OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology B J643

Gateway Science Suite

General Certificate of Secondary Education

Report on the Units

June 2009

J643/MS/R/09

Oxford Cambridge and RSA Examinations

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This report on the Examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

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

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GCSE Biology B Gateway (J643)

REPORTS ON THE UNITS

Chief Examiner's Report

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

The following Principal Examiners' reports give detailed comments on each unit, however there are some general comments that are worth making. Many of these are not new but that does not make them any less valid and it is to be hoped that Centres take note of these and pass them on to their candidates.

To give themselves the best chances of gaining marks, candidates should aim to always do the following.

Read the questions carefully and fully. This includes tables, graphs and so on. When examination papers are written, the wording is very carefully considered, for example, to avoid extraneous information. Therefore if candidates have not made use of the information given in a question they have probably missed something out. For example in B632/02 Q10(b)(ii), if candidates did not take note of the information about gelatine being a protein they almost certainly did not go on to score full marks. On the other hand, the question may include information to preclude certain answers, for example in B632/02 Q 3(b), candidates were told that sugar cane can be used as a fuel and were asked to give one other way biomass can be used, yet a significant number simply suggested it was used as a fuel. One further point, if candidates are given some information in a question then simply repeating it or rewording it without adding a level of analysis or explanation to that which was already there is unlikely to result in any marks.

Look at the number of marks and the space allowed for the answer in deciding how long the answer should be, how much detail it should include or how many examples to give.

Make statements that are as specific and detailed as possible, while still being correct. For example if the answer is 'a higher temperature' then 'the best temperature' will not suffice. If the answer is 'he needs more energy' then 'he needs energy' will not suffice. If the answer is 'the population falls', then 'the population dies out' is wrong. If the answer is 'there is less food' then 'there is no food' is also wrong.

Show working in calculations. Although full marks may be awarded simply for stating a final correct answer, if any error has been made, there is no scope for giving credit. Use a calculator, but make sure that answers are quoted to the correct number of significant figures as well as ensuring that rounding up and down is done correctly.

Plot graphs using a sharp pencil, not a pen, using small crosses to indicate the points. Draw smooth lines of best fit (be they curves or straight lines), not 'dot to dot' lines, nor 'sketchy' lines where several lines are drawn on top of each other. Usually a margin of error of +/- half a square is used for plotting (and reading) graphs but this can easily be exceeded if care is not taken or a blunt pencil is used.

Come prepared with a black pen (and a spare), pencil, ruler, sharpener, eraser and calculator.

B631/01 Foundation Tier

General Comments

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates, producing a good distribution of marks, covering almost the whole mark range available. Questions targeted at grades C and D allowed the more able candidates taking the paper to demonstrate what they knew and understood, whilst questions targeted at grades E, F and G allowed all candidates access to the paper. All candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. The quality of candidates' spelling, punctuation and grammar was generally good and there were only a few cases where it was really difficult to interpret a candidate's writing.

Comments on Individual Questions

SECTION A - MODULE B1

Question 1

(a) Most candidates correctly named fat as the food type missing from the list of constituents of a balanced diet.

(b) (i) It was not enough to simply say that carbohydrates provide energy, rather, to gain the mark, it was necessary to make a comparison, namely that Matt needed more energy than his brother, or that he was more active. Around half the candidates gave a sufficiently detailed answer to get the mark.

(ii) Similarly to the previous question, a comparison was also needed, although far fewer candidates gained the mark here, in this case for saying that Matt needed more protein because he was growing more.

(c) Although many candidates gained the first mark, usually for explaining that Matt's breathing rate increased to take in more oxygen, only a few correctly explained why his pulse rate also increased, for example to get the oxygen to his muscles more quickly. One common error was to repeat the first answer again. Another common response was to explain that pulse rate increases simply because the heart beats faster, which was not credited.

(d) Most candidates correctly gave sweating as one way of losing heat.

(e) (i) Most candidates correctly answered, explaining that the cut needed to be cleaned to prevent infection, with some including different examples of pathogens in their responses.

(ii) The majority of candidates gained a mark for explaining that blood clots to stop bleeding.

