OCR
RECOGNISING ACHIEVEMENT

GCSE

# Biology B

**Gateway Science Suite**

General Certificate of Secondary Education **J643**

# Examiners' Reports

# June 2011

**J643/R/11**

Oxford Cambridge and RSA Examinations

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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

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Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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## General Certificate of Secondary Education

## Biology B (Gateway) (J643)

## EXAMINERS' REPORTS

# Chief Examiner's Report

**General Comments**

The entry for certification in Biology has been increasing steadily from 10697 in June 2008, to 21713 this summer, the majority of candidates continuing to take the Higher Tier examinations. Over two thirds of candidates this summer took coursework option B635 (Science in the News and Can-Do Tasks), as opposed to option B636 (Research Study and Data Task), a balance that is consistent with previous years.

The following reports provide detailed feedback on each examination paper, although some general comments may be made. Usually candidates performed better on those questions where there was information given to help them answer, either in terms of clarification of what was required (for example, by means of bullet-pointed 'scaffolding') or in terms of there being information to analyse (for example in graphs, tables, diagrams or prose). It was also reported by Examiners that some candidates did not score as highly as they might have expected on questions requiring straight-forward recall of content. Having said this, there were also instances where candidates did correctly recall generic knowledge but did not always use this appropriately to answer specific questions. This brings us to the perennial issue of some candidates not answering the questions being asked, often apparently through not reading the questions carefully enough. Centres should also inform their candidates that when a question asks, for example, for two answers, they should not give two answers that are simply the converse of each other or different wordings of the same idea, but rather they should try to find two completely different points. Candidates should also be aware that, although they are often encouraged to answer in detail, if they give too many points there is the danger that they may give some answers which are incorrect and may therefore negate other correct answers. Examples of these points are illustrated in the following reports.

# B631/01 Modules B1, B2, B3 (Foundation Tier)

**General Comments:**

- In general the paper was balanced and accessible to all candidates.
- Very few candidates failed to complete the paper.
- Answers were appropriate to the question and there was less evidence than in previous series of guessing taking place.
- No artistic embellishments were observed indicating that the candidates were 'on task' throughout the session.
- Most questions were interpreted correctly. However, many candidates linked up all the boxes in Q.1(ai) rather than just the one line that was asked for in the question. The majority of candidates gave two reasons for Q.2(bii) but failed to realise that giving the reverse argument for the second reason does not gain credit.
- Overall candidates performed fairly well on this paper and marks ranging from low teens to low fifties were commonly seen.
- Weaker candidates were able to recall knowledge of the terms "endangered" and "diffusion" and understand the adaptations sperm cells show to aid fertilisation. More able candidates were able to describe how new cells are formed and had a knowledge of the presence of plant hormones in rooting powder. Most candidates could calculate an average in Q6(a) but it was very rare to see a correct calculation of the percentage in Q.9(bii).
- Candidates need to be more aware of making comparisons to avoid losing marks.

**Comments on Individual Questions:**

Q1 (ai) This was poorly attempted as the majority of candidates tried to link up all the boxes.

(aii) Few candidates referred to the idea of protection, the most common correct idea was that of it being automatic. Most candidates only scored 1.

(bi) Most got this right with 'nucleus'.

(bii) The majority of candidates gave correct responses with a wide range of disorders mentioned.

Q2 (ai) Generally a well answered question, but some just stated 'want it' rather than 'need it'.

(aii) Most gave cancer, a correct response.

(bi) A majority of candidates wrote 25 and gained the mark.

(bii) Most scored 1 by linking number of cigarettes smoked to birth weight but failed to score 2 as their second point was the reverse argument of their first.

Q3 (a) Only around half had this correct.

(b) Again around half had this correct and very few had both (a) and (b) correct.

(c) Quite a few worked out the RDA, 39g, but it was uncommon to see a calculation of her intake, 45g. Many got confused and said she ate 39g a day.

Q4 (a) The majority of candidates gained both marks; very few scored nothing. Those scoring 1 generally had the two eye problems the wrong way around.

(b) Most gained the second mark but very few mentioned measuring the resting pulse rate before exercise.

(ci) A large number of candidates erroneously wrote red blood vessels.

(cii) Most correctly identified the heart.

Q5 (a) Most candidates identified predator and habitat, less than half had the community mark.

(b) This was well answered by most candidates.

(c) Majority gained a mark, usually for 'reducing numbers caught' or the fish farm idea.

Q6 (a) Most candidates scored 2 here; not many scored 0.

(b) This was poorly answered, many just gave need to live near the sea. A lot of candidates wrote about being further from humans and predators. The most common correct answer was near food.

(c) Most were correct with the mates or shelter idea. Many gave habitat as an incorrect response.

Q7 (ai) The majority correctly named photosynthesis.

(aii) Most candidates gave chlorophyll; the most common incorrect answer was cellulose.

(aiii) The majority of candidates wrote oxygen; the most common incorrect response was carbon dioxide.

Q8 (a) The most common answers were camouflage and speed. Many didn't give clear associated explanations and many concentrated on sharp teeth and claws.

(bi) This question was well answered question with the majority gaining the mark.

(bii) Only about half the candidates had squirrel with very few giving kite but many got the second mark for habitat/environment.

Q9 (a) Many got adolescence in the wrong place, so generally marks were either 2 or 0.

(bi) Quite a lot of candidates correctly identified 14 months.

(bii) Around a dozen candidates in total got 2 marks here, and scoring 1 mark was very rare. Many did not attempt this at all and others divided 45 by 5 to give 9.

(ci) This was not answered well; many wrote about something happening to your head, or cells going wrong. Many candidates gave no response to this question.

(cii) Again, candidates often gave no response. Quite a few wrote about getting it from parents, or just said it is when genes go wrong. The most common correct answer was radiation.

Q10 (ai) This was very poorly answered, most said to protect/keep in the nucleus and cytoplasm.

(aii) Only about half gave cytoplasm.

(aiii) Many candidates did not give and answer to this question, and of those who answered many erroneously wrote respiration.

(b) Most got at least 2 marks, with marks generally awarded for 'tail for swimming' and 'large numbers increase chance of fertilisation'. Too many candidates are not specifying that the size is small and that there are many sperm, they just repeat the stem of the question, eg 'the size helps by...' or 'the amount of sperm helps by...'

Q11 (a) This was very well answered, few got less than 2 marks here.

(b) Not answered well. The most common mistake was to just define what a clone is without identifying an advantage. The most commonly seen correct idea was that of it being quicker.

(c) Less than half wrote hormones; many wrote nutrients or gave specific nutrients.

(di) About half correctly gave leaves as a response; many incorrectly wrote roots or stem.

(dii) A few more able candidates identified transpiration but the majority gave diffusion or evaporation.

