidates would be well advised to have these ideas clear in their minds in preparation for future sessions.

A221/02 – Twenty First Century Science Biology A (B1, B2, B3) Higher Tier

General Comments

Most candidates performed very well on this paper. It was pleasing to see how well the vast majority of candidates had been prepared for the examination. There was no evidence that candidates ran out of time.

Comments on Individual Questions

1 (a) This proved to be a nice easy start to the paper with most candidates being awarded the mark. When errors did occur it was usually because candidates did not follow the instructions given and failed to connect the label box to the nucleus.

(b) Part (i) was a well answered question with most candidates correctly realising that the disorder was recessive. Any candidate that did not put a ring around the correct answer but clearly identified the correct response, was credited.
Part (ii) was also answered well. The most common incorrect response was 'five' as this was the number of people who did not have cystic fibrosis.
Once again, part (iii) was well answered. It was clear that most candidates had been well taught how to interpret genetic diagrams and had a good understanding of how alleles are passed from one generation to the next.

2 This question proved to be more discriminating between good and excellent candidates.

(a) Although the correct answer of 'Peter' was given by many candidates, 'Stella' proved to be a powerful distracter. This is one area of the specification that would benefit by having more teaching time spent on it.

(b) Only the most able candidates correctly identified both 'Jane' and 'Ali' as the correct responses. Once again, candidates would benefit from having more teaching time spent on this section of the specification.

(c) This was not well answered by the majority of candidates. Clearly the idea of implications is not well understood. Many candidates gave either 'Jane' or 'Peter' as part of their response, neither of whom went on to give an implication in their statements.

3 (a) Most candidates correctly answered part (i) and were awarded the mark. When errors did occur they included giving the female pair of chromosomes, or for some strange reason giving 'YY' as their answer. Candidates who used lower case or who gave 'YX' instead of the conventional 'XY' were credited.
For some unaccountable reason part (ii) was answered better than part (i). This was possibly due to the fact that the single letter 'X' in 'XX' is easier to remember than 'XY'. When errors did occur it was usually due to getting the male and female pairs the wrong way round.

(b) This question was made much harder because a very large proportion of candidates failed to read the instructions in the question. Large numbers of candidates insisted on drawing a line from and to, each and every box. This resulted in no mark being awarded, even if they had correctly drawn the line linking the third box on the left, with the fourth

box on the right. It cannot be stressed enough that candidates should and must read the question carefully before attempting to answer it.

4   It was intended that this question should discriminate between the more able candidates. Only the most able scored all three marks. The degree of difficulty was made harder by the fact that candidates were not told how many correct responses there were. In this particular question the number of correct responses matched the number of marks available. However candidates should be warned that this will not always be the case and in the future for example, three correct responses may be required to score two marks. Boxes 1 and 4 proved to be the most powerful incorrect distracters for this question. Most candidates managed to score two of the three marks.

5   This question was an overlap question with the foundation tier so it would be expected that higher tier candidates should score well on this question.

  (a) Any age between 0-1.5 years was accepted as a correct response. Those candidates who gave their answer in months were also credited. Four, six and fifteen were the common incorrect responses. However most candidates gave the correct response for this question.

  (b) Once again most candidates gave the correct response of 'one year old' but a surprising common incorrect response was 'four years old'. Candidates who gave this response clearly failed to understand the term 'booster vaccination'.

  (c) Almost all candidates identified '4 and 15' as the correct response to this question.

  (d) Most candidates gave the correct response to this question. The most common incorrect distracter was that 'several injections are needed'

  (e) In part (i), most candidates correctly identified Jane as being the person who was giving two different views.
In part (ii), most candidates correctly identified Stella as the person giving the correct response. However Ranjit and Peter were common incorrect responses. Giving candidates some clarification of the use of the word 'justify' would help them with this type of question.

6 (a) Questions on double blind trials have always been answered well by candidates in the past. This proved to be no exception even though candidates were not told how many correct responses there were. However once again candidates should be warned that the number of marks will not always match the number of answers and in the future, three correct responses may be required to score two marks.

  (b) This was well answered by most candidates but "bacteria become used to the antibiotic" was a common incorrect response. Most candidates correctly identified boxes 3 and 4 as the two correct responses.

7 (a) Most candidates correctly answered this question, but distracter D proved to be a common incorrect response. It was pleasing to see that most candidates were able to identify a correlation without a causal link.