Question 2

(a) On the whole, parts (i), (ii) and (iii), all aimed at standard demand, were not well answered, with about a third of candidates correctly identifying the effector in the reaction, but far fewer correctly identifying the stimulus or receptor. Many gave descriptions of what they could see happening in the diagram without being specific enough, e.g. 'he catches the glass' instead of 'his hand', for the effector. Quite a few gave the brain as the receptor.

(b) Most candidates correctly calculated the number of units of alcohol as 5 for part (i), although only a minority could explain why, in part (ii), different volumes of drinks still gave the same number of units. The required answer was that the drinks differed in their alcohol concentration.

(c) Although the specification specifically lists temazepan as an example of a depressant, only a small minority of candidates correctly chose it from the list given. Most candidates appeared to be just guessing as there was no consistent pattern in the answers chosen.

Question 3

(a) Most candidates gained at least two out of the three marks, with almost half gaining all three, for identifying the correct causes of the different examples of variation.

(b) Most candidates gained two out of the three marks for describing what genes do, what they are made from and where they are found. Weaker answers described their role for example as 'making you who you are' whereas better answers referred to them as instructions or codes. Although many candidates used the term chromosome there was some confusion about its meaning with 'genes are made of chromosomes' being a not infrequent (non-scoring) answer. Many correctly referred to DNA however.

SECTION B - MODULE B2

Question 4

(a) Most candidates, though by no means all, knew that mammals are vertebrates.

(b) Most candidates correctly chose 'eyes at side of head' and 'stripes for camouflage' as adaptations to avoid being caught.

(c) Most candidates correctly gave one adaptation of predators, common correct responses including sharp teeth, sharp claws and camouflage. Unspecific responses such as just 'teeth' did not score.

(d) Most candidates knew that cacti are adapted to hot, dry deserts.

Question 5

(a) Most candidates were able to suggest a valid reason as to why whales may come close to land, for part (i). Common acceptable answers included finding food or giving birth. Fewer, about half the candidates, gave an acceptable answer to part (ii). The most commonly given acceptable answers referred to tourism or whale watching.

(b) Most candidates were able to explain the term 'endangered' for part (i), but less than half were able to choose the osprey as the endangered species from the list of British birds in part (ii).

(c) Most candidates correctly gave mammals as the class of animals producing milk. Those who didn't get the mark usually gave examples, such as cows.

Question 6

(a) Three quarters of candidates used the formula to calculate the population as 420, thereby getting both marks. A small number of candidates correctly used the formula but arrived at the wrong final answer, thereby gaining one mark. This illustrates the value of showing your working on this kind of question, where although full marks are available for just a final correct answer, showing your working is still recommended.

(b) About two thirds of candidates gave a valid suggestion as to why there is more waste now than 100 years ago. The most common correct answers were that the population is bigger or that there is more packaging used. Centres should train candidates to avoid making suggestions that are plainly incorrect, such as 'there is no recycling nowadays', when the candidate presumably meant 'there is more un-recycled / un-recyclable waste nowadays'.

(c) Marks were available for explaining that some rats are naturally resistant to warfarin, that this is a heritable trait and that it arose as the result of a mutation. Only two of these points were needed to gain full marks, but relatively few candidates did so, with just less than half gaining one mark and a similar number gaining no marks. One common mistake was to just restate information from the question, albeit slightly in their own words, e.g. 'some rats survive the poison', which obviously cannot be given credit on its own. Perhaps the most common mistake though was to confuse resistance with immunity. Some candidates gained a mark for the suggestion that some rats survived simply because they did not eat enough warfarin to kill them.

Question 7

(a) Most candidates correctly chose minerals from the list of things plants might compete for.

(b) This question, on chemicals needed for photosynthesis differentiated well, with about a quarter of candidates gaining both marks, half gaining one and the remainder nothing. Predictably, the most common incorrect answer was usually oxygen, and less commonly glucose. Disappointingly, a noticeable number of candidates suggested light, despite the question already having mentioned light and despite the question asking for two 'chemicals'. The most common correct answer was carbon dioxide.

(c) About a quarter of candidates gained two marks for correctly explaining that an increase in the number of rhododendrons meant fewer dormice because there would be fewer other plants and hence less food for the dormice. (The last point was not credited if a candidate said that the dormice had 'no' food.) Slightly more candidates gained one mark for a partly correct answer. Some candidates had apparently not read the start of the question and seemed to think that rhododendrons were animals that were eating the dormice.