(e) Quite a few candidates did not answer this; around half got it correct with mitosis or cell division/splitting.

# B631/02 Modules B1, B2, B3 (Higher Tier)

## General Comments

The level of difficulty of the paper appeared to be appropriate to the ability range of the candidates, producing a normal distribution of marks covering virtually the whole mark range available. Questions targeted at grades A*, A and B allowed the more able candidates taking the paper to demonstrate what they knew and understood, whilst questions targeted at grades C and D allowed all candidates access to the paper. Candidates appeared to have had sufficient time to complete the paper, with most attempting most, if not all, of the questions. The quality of candidates' spelling, punctuation and grammar was good overall and there were only a few cases where it was very difficult to interpret a candidate's writing.

## Comments on Individual Questions

Q1 (a)(i) A majority of candidates knew that the receptors were in the retina, although other eye parts were frequently mentioned.

(a)(ii) Only about half the candidates knew that the neurones would be sensory neurones, although motor and relay were also seen.

(b)(i) A small minority of candidates could clearly describe what an allele is. Answers often referred to different types of genes rather than different versions of the same gene.

(b)(ii) Less than half the candidates were able to explain what being heterozygous means. Some confused it with the term homozygous.

Q2 (a)(i) Most candidates correctly identified the substance as carbon monoxide. The most common incorrect answer was tar.

(a)(ii) Around a third of candidates made the link between tar and cancer or other lung diseases. Incorrect answers often referred to tar clogging up the lungs or blood vessels.

(b)(i) Most candidates were able to name the gap between neurones as a synapse.

(b)(ii) Most candidates simply described impulses as passing or jumping from one neurone to the next, which gained no credit. Only higher performing candidates correctly described the diffusion of neurotransmitters.

(c) Most candidates gained one mark for stating that the higher the number of cigarettes smoked, the lower the birth weight. The majority then gave the reverse argument as their second answer, and only a very few correctly referred to the large variation in results. When candidates are asked for more than one answer, they should avoid giving the same point twice, even though it may be reworded.

Q3 (a) A majority correctly explained that the breakfast contained the most vitamin C, although the answer had to be comparative, so some candidates lost the mark with answers such as 'high in vitamin C'. If they also stated that it contained the most iron then they lost the mark.

(b) Most candidates correctly calculated the RDA as 39g and also correctly compared this with the 45g gained from her diet.

(c) The concept of first class proteins is still not well understood, with only a small minority of candidates gaining the mark. Some candidates only referred to proteins as opposed to amino acids and while some did refer to essential amino acids they didn't usually explain that they are all found in animal protein.

(d) Most candidates gained at least one mark, and a minority gained two. Marks were most commonly awarded for the ideas that the advertisement may lead to poor self esteem, poor diets or eating disorders.

Q4 (a) Only a very few failed to gain both marks.

(b) Over half the candidates correctly chose the second box.

(c) Over half the candidates correctly gave concave lenses. The common incorrect answer was 'convex'.

Q5 (a) Although there was a spread of marks, the majority gained all three marks and hardly any candidates failed to score. Common errors included 'skeleton' for the first answer, 'eggs' for the second and 'biological' for the third.

(b)(i) Most candidates gained the mark for the idea of fishing quotas, phrased in one way or another.

(b)(ii) Many candidates did little more than reword the question and did not give a clear explanation. Some referred to fish moving from one part of the world to another without going further in their explanation.

Q6 (a) The vast majority gained both marks for calculating the average as 3.

(b)(i) To explain why dog whelks might be more common on the lower rather than the upper shore, it was not enough to simply say something like 'that's where it's wetter', as that simply described the conditions without making any link to the whelks. Answers describing avoiding desiccation were acceptable however. Most commonly, candidates gained marks for correctly making a link to an abundance of food or a lack of predators. Although a majority gained marks, very few scored two. One common error was to attribute the distribution to human interference.

(b)(ii) A majority gained one mark, usually for the idea of a small sample size, although some candidates did gain two. Some thought the conclusion was not reliable because all of the whelks had not been counted or because the quadrats were arranged in different patterns.

Q7 The common error was to confuse pollination with seed dispersal, so consequently candidates mostly gained either two marks or zero. Full marks could be gained either by giving two adaptations or giving one but explaining it.

Q8 (a)(i) The majority of candidates gained both marks for a fully correct equation, though some lost marks through not using subscripts correctly or for writing Co2 rather than CO2.

(a)(ii) Many candidates gained both marks although a few failed to follow the instructions and gave starch. Another minority didn't seem to appreciate the nature of glucose and suggested it changed into sugar. Cellulose and cell walls were common correct answers.

(b) A majority correctly gave another way of preserving organisms, usually in ice, or less commonly in amber. A noticeable number did not read the question properly, or did not appreciate what it meant, and described fossil formation in sedimentary rocks. A few confused the question with food preservation, usually suggesting fridges as the answer.

Q9 Marks were fairly evenly spread between zero, one and two. There seemed to be fewer candidates than in previous years who think that individual organisms evolve. Candidates often repeated the statement from the question that a long tusk helps attract a mate (which on its own gained no credit), without going beyond that to describe greater reproductive success. The idea of inheritance of the characteristic was well understood. Some candidates gave generic answers that could apply to any natural selection question (these did not gain credit) and many used the phrase 'survival of the fittest' which in this context was not appropriate.

Q10 (a) Only a minority gained the mark. The last option, that the head size decreases, was the common choice.

(b)(i) Most correctly read 14 months from the graph.

(b)(ii) About a third of candidates could read off Zoe's head size as 45cm and then use this to calculate the percentage increase as 11.1%.

(b)(iii) It was not enough to simply say that head size is measured 'to check for problems' or to 'measure brain size', rather the answer had to refer to possible growth or development problems. Around two thirds gained the mark.

(c)(i) Less than half the candidates could give a correct cause of mutation. Some gave the answer here to part (c)(ii).

(c)(ii) Less than half were able to describe a mutation as a change in the DNA base sequence. Some gave the answer here to part (c)(iii).

(c)(iii) Around a third of candidates knew that a mutation could cause a change in a protein.

Q11 (a) Most candidates knew that glucose moves into cells by diffusion.

(b)(i) Marks were fairly evenly distributed between zero, one and two. There was some confusion whether the acrosome contains enzymes or is an enzyme. Other poor wording, eg 'the acrosome eats away at the egg membrane', also did not gain credit.

(b)(ii) The majority of candidates knew that sperm cells are made by meiosis. Unlike in some previous years, candidates' answers were usually unambiguous in their spelling.

(c) Around two thirds correctly chose haploid as the answer. The common incorrect choices were diploid and zygote.

(d) This was targeted at A* so unsurprisingly only a handful of candidates were able to use the implications of surface area to volume ratio limiting movement in and out of a cell to explain why single-celled organisms are limited in size.