  (b) Statement B proved to be the most common incorrect response but more able candidates clearly identified C and D as the correct responses and scored both of the marks.

  (c) This was well answered with most candidates identifying A as the correct response.

8 This question was an overlap question with the foundation tier so it would be expected that higher tier candidates should score well on this question.

(a) Most candidates scored well on this question about data, as numbers were involved in both correct answers. However candidates should be warned that data does not always include numbers and future questions may not always be as straight forward. Even so a significant number of candidates gave Jane and Stella as incorrect responses.

(b) The correct response was given as Jane by most candidates. When incorrect responses were given, the answer was usually Ranjit.

(c) This question was not so well answered. Although some candidates gave Peter as the correct response, Stella was often quoted followed by Ranjit and Jane. This question proved to be more difficult than anticipated when it was written.

9 (a) The second and last boxes were the correct responses to this question. However the degree of difficulty was increased due to the fact that candidates were not informed of the number of correct responses and the number of marks allocated to the question did not match the number of correct responses. Consequently many candidates failed to score. Errors include only giving one response or giving more than two, which lost the mark even if the correct box had been ticked.

(b) This was structured in a similar way to 9a. Consequently it turned out to be a hard question with only the most able scoring. Correct responses were the third and last box.

(c) This proved to be a more accessible question. Most candidates scored all three marks on this question with weaker candidates scoring at least 1 or 2 marks. Candidates showed good understanding of the causes of extinction.

10 (a) Many candidates correctly identified both correct responses namely the fourth and fifth boxes. Because candidates were not told the number of correct responses, errors included ticking just one box or three or more. Normal marking rules applied so that a candidate that ticked more than two boxes (the number of correct responses) lost a mark for each incorrect response. So four boxes ticked equalled no marks even if both correct answers were given.

(b) Also proved to be a tricky question, with only the most able candidates scoring both marks. All the distracters proved to be powerful and there was no pattern to incorrect responses.

(c) Proved to be more straight forward and was an easy end to the paper. Candidates followed instructions and clearly drew the three connecting lines.

A222/01 – Twenty First Century Science Biology A (B4, B5, B6) Foundation Tier

General Comments

This summer's paper was well answered by most candidates indicating that they were well prepared for the exam and had a good working knowledge of the specification content.
There was no evidence that any of the candidates ran out of time.
This exam is mainly multiple choice or choosing the correct word or words from a given list and candidates should for any answer they are unsure of at least try to eliminate those answers that they know to be incorrect and then choose the response that they feel is most likely to be the correct response.
Candidates would be well advised to make sure that they know how many responses are required for each section and to ensure that they have only responded with the correct number.

Comments on Individual Questions

1 (a) Most candidates knew that enzymes were made of protein.

(b) Again a well answered question with most candidates knowing that increasing the temperature will increase collision rate.

(c) Generally well answered however, candidates who failed to gain 2 marks had not appreciated the importance of the word "high" linked to "temperature" and therefore "start" rather than "stop" was used by some candidates in the first sentence. The majority of candidates picking up 1 mark did so by correctly inserting the word "shape" into the 2nd sentence.

2 (a) Most candidates were able to interpret the diagram correctly and understood that cell A contained more glucose molecules than B, making it a more concentrated solution of glucose.

(b) This section of the question proved more difficult for some candidates with many not knowing which way the water molecules would move between the 2 cells.

(c) The majority of candidates knew that osmosis was a specific type of diffusion, however fewer knew that water moved from a dilute to a more concentrated solution.

3 (a) A well answered question with the majority of candidates knowing that "increasing body temperature slightly" results in sweating.

(b) Most candidates scored at least 1 mark on this question however, many failed to appreciate that the brain was involved in both detection and processing with respect to temperature regulation.

(c) Many candidates knew that lost water was replaced by respiration however, those who failed to answer correctly mainly circled "breathing" as their correct response.

(d) This question was not very well answered as many candidates had failed to read the instructions carefully and had tried to link up each "beginning" with a "middle" and "end" sentence.

4   On the whole question 4 was not answered particularly well and this would suggest that this is an area of the specification which needs to be covered in more detail.

   (a)   This section was only answered correctly by a minority of candidates.

   (b)   In this section few candidates knew that in meiosis chromosome number is halved.

   (c)   Here many candidates had circled 23 as the correct response and had not appreciated that the chromosome number is maintained during mitosis.