SECTION C - MODULE B3

Question 8

(a) Most candidates gained both marks for explaining that sperm A was most likely to reach the egg first as it had the biggest tail or that it would swim fastest.

(b) Roughly a third of candidates gained each of one, two or three marks. The most common correct answer was 'fertilisation'.

(c) (i) Most candidates correctly answered the question. As it was at low demand, a straightforward answer such as 'mother' was sufficient, although many candidates gave more specific answers such as 'placenta'. As candidates are not aware of the target level of difficulty of a question, as a general rule they should be encouraged to make their answers as precise as possible.

(ii) About two thirds of candidates gained both marks, usually for the straightforward answer that the heart 'pumps blood'. Non-scoring answers were usually too vague, such as you need a heart 'to stay alive'.

Question 9

(a) This was the least well answered question on the whole paper, with the vast majority of candidates failing to score at all, although the asexual reproduction of potato plants is clearly on the specification. Many did not understand the term asexual as their descriptions included references to flowers and pollen, whereas others may have understood the term but were not familiar with how potato plants reproduce, describing, for example, potato tubers growing on the branches. Some gave descriptions of tissue culture and others genetic engineering. About a fifth did not attempt the question.

(b) Around half the candidates gave a correct suggestion as to the cause of the differently coloured flowers. Many suggested they had arisen from a genetic change, though not as many used the word 'mutation', but valid references to environmental causes, such as the lack of certain minerals, were also accepted. Some candidates appeared not to have read the question properly and thought the different coloured flowers were on different plants. Some of these tried to answer in terms of dominant and recessive characteristics.

(c) Most candidates correctly chose the third and fourth features as those that would be suitable for selection.

Question 10

(a) (i) Over a half of candidates gained two marks and about a third gained three for plotting the graph and drawing the line. Although this has been said many times before, candidates should be reminded to use sharp pencils and draw a single smooth line of best fit.

(ii) Around half the candidates correctly identified the optimum pH (any answers in the range 7.0 – 8.0 were acceptable). The common error was to give 2.5 (the time) instead.

(b) (i) About a third of candidates knew that sugar moves into the blood by diffusion. The most common incorrect answer was probably ‘absorption’.

(ii) Only about one in ten candidates knew that sugar is transported in the blood plasma. Most thought it is carried by the red blood cells.

B631/02 Higher Tier

General comments

The paper seemed to discriminate fairly well between all levels of candidates, with a wide range of total marks being scored. Even the lowest scoring candidates were able to attempt the majority of the questions and there was no indication of candidates being rushed for time. Questions with calculations or graphs were answered well. However, there are key concepts, such as 'mutations', 'resistance' and 'immunity' that are not understood well.
Poor handwriting sometimes made responses very difficult to interpret.

Comments on Individual Questions

SECTION A - MODULE B1

Question 1

(a)(i)-(iii) Candidates generally achieved 2 marks of 3. The main problem was that often they would describe what a 'stimulus', 'receptor' and 'effector' are, rather than naming them as requested for this reflex. Sometimes the correct names would be given in the wrong order. Part (iii) tended to be answered best.

(b) All but a few candidates managed to calculate the correct number of units in the drinks, but in (ii), many just quoted how many drinks each person had drunk and how many units it contained, or referred to the volumes without linking to alcohol concentrations.

(c) This was not well answered. There appeared to be a fairly random selection of answers regarding the other depressant in the given list.

Question 2

(a) The vast majority of candidates gave 'glucose' as the correct response.

(b) (i) More than half the candidates understood that there was insufficient oxygen available to sustain aerobic respiration, but the most common wrong answers were, 'they ran out of energy/glucose' and 'aerobic respiration doesn't supply enough energy'.

(ii) The majority of candidates scored at least 1 mark with 'lactic acid' and many also achieved a second mark for describing the effect of fatigue/ache or pain, which lactic acid produces. Common vague responses included, 'too much lactic acid can damage the muscles' and 'they have to wait for oxygen to get rid of the lactic acid'.