Q12 (a) A majority of candidates could give an advantage of growing plants by cloning rather than from seed. Just saying they would be the same was not enough; why this could be an advantage was needed for the mark.

(b)(i) It appeared that not all candidates understood the term aseptic, as less than half were able to explain why aseptic conditions are important during tissue culture.

(b)(ii) A minority of candidates appreciated that auxin is normally made in the tips of shoots and roots. A small number gained the mark for the answer that the auxin gene is switched off.

(b)(iii) Although there was some confusion between mitosis and meiosis, over half the candidates gained at least one mark, and about half of these gained two, for a correct description of what happens to chromosomes during mitosis. A common reason for losing marks was a lack of clarity, eg describing chromosomes as 'splitting' and not being clear if this referred to DNA replication or chromatid pairs separating.

(c) Only a minority of candidates appreciated that plants are easier to clone than animals because animal cells usually lose the ability to differentiate. Often candidates described the complexities of cloning animals without explaining the reason. Some tried to invoke ethical issues.

# B632/01 Modules B4, B5, B6 (Foundation Tier)

**General Comments:**

This paper elicited a range of marks from the candidates and allowed candidates to demonstrate what they knew about the topics. There were few marks right at the top end of the distribution, perhaps indicating that most candidates were entered at the correct tier.

It was good to see some improvement in calculations and graphical skills are also improving.

There are problems with candidates failing to recall or understand parts of the nitrogen cycle and kidney function is still poorly understood.

**Comments on Individual Questions:**

Q1 (a)(i) Many candidates missed the point about the plastic bag and the idea that the bag is impermeable was rarely seen.

(a)(ii) Most candidates scored 2 marks, with a few failing to show their calculation or making numerical errors.

(b) Many candidates scored marks for leaf and/or evaporation, with some knowing transpiration or diffusion and a small number mentioning stomata or pores. Too many just explained in terms of the water being used up by photosynthesis and quite a number put respiration.

(c) Poorly answered. Most candidates chose C, thinking that the fan was blowing extra carbon dioxide in. If the answer of A was given most only scored 2 (for photosynthesis). Those that mentioned light rarely got the idea of MORE light.

Q2 (a) Reasonably well answered – but many answers just referred to ice. Some candidates thought the fur stopped it decaying. Most candidates scored the mark for mentioning frozen/freezing but some clearly explained lack of bacteria and/or oxygen. Many were confused about what caused decay eg detritivores/animals/insects, many thought bacteria were killed by cold.

(b) Well answered. Most candidates chose teeth, with the most common incorrect answer being fur.

(c) This was poorly answered. Very few candidates scored marks with proteins, amino acids & enzymes.

(d) Most candidates provided good answers, most commonly carbon dioxide, occasionally methane.

Q3 (a) A surprising number of candidates did not know this. Incorrect answers included producers and from the Sun.

(b) Fairly well answered. The majority of candidates had the right idea but far too many confused it with growth and a few gave unqualified "waste".

(c)(i) Most candidates answered this correctly.

(c)(ii) Correct answers were rare. The range of answers included 5, 50, 20 and 0.05.

(d) Most candidates knew this, but some struggled to explain it. Some wrote 'units' without mentioning energy.

(e) This was surprisingly poorly answered with few candidates scoring both marks and a variety of wrong answers.

Q4 (a) Some answers here were too vague, eg blood transfusions and 'if you were just a bit short on blood or blood cells'.

(b) Mostly correct, the most common wrong answer was platelets.

(c) Most candidates answered correctly but a few wrote heart, a named vessel or 'artillery'.

(d)(i) The majority of answers were correct.

(d)(ii) The majority of answers were correct.

(e) Most candidates seemed to get the right idea but with some struggling to explain what they meant. A few simply stated that it was a popular group.

Q5 (a) Many candidates answered correct, but tendon was often given with the other two answers seen occasionally.

(b) Most candidates scored one mark for triceps. Hinge was sometimes seen but more often candidates gave ball and socket. Occasionally a candidate scored the final mark with antagonistic.

Q6 (a)(i) Many candidates knew excretion, but generally could not spell it correctly. A wide range of incorrect answers were seen.

(a)(ii) This was answered surprisingly poorly – the most common answer was glucose and water.

(b) Most candidates had no real idea how to answer this question. Two marks were very rarely given, often just one for 'made in the liver'. A wide range of incorrect organs given, most commonly the kidneys and bladder, and many thought urea was made from glucose and water.

Q7 (a)(i) Most candidates answered correctly but a few gave fins or scales.

(a)(ii) This part of the question was not well answered. Most answers were too vague, eg 'for swimming under water'.

(b) This was also poorly answered, often due to failure to mention gills. There were a small number of good attempts and a small number of higher level answers relating to gills sticking together when out of water.

Q8 (a) The answers here were disappointing with too many vague answers about sperm and egg meeting or just about creating pregnancy or a baby. Quite a number of candidates just wrote that sperm and egg fertilise.

(b) There were some misconceptions here with the twins sometimes having different fathers. Many got the idea of different genes, but too many referred to different characteristics. Also some thought one twin got all (or more of) the height genes and the other got none/less. Only a few candidates mentioned anything else with a few references to different diet or different amounts of growth hormone. This question was a good differentiator.

Q9 (a) There were a surprising number of wrong answers here (all options seen), but many got both correct.

(b) This was not well known with many candidates inventing names. Biogas was rare, but biofuel was more common.

(c) All three possible answers were seen here.

(d) Many candidates scored 2 marks but a significant number had no real idea how to approach the question. A few candidates did not even attempt it.

Q10 (a)(i) Most candidates thought, erroneously, that yeast is a bacterium. There was also a range of other incorrect answers such as living and small.

(a)(ii) This was excellently answered and wrong answers were rare.

(b)(i) Fairly well answered, but there were a selection of wrong answers, eg 3.2.

(b)(ii) Many candidates referred to rate of reactions, collision, more energy etc. Discussions of temperature often failed to refer to higher or lower temperatures. Also, candidates often wrote about alcohol production, fermentation etc instead of reproduction or growth.

(c) The answer 'gasohol' was rare, but a few gained the mark with 'biofuel'.

Q11 (a) This was not well answered – too many candidates answering C.

(b)(i) A surprising number of candidates could not answer this.

(b)(ii) Candidates found this very hard and good understanding was rare. Few realised that the plasmid came out of a bacterium; many thought it came out of the plant cell it was being put back into. Most realised that an insect poison gene was put into the plasmid, but some used insect poison instead. Too many had the plasmid put back into the nucleus, not just the cell. Most commonly this scored 0 or 1 mark. For the 3rd point, candidates often just repeated words from the question.