   (d)   This section was not very well done. Very few candidates knew that mitosis maintains chromosome number. Most responses were divided between the 2 incorrect responses.

5 (a)   Many candidates scored at least 1 mark on this section with the majority knowing that DNA is found in the nucleus of the cell.

   (b)   Again the majority of candidates scored at least 1 mark here, many tending to know that there are 4 different bases along the DNA molecule.

   (c)   A well answered section with most candidates scoring at least 1 mark.

6 (a)   This section proved to be the most difficult. Very few candidates knew that this process was photoperiodism with many writing photosynthesis or not answering the question at all. Again this is a section of the specification that candidates would be advised to cover in more detail.

   (b)   Section b was well done with the majority of candidates scoring the single mark.

   (c)   In this section most candidates scored at least 1 of the 3 available marks although very few scored all 3. Candidates tended to answer "the cut end starts to grow new roots" correctly with a fairly equal distribution of correct responses for the other 2 sentences.

7 (a)   Most candidates performed well on this section and correctly identified the parts of the motor neurone.

   (b)   Most candidates scored 1 mark on this question gaining this for the correct response "increase the speed of transmission of a nerve impulse".

   (c)   The majority of candidates failed to answer this question correctly. The main incorrect responses being "effectors" and "receptors". Those candidates who had learnt and understood this section gained both marks clearly knowing that sensory neurones carry impulses to the central nervous system and motor neurones carry impulses away.

8 (a)   This section was answered well by about half of the candidates and they either knew both functions of the cerebral cortex or neither.

   (b)   This question was very well answered with most candidates scoring 1 mark.

9 (a)   This question was answered correctly by about half the candidates. Incorrect responses were spread between the other 3 possible responses.

   (b)   This section was an easy finish to the paper with all candidates attempting to answer the question and most candidates scoring at least one of the 2 possible marks.

A222/02 – Twenty First Century Science Biology A (B4, B5, B6) Higher Tier

General Comments

The paper was accessible to the majority of candidates. No clear pattern emerged with regards to the presentation of the paper and most candidates were able to respond to almost all items. The candidates were generally high scoring. In general, candidates showed a sound knowledge and understanding of homeostasis, the operation of enzymes, hormones and reflexes. Candidates did, however, show the least confidence in the areas of mitosis and meiosis.

With the exception of one or two items noted, the majority of items did not appear to generate errors due to the misinterpretation of instructions or rubric. The candidate scores ranged from 3 to 42 out of a maximum of 42 marks, indicating a full range of performance according to the skills and knowledge of candidates. Fifty four candidates were able to achieve full marks and showed an excellent performance. Many candidates appear to have been well-prepared for this paper and they showed the confidence to complete all items. Relatively few candidates tried to cross out initial responses. Finally, there was little evidence that candidates ran out of time, the items located at the end of the paper were answered with an equal level of success to those positioned at the start of the paper.

Comments on Individual Questions

1 (a) The majority of candidates scored one mark. The most common error was shown in the first sentence. Candidates were unsure about the structure responsible for the detection of blood temperature.

(b) Most obtained the mark but some were confused about breathing and respiring in relation to water gain.

(c) Generally well answered but although some candidates realised that maintenance was involved, they did not necessarily recall the feature of internal environment.

2 (a) This question did not appear to present a difficulty for the majority of candidates.

(b) Again, this question did not appear to present a difficulty for the majority of candidates.

(c) Not all candidates linked pH with the shape of an enzyme. There seemed to be some confusion with the collision rate and pH.

(d) Most candidates obtained at least 1 mark. Jane was often placed in the right hand column and Scott in the left. Some candidates failed to appreciate that all four names were to be placed in the boxes, thereby preventing them from obtaining the full marks.

3 (a) Many candidates obtained all three marks but many wrote urine instead of urea and failed to identify both water and sugar as components of the dialysis fluid.

(b) This question was well-answered by many candidates. No pattern emerged for alternative responses.

(c) This question was also well-answered by many candidates, and no pattern emerged for alternative responses.

4 (a) Photosynthesis was a common, incorrect response. Not all candidates were able to spell phototropism correctly but most scored the mark.

(b) A very well answered item. Very few candidates gave other responses.

(c) Also well answered but a number of candidates scored 1 or 2 marks because they were unsure of the hormone content of rooting powder and did not realise that unspecialised cells were involved. Almost all realised that new roots were formed from the stem cut surface.