(c) Most candidates are now able to quote 'vasodilation', though a full understanding of this process remains unclear to many. Too many are still referring to it as 'moving blood vessels closer to the surface'. Stronger candidates were referring to some aspect of 'homeostasis', but few were achieving the mark for 'increasing heat loss' etc. The comparative needed for this response, 'loses <u>more</u> heat', was usually lacking.

(d) The large majority were able to comment on the need for rehydration / replacing lost water.

Question 3

(a) The majority of candidates were achieving 3 marks here. Most lost a mark for failing to give a clear indication of the parental genotype, Ff. Alleles were already shown separated in the Punnet square. The ratio 1:4 was given in error a number of times. 'F' and 'f' were often hard to distinguish.

(b) (i) & (ii) Most answers included the correct letters for the 4 bases in DNA, but far fewer candidates could describe what made the alleles different. Common errors were suggesting that the bases paired differently or made some comment about the proteins synthesised, which was not relevant here.

(c) Relatively few candidates were really clear about why antibiotics should be prescribed sparingly. The commonest error was to use 'immunity' instead of 'resistance', concepts that were confused in a later question too. Others wrongly understood that the antibiotic had an 'immunity/resistance effect' on the person rather than the bacteria.

SECTION B – MODULE B2

Question 4

(a) Most understood that animals cannot make their own food.

(b) (i) The majority of candidates wrote correctly about the zorse being the offspring of two species or being a 'hybrid'.

(ii) The most usual correct answer was 'hybrid' as above, but equally common was 'a mixture of two species'. A number gave confused responses about infertility.

Question 5

(a) There were sufficient marking points available in this question for the majority to gain the mark. 'Tourism' and 'hunting' in some shape or form were the most common correct responses.

(b) (i) & (ii) Candidates scored well here. Usual responses were for 'pollution' and 'competition for food resources', though many also used the 'climate change' response. Converse arguments were given for part (ii). The most common correct response for part (ii) was 'a breeding programme', though many spoke of 'conservation programmes' without suggesting how this could be conducted. A significant number gave unqualified comments about 'habitat loss/degradation' without specifying what the habitat problem was, so forfeited the mark. Other candidates gave answers here which were relevant to 5 (a) and lost the marks.

(c) Almost universally correctly answered.

(d) Reasonably well answered with both marking options appearing regularly. Others gave simple incorrect responses, such as 'how whales reproduce'.

Question 6

(a) The majority of candidates were scoring 2 marks for the correct answer of 420. Few scored the intermediate mark for placing correct numbers in the formula in the event of not gaining the full 2 marks.

(b) (i) As in question 3 (c), there was much confusion here between 'immunity' and 'resistance'. The majority of candidates lost the first marking point by referring to immunity. Many candidates scored with the idea of parents 'passing on' their ability to withstand warfarin, while fewer wrote about mutations or the rats eating too little of the poison.

(ii) Relatively few candidates fully understood Lamarck's theory of acquired characteristics. Responses were either very general, that Darwin's theory had been proved correct, whereas Lamarck's had been proved wrong, without saying why. Those that gained a mark often gave an example of an acquired characteristic that was not passed on; e.g. a scar, sporting ability, etc.

Question 7

(a) Most candidates are now correctly learning the symbol equations for photosynthesis and respiration.

(b) Generally not well answered. Many candidates scored 1 mark for reference to starch being insoluble, though many wrote incorrectly about the movement of starch and glucose around the plant. Very few gained the second mark regarding the consequence of starch insolubility or glucose's solubility.

(c) Most candidates scored with 'coloured petals', though several lost the mark by simply writing 'bright flowers'. 'Sticky pollen' and 'nectar' were also popular correct responses.

(d) Few scored here regarding the symbiotic relationship between legumes and nitrogen-fixing bacteria. Common incorrect responses were 'water', 'warmth/somewhere to live' etc.

SECTION C - MODULE B3

Question 8

(a) (i) & (ii) The majority of candidates scored well in both parts of this graph question. A few candidates were content with plotting the points and not drawing the line.

(b) (i) Generally well answered.

(ii) Quite surprisingly, this question was only moderately well answered with 'plasma'. A number of candidates incorrectly suggested 'platelets' and 'RBC'.

Question 9

(a) (i) About half the candidates correctly sorted the sequence involved in cloning and implanting cow embryos.