# B632/02 Modules B4, B5, B6 (Higher Tier)

## General Comments

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates, producing a normal distribution of marks, covering virtually the whole mark range available. Questions targeted at grades A*, A and B allowed the more able candidates taking the paper to demonstrate what they knew and understood, whilst questions targeted at grades C and D allowed all candidates access to the paper. Candidates appeared to have had sufficient time to complete the paper, with most attempting most, if not all, of the questions. The perennial issue of candidates not reading questions carefully and therefore answering different questions from those actually being asked did adversely affect the marks of some candidates. The quality of candidates' spelling, punctuation and grammar was good overall and there were only a few cases where it was very difficult to interpret a candidate's writing.

## Comments on Individual Questions

Q1 (a) A majority of candidates correctly explained that the bodies had only partly decayed, usually due to a lack of oxygen, but also due to the acidity of the bog. No mark was given for the suggestion that there was a lack of water.

(b) It was not enough to basically just reword the question and say it was 'too cold for microbes' or that they lacked energy, rather some link had to be made to a reduced rate of microbial respiration, growth or reproduction, or a reduced rate of enzyme action. Around half the candidates gained the mark.

(c)(i) Half the candidates gained the mark, usually for protein, ammonia or ammonium compounds.

(c)(ii) Most candidates gained the mark for methane or carbon dioxide. Incorrect answers included nitrogen and carbon.

(d)(i) Over half the candidates correctly named denitrifying bacteria. The common errors were to give nitrifying or nitrogen-fixing bacteria.

(d)(ii) The majority of candidates knew that nitrates were converted to nitrogen gas, although a noticeable number correctly suggested ammonia or ammonium compounds.

(e) Around two thirds of candidates gained the mark for explaining that peat is not a biofuel because it is not renewable or because it takes a long time to form. There was scope on the mark scheme to award the mark if candidates gave a valid reason why peat could be classed as a biofuel, but this was very rarely given. One common non-scoring answer was that peat is a biofuel because it is made from dead organic matter.

Q2 (a) Most candidates gained the mark, with a variety of answers such as 'heat', 'respiration', 'movement' and 'excretion'. The common incorrect answer was 'growth' which if it appeared, negated any other marks as it showed a complete lack of understanding of the question.

(b)(i) Almost all candidates correctly calculated 10%.

(b)(ii) Just over half the candidates correctly calculated 0.5%. The common incorrect answer was 5%.

(c) The vast majority of candidates correctly explained that humans would get more energy by eating corn than by eating chickens.

(d) Over half the candidates gained at least one mark but only a minority gained two. Marks were available for the idea that if they move around more, then chickens will use more energy, and for the idea that therefore the chickens will growth more slowly or will need more food. Some candidates lost marks because their answers were not comparative.

Q3 (a) Almost all candidates identified the correct solutions.

(b) Although many candidates may have understood osmosis, they often lost marks through a lack of clarity. The most common shortcoming was to refer to just 'concentration' when they may have meant 'water concentration'. (Unqualified references to concentration were taken by Examiners to refer to solute concentration.) It was also often left unclear what was moving and in what direction. Although some candidates correctly said it was water moving into the potatoes, others just referred to 'it' moving. Marks were fairly evenly distributed between zero, one and two marks.

(c)(i) Most candidates correctly chose A. C was the most common incorrect response.

(c)(ii) The majority of candidates correctly chose 'turgid'. The most common incorrect answer was 'flaccid'.

(c)(iii) Around half the candidates correctly named chloroplasts. Incorrect answers included cell walls, stomata and xylem. Chlorophyll gained no credit as the question asked for structures.

(c)(iv) Two thirds of candidates gained the mark, usually for xylem being hollow or dead.

Q4 (a) Two thirds of candidates correctly stated that haemophilia affects blood clotting, although many got confused with haemoglobin and thought it was to do with carrying oxygen.

(b) It's unclear whether it was a lack of understanding or shortcomings in expression, but less than a third of candidates could clearly and unambiguously explain what is meant by a double circulatory system. For example, that it is simply 'two circuits' was not an uncommon answer. Some seemed to think it is a way of separating oxygenated and deoxygenated blood.

(c) Nearly half gave a satisfactory description of one of Galen's ideas.

(d) Most candidates knew that the heartbeat is controlled by the pacemaker.

(e)(i) Less than a third correctly identified which blood groups have no a or b antibodies, arriving at the answer 4%. Many gave 44%, showing they thought blood group O was the answer.

(e)(ii) Even fewer than in part (e)(i) correctly identified those with the rhesus antigen to produce the answer 83%. Many gave 4%, 17% or 44%.

(f) Although many candidates attempted to answer in terms of antigens, antibodies and agglutination, to gain the mark it was necessary to specifically explain that clumping would occur due to the presence of antibody a and antigen A. Only a small minority gained the mark.

Q5 (a)(i) Despite many interesting spellings, the majority of candidates gained the mark for naming synovial fluid.

(a)(ii) Most candidates could describe the function of synovial fluid.

(b) Virtually all candidates gained at least one mark, usually for 'triceps'. Around a third gained two marks and nearly half gained three. 'Antagonistic' was the most difficult answer to get and when it did appear Examiners reported it was frequently misspelt.

Q6 (a) There was a fairly even split between those getting zero, one and two marks. Common errors included that urea is made in the kidneys, pancreas or stomach and that it is made from glucose, salt, minerals or waste.

(b) Less than a third of candidates gained any marks, and of those only a third gained both marks. This is not surprising as the question was targeted at the most able. There were many mentions of ADH and water, as these were in the question, but only a few candidates were able to give a correct, coherent answer.

(c) Most candidates explained that we have two kidneys or that we only need one to survive.

Q7 (a) A majority of candidates gained the mark for explaining that gills only work in water, with the better answers giving reasons such as the gills drying up or sticking together when out of water.

(b) To gain each mark, candidates had to describe each adaptation and explain it. This turned out to be a taxing question with a majority of candidates failing to score. The common error was to not give a detailed enough explanation, with many candidates not going much beyond the idea of efficient gas exchange which was already in the question. No credit was given for gills being moist. Some candidates did not read the question carefully and wrote about other fish adaptations such as being streamlined. Some described gill rakers.

Q8 (a) Given that the question had already used the term 'fuel', there was no mark for this as an answer on its own, nor simply for the answer that it can be burnt, consequently many candidates did not score, although the majority did gain the mark for specific examples of the use of methane for heating or in vehicles.

(b) Candidates often lost marks for not giving comparative answers, eg there was a mark for saying the methane would be 'more flammable' but not for it simply being 'flammable'. About half the candidates gained one mark, usually for the fact that the methane wouldn't be explosive. Very few gained both marks. Some incorrect answers suggested that bacteria would not be able to work.

(c) Two thirds of candidates correctly chose B. The usual wrong answer was C.