5 (a) This item was generally poorly answered. Many candidates realised that bases and amino acids were involved in sequences but put the responses the wrong way around.

(b) Generally well answered. No clear pattern emerged for alternative responses.

(c) Many candidates failed to obtain both marks. There appeared to be some lack of clarity with regards to mitosis and meiosis.

6 (a) Although most candidates realised that the stem cells are unspecialised, many described human stem cell division as meiosis, rather than mitosis.

(b) A surprising number of candidates chose the 16 cell stage (or other stages) rather than the 8 cell stage for this item.

(c) Many candidates identified the correct pattern of true/false statements. Some were slightly confused about the inactivity of genes in many plant and animal cells.

7 (a) This did not present a problem for most candidates.

(b) Again, generally well answered by most candidates. A small number of candidates chose the word 'recognition' rather than 'repetition'.

8 (a) Candidates appear to be increasingly confident when dealing with sequence boxes in such items. Most candidates obtained full marks for this item.

(b) This item was generally poorly answered. Many chose the speed or strength of the nerve impulse, rather than the direction of the impulse.

9 (a) A generally well answered item. A number of candidates responded to more than two boxes, thereby preventing a full allocation of marks.

(b) Many candidates failed to realise that two boxes were involved for one mark. This prevented them from obtaining the mark. Such candidates ticked the first box correctly.

(c) Few candidates obtained both marks. Relatively few candidates could identify 'neuron' as the correct response in the second space. However, many did appreciate that the reflex arc was involved and that the brain modified the reflex response.

A223/01 – Twenty First Century Science Biology A (Ideas in Context plus B7) Foundation Tier

General Comments

This was only the second time this unit has been examined. There was a relatively small entry who scored marks ranging from 3 to 47 out of the 55 available, which was similar to last year's entry.

Given the open response nature of the questions it was pleasing that there were relatively few no responses, indicating good exam preparation and some confidence. There was no evidence that students were short of time with the final questions apparently receiving the same effort as those at the start of the paper. Question 1 based on the pre-release material was generally well answered, an improvement from last year suggesting that centres had prepared students well, discussing the material and thinking about the types of questions that could be posed.

Some questions proved very demanding and there was evidence of a lack of knowledge in several areas (energy flow in food chains, pyramids of numbers and biomass) and the calculation presented problems for the majority of candidates.

Comments on Individual Questions

1   In the main this question based on the pre-release article was well answered by all candidates

   (a)   In part (i) most candidates correctly gave the increased risk as 3 although some gave an example of a factor that increased risk and 7 was a common error.
   Again in part (ii) most candidates scored well here identifying factors that increased the risk. Some did not read the question carefully enough and gave "wide hips" as a factor.
   Part (iii) proved a very difficult question with students often failing to adequately express their ideas. Answers of the type "a risk factor is something that increases risk" were common whereas the mark scheme was looking for the idea of changing the chance or probability of developing breast cancer.

   (b)   Was well answered, with most candidates describing intercristal diameter accurately.

   (c)   In part (i) the majority of candidates correctly identified that the increased risk was at the beginning and end of pregnancy.
   Similarly in part (ii) most candidates correctly reported that higher levels of oestrogen caused changes to breast tissue in the fetus.

   (d)   Although most candidates spotted that using synthetic oestrogen to treat women at risk of miscarriage had led to the discovery of a link between high oestrogen levels and breast cancer, they often failed to gain the second mark by going on to say that the children of these women showed a higher incidence of cancer.

   (e)   This was disappointingly answered with many references to fair test or accuracy whereas the mark scheme was looking for ideas of reliability or even that outliers could be spotted in the data if there were enough results.

(f)   Again well answered by the majority of candidates with many correct references to development of drugs to reduce oestrogen levels.

2   This question was about energy transfer and proved to be very difficult. Many candidates failed to use the terms autotroph and heterotroph referring instead to plants and animals. Those that did use the terms often did so incorrectly. Although many candidates recognised the role of the Sun as a provider of energy, a surprising number reported that the Sun produced chemical energy which is passed on to plants. Poor expression hampered the explanations of many candidates here.

3   This question required the calculation of a percentage biomass in a soil sample. Correct calculations were rare. The majority of candidates failed to show any working out so it was difficult to give credit. Centres should encourage candidates to clearly record their calculations even if they use a calculator, lack of which may well have been the cause for the number of no responses to this question.

4   This question was about ecological pyramids. This question was surprisingly problematic for many candidates who appeared to have little familiarity with either pyramids of number or biomass and it was one of the relatively few questions where there were a substantial number of candidates who made little or no attempt to answer the question.

(a)   The majority of candidates could not correctly identify the two pyramids.

(b)   Descriptions of the advantage of each pyramid were, perhaps unsurprisingly given the poor responses in (a), confused.

5   This question was about photosynthesis.

(a)   It was pleasing to see how many candidates could correctly complete the equation for photosynthesis, the commonest error being to transpose water and oxygen.

(b)   Again many candidates scored a mark here for knowing a factor that could affect the rate of photosynthesis although some failed to gain credit for references to "Sun" rather than "light" or "sunlight".

(c)   This proved to be the most difficult part of the question; both parts (i) and (ii) proved difficult as few candidates could give a correct example of either type of polymer.

6   This question was about parasitism.

(a)   Candidates often showed a good knowledge of parasitism and gave accurate examples. However, a large number tried to answer in terms of how being infected by a parasite could be both an advantage and a disadvantage so failing to gain full marks.

(b)   Again candidates showed a good knowledge of parasitism, most spotting the incorrect sentences or at least one or two of them.

7   This question was about bacterial cell structure and new technologies.

(a)   A sound knowledge of bacterial cell structure was shown with the chromosome being correctly identified by most candidates. A significant number of candidates confused "wall" and "membrane" on the diagram.

(b)   Products from fermenters were less well known, alcoholic drinks and penicillin being the most common correct examples given.

(c) The majority of candidates correctly identified the argument as being ethical but did not in all cases go on to justify this adequately. Where they did it was often by reference to religious belief. Some candidates misunderstood the question and wrote about the economic, ethical and social implications of genetic modification.

8 This question was about respiration.

(a) This was surprisingly poorly answered with many students answering in terms of muscle growth due to exercise rather than simply muscle contraction.

(b) This proved difficult and many candidates showed considerable confusion about what the blood transports. Clear answers were rare but many candidates scored marks for references to increased heart and or breathing rates,

(c) This was less well answered than the similar question on photosynthesis. A common misconception was that lactic acid was used in anaerobic respiration.

(d) Again whilst many candidates knew oxygen was needed for aerobic respiration some referred only to the need to breathe for aerobic respiration.

9 This question was about the circulatory system.

(a) Candidates had to choose from a list to describe the function of components of the blood labelled on a diagram of a blood smear. The functions of red, and to a lesser extent white, blood cells were well known. Fewer candidates knew the function of platelets with transmitting nerve impulses being a common error.

(b) The AB blood group was clearly well known but many candidates gave answers in terms of compatibility of blood for use in blood transfusions. Many candidates confused antigens and antibodies or hedged their bets by referring to antibodies and antigens on red blood cells and in the plasma.

(c) Whilst many candidates correctly identified B as correctly showing a double circulation system many of these were unable to explain their answer sufficiently clearly to gain the second mark.

10 This was a question about a sprained elbow and its treatment.

(a) Unlike last year most candidates showed a good knowledge of joints and correctly identified the functions of the parts labelled.

(b) In part (i), whilst many candidates suggested suitable examples of medical history with allergies to drugs being a common suggestion, some unlikely suggestions were also made.
In part (ii) it was gratifying to see how many candidates linked their answers to b(i) and b(ii), many candidates recognising the role of the information suggested in b(i) in helping to diagnose or treat the injury.

A223/02 – Twenty First Century Science Biology A (Ideas in Context plus B7) Higher Tier

General Comments

Most candidates performed 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 any candidates ran out of time.

Comments on Individual Questions

1   This question was based on the pre-release material "Wide hips increase risk of breast cancer".

   (a)   This question required candidates to use the pre-release material to discover that a study using synthetic oestrogen increased the risk of cancer in the babies of pregnant women. Most candidates scored the first mark for using synthetic oestrogen, but failed to gain the second mark as they assumed the cancer was in the mother and not the baby.

   (b)   Most candidates were awarded this mark. Credit was given for any idea that a risk factor increases the chances of harm. Candidates who said it causes harm did not score, neither did those candidates who simply reworded and repeated the question by saying "something that is a risk".