(d) Most candidates correctly calculated 150 for two marks.

Q9 (a) The equation proved difficult with about a third of candidates gaining full marks. One mark was available for correct formulae but incorrect balancing, but this applied to few candidates. Although some clearly didn't know what substances were involved, others did but produced incorrect formulae. Some lost marks through incorrect use of lower case letters or not correctly using subscripts.

(b)(i) Around half the candidates correctly suggested that higher temperatures increased the rate of reproduction. Marks were commonly lost either through not giving a relationship, eg 'temperature increases reproduction', or for referring to alcohol production instead of reproduction.

(b)(ii) Around a third of candidates recognised that the rate of reproduction would double. That it would simply 'increase' was insufficient. Some also didn't follow the instructions in the question and referred to alcohol production.

(c) Most candidates could give one advantage of using biofuels, most commonly that they are renewable or the idea that they are carbon-neutral. Candidates should be aware that unqualified answers such as 'clean' or 'environmentally friendly' won't usually gain credit in examinations, as was the case in this question.

Q10 (a)(i) Although many candidates gained one mark for the idea that fertilisers caused rapid algal growth, far fewer gained the second mark for correctly linking this to the low levels of oxygen, many saying simply that the algae used up the oxygen.

(a)(ii) The concept of persistence did not appear to be well understood, with a very small minority gaining full marks, although about a third of candidates did gain one mark, usually for the idea that high levels of the insecticide would be toxic. Many candidates simply described the food chain.

(b) Most candidates correctly chose 'transgenic'.

(c) To gain each mark candidates had to not only name each enzyme but explain what it does to DNA. About a quarter of candidates gained one mark, usually for the restriction enzyme, and about a quarter gained both marks. Although some clearly didn't know the answers, with other enzymes appearing regularly (especially amylase and lipase), others lost marks through not specifically saying what happened to DNA, so, for example, saying that restriction enzymes cut DNA gained a mark, but just saying that they removed genes (as shown in the diagram) was not enough.

Q11 Most candidates gained at least one mark with about a third gaining two. The most common correct answers referred to whether antiseptics or antibiotics were used for prevention or cure, or whether they were usually taken internally or externally. Some candidates correctly explained that antibiotics only kill bacteria. Common errors were to give two answers that were the same marking point, eg 'antiseptics are used externally' and 'antibiotics are used internally', or to confuse antibiotics with antibodies.

# B635 Can-Do tasks and report on Science in the News

**General Comments**

For teachers and moderators, Science Skills assessment is now well established. However, it is not possible to report any improvements in the average performance of candidates though there is some evidence that the expectations of teachers and centres are higher.

For Science Skills assessment, there are two components: Can-Do Tasks and Science in the News.

The aim of Science in the News is to get candidates to research a scientific issue, looking fairly at both sides, before reporting and finally coming up with a reasoned answer to the question. In some centres candidates do this, but in some it is no more than an essay on the topic giving few opportunities for matching the assessment criteria. Too often this year centres have awarded 6 marks routinely for Qualities A and F with little regard for the hierarchical criteria.

It is possible for candidates use the same piece of Science in the News for more than one specification. However, each specification is moderated separately so if the same piece of work is used, it must be photocopied each time it is used. Marks cannot be just transferred from one specification to another.

It is disappointing that an increasing number of candidates score 24 for the Can Do tasks and nothing for Science in the News. The skills claimed to be shown in completing Can Do tasks are valuable in the Science in the News task.

Centres are reminded that, if a piece of work is resubmitted in a following year, the Science in the News report cannot be added to but new Can-Do tasks can be attempted. If the Science in the News report is not considered to represent the true standard of the candidate a new and different Science in the News task should be attempted.

**Administration matters**

Administration matters – general

Teachers are required to supply, for each of the candidates chosen in the sample, a breakdown of the marks awarded for the Can-Do tasks together with the marks awarded for each of the six Qualities in the Science in the News task which had been chosen for assessment. For the first time this year the sample was chosen by OCR's Moderation Manager and not the Moderator.

Administration matters – selecting tasks for Science in the News

One of the strengths of Gateway Skills Assessment is that all of the materials which are required for each of the Science in the News tasks are provided by OCR and are available on the secure Interchange website. Some centres have not realised that new tasks are been added each year and it is a pity that over 90% of candidates complete one of the tasks which were in the original batch. It is of little surprise that candidates say the data is out of date.

Centres completing the same task year after year may give the impression that there is only one scientific issue worth discussing. It is worth noting that for the new Gateway specifications, the Controlled Assessment tasks, still set by OCR, will change each year. Teachers sometimes

argue that they use the same task because they have set up mark schemes for the task, but all marking should be against the published generic criteria and so changing the task should not matter.

Administration matters – Supervision of Skills Assessment

One of the strengths of Gateway Skills assessment is that the assessed work is under the direct control of the teacher. This is a good precursor for the new Controlled Assessments which begin in 2012.

All Science in the News tasks are written under controlled conditions so that the teacher can sign the Centre Authentication Form (CSS160) with confidence. Unfortunately, there is sometimes evidence of teachers advising candidates of improvements that should be made before the work is submitted. This is not permitted. Also, candidates cannot bring into the session summaries they have written. They can bring in their research, a bibliography and any graph that they have prepared.

The teacher should give the candidates the OCR stimulus material for a task after the topic has been studied so that they are fully equipped with the background to the task. The teacher may read through the stimulus material and explain any scientific words but they must not give any opinion.

Centres are allowed to use their own writing frames providing they are generic i.e. not specific to the task and the same writing frame must be used for all tasks. There are still a few centres using non-generic writing frames.

There is considerable evidence that candidates do their best when they are given independence to study the topic and look at both sides of the argument. It is common, in some centres, for candidates to be provided with a list of suitable sources. Even if they are fully referenced, this does not automatically give the candidates 4 marks. Sources must be used and not just quoted. It is not unusual to see 10 or more sources listed. This is totally unnecessary as no candidate can use all of these adequately in the report. Telling candidates which are for and which are against the argument is giving too much assistance.

Administration matters – research time

Each Topic requires the candidates to undertake some research for themselves in a period of approximately one week This research could be done in school, either in the laboratory or a computer facility, or it could be done at home, and it is emphasised that the candidates do not need to be supervised during this preliminary research and they do not necessarily need to work on their own. If the preliminary research is done in school, teachers can provide some materials to get the candidates started with their task. However, in some centres the candidates are provided with a complete list of source material for use and the necessary element of choice and selection on the part of the candidate for relevant aspects had therefore been removed.

Administration matters – supervised session

When the preliminary research has been completed, the Science in the News tasks are written up under controlled conditions in the classroom/laboratory. Candidates are required to work independently and, although a time of 1 hour is suggested, the centre may use more or less time as required. If it extends beyond one lesson, the work should be collected in between the sessions and stored securely.