   (c)   This question was answered quite well by many candidates. Good responses referred to increasing reliability or confidence in the results. Candidates who referred to reducing outliers in results also scored. Answers that simply stated to improve accuracy however did not score.

   (d)   This was answered well by most candidates. Credit was given for recognising the reviewers had to be experts or fellow scientists and for the idea of checking the work. Credit was not given for simply stating "review" the work as this was given in the question.

   (e)   Most candidates managed to score at least one of the two marks for this question. Candidates who stated that new drugs could be developed to lower oestrogen levels scored both marks. Those candidates who referred to the idea of screening pregnant women scored one of the two marks.

   (f)   Again, this was quite well answered with most candidates scoring at least one mark. Good answers referred to the fact that that this was a genetic factor and that it could be passed onto their children. Candidates who stated "wide hips or the oestrogen gene can be passed onto their children" scored both marks.

   (g)   This question was surprisingly well answered as it required candidates to think carefully about the data provided. Most candidates scored at least one mark for giving the idea that David was wrong because this is a correlation but not a cause. Simply stating David was wrong did not score. Those candidates who went on to say that it increased the

risk, or that other risk factors may be involved, scored the second mark. It was pleasing to see how well candidates coped with the idea of a correlation.

2   This and following questions were based on B7 of the specification. Most candidates scored at least one mark for this question. Candidates were required to indicate that the energy came from the Sun, was converted into chemical energy by autotrophs, who in turn were consumed by heterotrophs. These three points were converted into two marks. However those candidates who referred to energy being made, or the Sun providing chemical energy, were limited to a maximum 1 mark.

3   This question required candidates to determine the biomass in a soil sample and then calculate the percentage biomass in the sample. Only more able candidates scored two marks for this question. Answers of '20' were awarded two marks, but candidates who gave an incorrect answer were credited with one mark if they had the number 30, or '140 – 110' in their working. This is a very good reason why candidates should always be encouraged to show their working.

4 (a)   This was very well answered by almost all candidates who gave the correct answer of 10.

(b)   This was also well answered by most candidates. Credit was given for stating that energy is lost and then going on to give an example such as movement or heat. Vague answers such as respiration and bodily functions, were not credited.

(c)   Most candidates scored this mark by stating that not enough energy would be available for another stage. Candidates who did not score often gave answers such as the animals would be too big or the pyramid was too small at the top.

5 (a)   Most candidates scored two marks on this question. Those candidates who gave the chemical formulae of the compound scored providing the equation was correct. This is always a risky strategy by candidates who would be well advised to simply do as they were asked and write down the word equation.

(b)   This was well answered with most candidates scoring both marks. This question was made more difficult as candidates were not told how many responses were required. Thus it was all the more pleasing to see most candidates scoring both marks.

(c)   Starch or cellulose were the answers required in part (i). Chlorophyll was a common incorrect response but most candidates gave the correct response.
In part (ii) most candidates gave the correct answer, protein. Named plastics were the most common error for this question. Specifically named proteins such as keratin, were credited.

6 (a)   This question was answered well by most candidates. Credit was given for red blood cells and recessive and both were needed to score the mark. Answers that referred to not dominant or co-dominant were credited.

(b)   Candidates were only credited for HH and not for saying "healthy person" as it was the genotype and not the phenotype that was requested. Most candidates answered this question correctly.

(c)   Candidates were keyed into this question by the previous one, so most gave a sensible answer that involved malaria. However some did not and failed to score either of the two marks. Good answers referred to carriers having some protection from malaria and that this condition increased their chances of survival, so that they could pass the condition onto their children.

7 (a) This question was about labelling a diagram of a bacterium. Candidates are familiar with labelling animal cells and some incorrectly labelled the bacterial DNA as a nucleus. This was not credited. However candidates only had to have one correct label to score one mark. This ensured that most candidates scored at least one mark for this question. Indeed most scored two marks by correctly labelling the wall, the membrane and the chromosome or DNA.

(b) This was not an easy question but candidates did surprisingly well with most scoring at least one mark. Good answers referred to cutting out the required gene by using restriction enzymes, naming a specific vector such as a bacteriophage and then explaining how the vector transferred the gene.