A limit of 400-800 words is also suggested in the specification.

Increasing numbers of candidates use word processors to produce their reports.

Centres are reminded that this is acceptable, providing the centre can ensure

- that no complete or largely complete report is brought into the writing session on a USB storage pen or in any other electronic format;
- no competed report is taken out or e-mailed to another person;
- the candidate cannot access websites electronically either from storage devices or the Internet; the Internet should be off during the writing up session.

If these conditions cannot be guaranteed, it is not possible for the teacher to sign the Centre Authentication Form, and hand-written reports should be used.

Moderators continue to see word processed reports in which the whole report has been pasted in electronically from websites without any acknowledgement, as if it was the writing of the candidate. Quality F marks can only be assessed against work the candidate has written, even if the source is fully referenced.

Evidence of drafting and redrafting of candidates' reports or too much coaching leads to the work not being accepted for moderation and reported to the OCR Malpractice Committee.

**Can-Do tasks**

Can-Do tasks are an important part of the Gateway Science specification. Carried out well they are motivational for students at all attainment levels. The Tasks ensure that practical science is an important aspect of the course and they can also ensure that ICT is used appropriately.

They are not expected to differentiate candidates above Grade C.

These tasks must be credited for individual work and not for a group of candidates collectively completing a task. All aspects of a task must be completed before credit is given and it is not possible to award 1 or 2 marks for a 3 mark task.

Centres are not expected to provide any evidence for the moderator to support the awarding of marks for Can-Do tasks.

**Science in the News**

Approach

Since Can-Do tasks will not differentiate above Grade C, it is essential that the necessary differentiation between the levels of attainment of candidates is obtained using Science in the News.

The marking criteria must be applied hierarchically. They can only be awarded when the whole statement is fully matched. There are still some centres trying to use a 'best-fit' principle.

It has always been OCR policy to encourage teachers to annotate coursework. As candidates may attempt several Science in the News tasks, this represents a burden on teachers when, in reality, very little of the work will be seen by a moderator. It is recommended that the emphasis should be given to the need to report back to students so they can improve in the future. When the sample is requested by the moderator, a little time should be spent checking the annotation of the maximum of 20 reports that have to be sent. In particular annotation should concentrate on why intermediate marks (i.e. 1, 3 and 5) have been awarded. The aim of annotation is to provide evidence that the moderator is able to accept in support of the marks awarded by the centre.

It is important that internal standardisation is carried out and the moderator informed of the way in which it has been done. This year several centres had clearly not internally standardised the

marks and consequently the rank order was not valid. In such cases the sample has to be returned to the centre, and it is not desirable for teachers, for moderators or for OCR if work has to be returned at the beginning of June to be re-marked. It is possible that the marks of a centre could be reduced if one or two teachers have over-marked and internal standardisation has not taken place.

**Quality A (Approach to the Task)**

Candidates who do not undertake any research of their own cannot be awarded a mark in Quality A since the use of the OCR source material does not count for research purposes. Many candidates try to use it as a source. However, candidates who do not do any research for themselves, but rely on the OCR source material alone, are able to gain marks in the other five Qualities.

For 2 marks candidates only need to use one source – from a book, newspaper, Internet etc. The source does not have to be referenced.

For 4 marks, however, a candidate must use more than one source. Two sources are sufficient and it helps later in their report if one source is for and one source is against the question posed. It is essential that not only that each of the sources is fully referenced so that it can be checked, but also that it is clearly identified where it has been used in the report.
Without detailed referencing it is impossible to support a match to 4 marks. A long list of sources, even if fully referenced, does not mean the award of 4 marks unless they are used.

For an award of 6 marks it has to be clear that the sources have been used correctly to produce a structured and balanced report. The candidate is expected to have looked equally at both sides of the issue. Centres are reminded that 6 marks is awarded for the quality of the research and how it is used to produce a balanced report, rather than the quantity of research which has been done
Again it is important to say that little credit can be given where large amounts from a website have just been pasted in but not used, even if the work is fully referenced.

It is recommended that candidates attach their preliminary research to the back of the report which has been produced during the supervised session. This will assist the teacher in marking the report since it will save having to go back to the sources to check the information. This preliminary work does not have to be sent to the moderator.

**Quality B (Analysis of the data)**

The award of marks for this quality is dependent on the candidates actually processing the information/data which they have collected.

For 2 marks the candidate needs to identify a simple trend or pattern e.g. *'….more women get skin cancer than men…*'. It is not sufficient to quote just a fact e.g. *'…7000 women in England get skin cancer…'*. Trends can come from the OCR source material or from the candidate's research. There are always ample trends and/or patterns within the OCR source material. The trends quoted must be correct.
There are still many examples of candidates carrying out processing, even quite advanced processing, without identifying any trend. This is not worth even 2 marks as the mark descriptors are hierarchical.

For 4 marks there must be evidence of more than one trend, although which is the main trend may not be obvious, and some processing should done by the candidate, at a standard approximating to GCSE grade C level. This could be by drawing a graph, pie chart or bar chart from the data, calculating averages or percentages, or extracting and using data from a graph etc. It is important that the processing is correct. A poorly drawn graph with incorrect scales or

incorrect average calculations should not gain credit. Teachers are reminded that, for the sort of data obtained, bar charts are often more appropriate than line graphs.

Few candidates progress beyond 4 marks. This is not surprising considering the hierarchical nature of the mark descriptors. It is not sufficient just to pick out an apparent anomaly in data. To secure above 4 marks, the candidate must do some **further** processing to identify some new information or to identify anomalies. In a few cases it was apparent that a candidate was told to take a particular approach to get 6 marks but did not fully understand what they were trying to do.

**Quality C (Evaluation of the data)**

There are still some reports where the quality of the data is totally ignored and so a mark of zero has to be awarded.

For 2 marks the candidate needs to make some comment about the quality of the sources used or the data within them. This can be a very simple statement.

For 4 marks the candidate must compare the likely reliability of different sources and explain why one source is likely to be more reliable than another. It is common for candidates to write that the OCR source material must be reliable as it comes from an examinations board. This is not true because, in writing the source material, unreliable sources are used along with reliable ones. The candidate must go back to the reliability of the original sources.

To go above 4 marks the candidate's judgement about reliability of sources must be sensible and supported. They must also consider the validity of the sources.

**Quality D (Relating Data to the issues)**

Social, economic and environmental aspects of the topic are an important part of the assessment and some Centres did not develop these areas sufficiently with their candidates during the teaching process.

Different Science in the News tasks provide different opportunities for consideration of social, economic and environmental aspects, and it is difficult to link all three of them in some tasks. Teachers should remember that the 2, 4 and 6 mark descriptors are loosely linked to performance at F, C and A respectively. So when awarding 2 marks, teachers should ask whether the response matches the expectation from an F grade candidate. Similarly, performance at C and A can be the evidence for awarding 4 and 6 marks. It is not necessary to cover all three aspects even at 6 marks providing the approach to these aspects is at a suitably high level. For the award of 6 marks, the information must be accompanied by correct science.

Often these social, economic and environmental aspects were diffused throughout reports rather than in a separate section. This does not affect the mark awarded but makes it more difficult for both the teacher and the moderator. There is some evidence that teachers have been more generous in marking this Quality.

**Quality E (Justifying a conclusion)**

All of the tasks are posed as questions and therefore need an answer. No marks can be awarded where no decision is reached. The aim is that candidates come to a decision as a result of their studies.

For 2 marks the candidate needs to decide *'yes'* or *'no'* and then give a reason. The use of the word *'….because…..'* in the candidate's response is useful but not essential.

For a match to 4 marks, the candidate does need to link clearly their choice to two particular sources.

For 6 marks a candidate needs to decide which source is more significant. Few candidates can do this. It is here that researching sources with different viewpoints becomes helpful.

**Quality F (Quality of written communication)**

There was some generosity in Centres in awarding marks for this Quality. The use of a scribe to write the report for the candidate could limit the mark that can be awarded.

For 2 marks there could be many mistakes but it would still be possible to read the report.
For 4 marks there should start to be the correct use of scientific vocabulary. Some reports lack scientific vocabulary or it is merely pasted in without understanding. This makes 4 marks insecure.

For 6 marks, there are few errors and a good use of scientific vocabulary.

Some reports had been word-processed and a spell-checker obviously used. Such reports need to be near faultless and to contain scientific vocabulary to award 6 marks.

**Summary Comments**

The job of moderators is to try to support the decisions of centres whenever possible. Providing the marking is within plus or minus 4 marks of the moderator, no changes are made as the centre is deemed to be 'within tolerance'. Where the marks are outside tolerance and adjustments have to be made, moderators will provide useful reports for centres.

Since the same work can be submitted for Science in the News for Science and separate sciences, the same grade boundaries apply for B635, B645 and B655. Approximately two thirds of the separate science cohorts used Science Skills assessments rather than Additional Science Skills assessments.

# B636 Research Study, Data Task and Practical Skills

**General Comments**

It is pleasing to note in this, the penultimate report on this specification, that the majority of centres applied the criteria sufficiently accurately as to make any scaling of their marks unnecessary.

Those centres are thanked for their attention to detail and their compliance with the administrative procedures.

There were, however, a significant number of centres where problems still arose and it is to those centres that the following remarks are chiefly directed.

Centres are reminded that it is the job of a moderator to support the decisions of the teachers in a centre wherever possible. Annotation of the work in the sample submitted, to show where and why marks were awarded, greatly facilitates this process. Too often it is not clear to a moderator on what basis a particular mark is decided upon.

**Administration**

Most centres coped well with the change to the system of sampling. It is hoped that next year the process will run more smoothly for all centres.

Whilst moderators no longer need the MS1 sheets in order to select a sample it is still helpful if these sheets are sent to the moderator either early or with the sample of work (see comments in the section on internal moderation). Along with the MS1 sheets it is essential that the Centre authentication sheet (CCS160) is included. If this sheet is not supplied then marks for the skills assessment have to be withheld.

Each sample of work should have the Skills Assessment Record sheet attached to the front. This is the only way a moderator has of knowing the mark awarded for Practical Skills.

There were too many cases where the marks on the record sheet had been wrongly totalled or where the mark had been wrongly transferred from this sheet to the MS1 mark sheet. Errors like this delay the process of moderation and cause additional work for both the moderator and the centre.

**Supervision of candidates**

Centres are reminded that, although close supervision is not necessary in the research phase of the Research Study or during the practical part of the Data Task, it is obligatory for the sessions where the written work is done.

Centres have to fill in a Centre Authentication Form. By completing this form a centre certifies that candidates have been supervised as instructed in the board's regulations and that they are satisfied that the work is the candidates' own.

There has been more than one occasion, this year, where two identical pieces of work have been present in the sample requested. There were also a good number of cases where different pieces of work had similarities which seemed to go beyond what could have occurred by coincidence.

Where this occurs and plagiarism has clearly taken place, neither candidate's work will be credited.

If candidates are supervised properly, according to the board's regulations, this should not occur. Please note:

- Candidates are NOT allowed access to the internet during either of the supervised sessions.
- Candidates may not bring any electronic media into a supervised session.
- In the Research Study session candidates may have access to their rough notes and print outs of their research but nothing else.
- In the Data Task session candidates should have access only to their results and the instruction and question sheet for the task.
- Redrafting (producing a second version of the work after teacher correction) is strictly prohibited.

**Comments on the assessment of the different qualities**

**Research Studies**

The Research Study assesses the candidate's ability to research a topic and to use the results of that research to answer the questions posed.

Candidates should not be taught the information needed to complete the task. This obviates the need for research and results in very similar answers from all candidates. Marks are rarely very good and candidates frequently do poorly by miss-remembering what they have been taught.

Candidates should write answers to each question separately not write an essay on the whole topic. Candidates following this structure are likely to answer each question thoroughly.

High marks cannot be scored if questions are answered incompletely.

**Quality A: Collecting information**

There are two common errors in assigning marks for this quality.

Sometimes a candidate is given zero marks because they have given no references. Wrong! They can have two marks if it is clear from their answers that they have done some research.

Sometimes a candidate is given six marks because they have a large number of fully referenced sources in their bibliography. Wrong! This is only worth four marks. For higher marks the sources must be referenced in the text of the study. If sources are linked to the questions five marks are available, if they are linked to items of information within the answers six marks can be awarded.

In summary, it is not necessary to have a long list of sources to gain high marks but it must be clear how the sources have been used.

**Quality B: Interpreting information**

The key word for this quality is 'information'. Some Research Studies involve the drawing of graphs or other interpretation of data. Doing this, even when correct, does not merit 6 marks.

It is the information in the candidate's research which must be interpreted. Their understanding of the information discovered must be clear from their answers to the questions. Higher marks will be gained from the understanding (interpretation) shown in answers to the later, more open ended questions.

Good answers to early questions followed by poor answers to later questions do not deserve six marks.

Answers copied from internet sites are worth some credit and can be given a maximum of four marks if they are relevant and answer the question completely and appropriately. However, for six marks candidates must demonstrate their understanding by use of their own words.

**Quality C: Developing and using scientific ideas**

The 'scientific ideas' involved here depend on the topic of the study. Topics are either an extension of an idea which is part of the specification or from an area outside the specification with clear links to science taught in the course.