(c) This question was also answered well by most candidates. The majority of candidates realised that this was an ethical implication and went on to explain why, such as it is morally wrong or against God or nature. Unfortunately several candidates then went on to lose the mark by saying it could also be a different implication, or giving a wrong reason such as "we do not know the danger it could cause when released into the environment". This was basically asking the examiner to choose the correct response so did not score.

8 (a) This was another question where candidates were not told the number of correct responses required. Candidates should be warned against assuming that because this is a two mark question, there must be two correct responses. Questions will be set that require a different number of correct responses to the marks available. Candidates who gave three responses were only able to score a maximum of one mark. Most candidates scored at least one mark and many scored both. A common incorrect response was box 4 "ATP is converted to lactic acid during respiration".

(b) This was well answered, requiring glucose on the left of the equation and lactic acid on the right.

(c) This was worth four marks and most candidates managed to score some of them. Many scored full marks. There were no common, consistent errors.

(d) This question was about oxygen debt. Credit was given for knowing that lactic acid would be produced and that insufficient oxygen was available.
A third mark was available for producing a clear ordered answer. This was credited even if the answer was in error provided it attempted to answer the question that was asked.

9 (a) Although many candidates scored three marks for this question a significant number of candidates did not. Common errors included labelling platelets as plasma or stating that platelets stop blood from clotting. Several candidates also thought that red bloods cells carried food around the body as well as oxygen. This did not score.

(b) This proved to be a more challenging question. Candidates were required to choose the two correct responses and use them in their answer. Only the most able candidates stated that AB antigens were found on red blood cells and there were no AB antibodies in the plasma. Candidates often confused antigens with antibodies in their answer.

10 Most candidates scored at least one mark for this question. Credit was given for explaining a measurement that could be taken such as age, weight or blood pressure and a second mark for indicating a comparison or change that may take place in the measurements. Those candidates who referred to the accuracy of monitoring or gave an example of making the data more reliable e.g. recording the same time each day, were also credited.

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	
P(b)	(i) 6 (ii) 4 (iii) n/a	5	**6**
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

OCR

RECOGNISING ACHIEVEMENT

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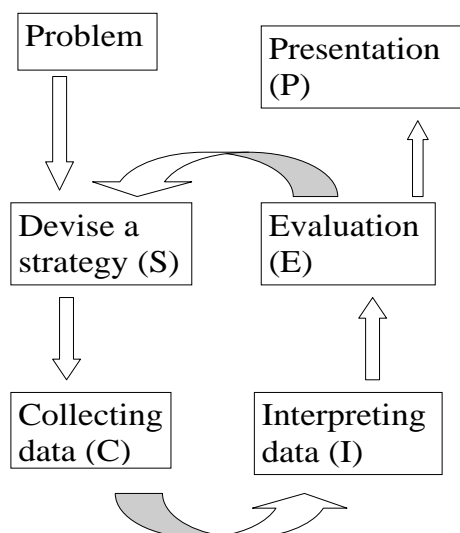
D(c): The assessment of the use of scientific terminology and the level of spelling, punctuation and grammar was generally very fairly assessed by Centres.

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.

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Problem            Presentation
                        (P)

Devise a           Evaluation
strategy (S)       (E)

Collecting         Interpreting
data (C)           data (I)
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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
Biology A (Specification Code J633)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A221/01	Raw	42	N/A	N/A	N/A	30	26	22	19	16	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A221/02	Raw	42	39	35	31	27	23	21	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A222/01	Raw	42	N/A	N/A	N/A	26	22	18	15	12	0
	UMS	34	N/A	N/A	N/A	30	25	20	15	10	0
A222/02	Raw	42	37	32	26	21	16	13	N/A	N/A	0
	UMS	50	45	40	35	30	25	23	N/A	N/A	0
A223/01	Raw	55	N/A	N/A	N/A	23	19	15	11	7	0
	UMS	100	N/A	N/A	N/A	60	50	40	30	20	0
A223/02	Raw	55	45	37	29	21	16	13	N/A	N/A	0
	UMS	100	90	80	70	60	50	45	N/A	N/A	0
A229	Raw	40	33	30	26	23	19	15	12	9	0
	UMS	100	90	80	70	60	50	40	30	20	0
A230	Raw	40	33	31	28	25	21	18	15	12	0
	UMS	100	90	80	70	60	50	40	30	20	0

A229/A230 (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
J633	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
J633	16.6	46.8	76.2	92.7	98.0	99.4	99.9	100.0	100.0	16407

16793 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.