Whichever is the case, more is expected than a reiteration of what has been taught. There should be evidence that some research has been done and the results should be correctly applied to answer the questions posed. Wrong answers should not be given credit.

It is chiefly in this quality that candidates who have been taught the necessary information usually fail to perform as well as they should.

As in quality B, credit (up to a maximum of four) can be given for text copied from sources, as long as it is relevant and fully answers the question.

**Quality D: Quality of written communication**

The criteria for this quality are reasonably clear and centres usually get the level about right. However, it should be noted that the consistent and correct use of scientific and technical vocabulary is more important than minor grammatical errors. A perfect piece of English with few if any examples of appropriate vocabulary is worth four. Whereas, a piece of work which is clearly science with appropriate vocabulary, is worth six even if there is the occasional spelling mistake.

Candidates are often given too much credit for the words which originate from a website. Only their own words can be given credit in quality D.

**Data Tasks**

It is intended that candidates actually carry out the investigation described. Fallback data is provided for candidates who have been absent for the practical session, or whose results make it difficult to detect patterns and so come to a valid conclusion.

Candidates who use fallback data for the second of these reasons should also include their own results. They should use their own results for answering Q3 (evaluation) but the fall back data for their other answers.

All candidates should include a table of results, even if they are using the fallback data. Moderators need to see evidence of the 'simple processing' (usually averaging) before they can give marks for quality B. They also need to check the accuracy of the plotting in the graph.

If a candidate does not perform the investigation they are disadvantaged, especially in answering questions 3 and 5 (skills C and E)

**Quality A: Interpreting the Data**

Candidates' graph drawing skills are generally quite good and marks of less than four for this skill are rare. Where marks are low it is usually due to small, poorly drawn graphs, inaccurately

plotted points and wrongly scaled axes. Any two or more of these factors is likely to result in a lower mark.

Candidates were sometimes given six marks for graphs which were not of sufficient quality. The graph line should be well drawn and not too thick. It should be drawn with a ruler if straight or be smooth if a curve. Graphs should be accurately plotted and on axes with sensible scales. The scale should allow the graph (not just the grid) to occupy at least half of the available A4 space.

A best fit line should ignore 'outliers' but should then have an approximately equal number of points on each side of the line. A best fit line does not always have to go through the origin, indeed sometimes it should not.

**Quality B: Analysis of the Data**

Most candidates managed to score four marks for this quality but 'real' marks higher than this were rare. Simple processing (eg averaging) and a description of the observed trend are all that is required for 4 marks and this was usually accomplished. Thankfully the use of an unqualified 'positive correlation' was not frequently seen (it is certainly not worth any credit).

Gaining higher marks proved difficult. A significant number of centres attempted to provide guidance to their candidates on what 'additional processing' to attempt but, in addition to being too much help, this rarely resulted in any additional marks as candidates didn't understand why they were doing the required task and so did not use the results. Simply spotting an anomaly will not do. Both the additional information and the detected anomalies must depend on the processing which has taken place. Simply spotting a point which is off the line or a measurement which is an outlier will not do as it can be seen from the raw data and/or the graph.

The most fertile area towards which candidates can be directed is showing whether their data is or is not valid. No guidance on how to approach this should be given. This is a high order skill which is designed to discriminate between the most able candidates.

**Quality C: Evaluation of the Data**

There are two strands to this skill and where candidates concentrated on only one aspect they were often marked overly generously. Since the assessment criteria are hierarchical the maximum mark is two where only one strand is addressed.

Candidates should discuss the methods used and how it relates to the reliability of the data. The reliability of the data is most easily accessed by considering the consistency of repeat values or, in the few tasks where there are no repeats, the proximity of points to the best fit line.

Candidates scoring 4 marks were not uncommon though 3 was sometimes more appropriate. To gain higher marks the validity of the data needs to be discussed. The concept rather than the word is important. Does the data from the experiment correctly represent what should have been obtained? The most straightforward way to approach this is to compare two data sets (another candidate's data is likely to provide a better comparison than the fall back data) or to use the graph to work out a quantity for which the value is known (this is only possible in some of the tasks).

**Quality D: Justifying a conclusion**

A significant number of candidates wrote a conclusion which, whilst it contained some science, was not directly related to the data obtained. Even for two marks it is necessary to relate the conclusion to the data.

The difficulty arises where the candidates have, understandably, been taught the necessary theory before the task is attempted. Weaker candidates then regurgitate this information with sometimes less than perfect recall and omit any mention of the data obtained in the experiment.

To score well in this quality the link to the data needs to be plain and the explanation needs to use appropriate and correct science which is clearly understood.

Having said that, most centres marked this quality with reasonable accuracy.

**Quality E: Planning further work**

Candidates in some centres clearly paid more attention to the criteria than to the question posed. These candidates (sometimes a whole centre) suggested further work which bore no relation to the problem posed in question 5. Such answers deserve no credit as the question has not been answered.

Some candidates gave a good answer to the second part of question 5 but, since their plan was insufficiently detailed, could score no more than three marks.

A detailed plan does not have to be pages long. It is intended that the investigation which they have just completed should be use as a basis. It is, therefore, not necessary to give great detail. 'The investigation just completed was repeated but…' is an acceptable way to start. After the 'but' should come;

- A description of the variables, which to control which to vary and which to measure.
- An account of how the variables are to be held constant and controlled.
- A range of values for the controlled variable.

This amount of detail would allow a third part to perform the intended investigation.

The most frequently omitted part of this description is the range of values to use. This omission limits the mark for quality E to three.

**Internal Moderation**

It is a requirement of the board that internal moderation of the work in a centre should take place. This is necessary unless all of the work is assessed by the same teacher.

Moderators have to judge whether the centre as a whole is marking to the same standard as other centres. A moderator is not permitted to change the rank order of the candidates in the centre. This means that if standards vary across different groups and if scaling of marks is required, unfairness to candidates can arise. Candidates who were marked generously will benefit as their marks will be reduced by a smaller margin than is appropriate, however candidates who were marked accurately will have their marks reduced to below what they deserve.

Where the problem is serious a centre will be asked to remark the work of all candidates and to resubmit their marks for moderation.

If MS1 sheets are sent which include the set of each candidate this can ease the problem. If only one teacher's marking is out of tolerance then the centre can be requested to remark the work of just that teacher. This reduces the workload of the centre and maintains fairness for the candidates.

Further guidance on assessment of skills can be found in the Additional Science Support Booklet which was sent to all centres and which is also available on Interchange and at www.gcse-science.com .

Next year a series of training courses will take place in different parts of the country details of these has been sent to centres and is also available on www.ocr.org.uk .

Centres can be part of a cluster. Cluster co-ordinators conduct meetings where centres can exchange ideas and experiences as well as receiving training.

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

**OCR Customer Contact Centre**

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

**www.ocr.org.uk**

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