(ii) Very few were able to give an advantage of this type of cloning and usually reverted to a description of selective breeding alone. Far more were able to give the disadvantage – that if one caught an infection/disease, then the majority/all of the clones would be susceptible.

(iii) The cloning of Dolly the sheep was not well understood by the majority. Bits of the process were known, but not the overall picture. Successful candidates scored most often with 'only one adult involved' or 'fertilisation/a sperm not involved'. Every wrong, imaginable technique of genetic engineering or cloning was suggested.

(b) (i) Many achieved ‘mitosis’ for the mark, with all the usual array of spellings.

(ii) Moderately well answered, though the majority of candidates lost this mark by referring to the loss of some cells being inconsequential when there were many that could replace them. The most common correct response was ‘large surface area’.

Question 10

(a) Generally well answered.

(b) Many understood the idea of more auxin accumulating on the shaded side of the seedling, though very few achieved the ‘cell elongation’ mark.

(c) In choosing where cell division took place in a seedling, there was a fair spread of choice for the four letters. The most common incorrect response was A, furthest from the shoot tip.

Question 11

(a) Generally not well answered. Candidates understood from the question that inbreeding is not a good idea, but could not clearly explain why and often opted for references about inbreeding ‘causing mutations’. The most usual correct answer was some variation of a ‘reduced gene pool’. While candidates understood that race horses might suffer from not being able to race, being crippled etc, they could not simply state that inbreeding increased the risk of genetic abnormalities. A few correctly wrote about the combination of harmful recessive alleles.

(b) (i) Generally well answered with ‘large/greater surface area’ or ‘one cell thick’.

(ii) Very few candidates scored here. Most wrote a description of a double circulatory system pumping the blood twice, without any reference to the increased blood pressure.

B632/01 Foundation Tier

General Comments

The level of difficulty of the paper was felt by Examiners to be appropriate, producing a spread of marks. Only a few candidates scored very highly and this was, in part, due to candidates being unable to show their understanding in continuous writing responses. The majority of candidates attempted most questions. Even weaker candidates did attempt a reasonable proportion of the questions. There was no indication that candidates had too much or too little time. It was noticeable, however, that weaker candidates were less successful in answering questions in the B6 section of the paper.

Comments on Individual Questions

SECTION A - MODULE B4

Question 1

(a) This was, in the main, well answered with most candidates scoring two marks.

(b) Surprisingly this was not well known. Some common errors were "to make the plant green" and "to absorb water."

(c) Most candidates knew that roots absorb minerals, some even referring to root hair cells.

Question 2

(a) Only the most able candidates scored both marks. Weaker candidates did score the leaf mark but a surprising number failed to score anything.

(b) Very rarely did anyone score both marks. Were candidates did score, they picked up a single mark for either support or cooling.

(c) (i) Pleasingly, most candidates did score and coped comfortably with the calculation.

(ii) The importance of comparison of increasing air movement was not appreciated by most candidates. Many lost the mark as they did not make the distinction of **more** transpiration / water lost / weight lost.

(d) Humidity was seen as the most common answer but a surprising number of even good candidates put wind as their preferred response.

(e) Some candidates referred to a “control” but many just referred to fair testing without any explanation.

Question 3

(a) Very few candidates appreciated that wood is biomass that can be used as a fuel. Most gave answers of petrol or kerosene.

(b) (i) This was a well answered question but several candidates thought that "insect killer or insect repellent" was sufficient.

(ii) Generally a well answered question as there were a number of possible responses which gained credit. Many of the possible correct responses on the mark scheme were seen.

Question 4

(a) Generally well answered by more able candidates but a significant number of candidates failed to score.

(b) (i) Many failed to score on this question.

(ii) Again, this question was poorly answered since incorrect answers in part (b) (i) left candidates often making incorrect responses here.

(c) (i) This was quite well answered with many referring to yellow colour, although there were some that used inaccurate terms like discoloured or brown.

(ii) Poorly answered with many candidates referring to phosphates or even just “water”.

SECTION B - MODULE B5

Question 5

(a) Only the most able candidates scored both marks. Weaker candidates did score the trachea mark.

(b) Generally well answered with bronchitis and cancer most commonly given but also emphysema was seen.

(c) (i) Rather poorly answered by many candidates as they did not relate how quickly air flows through the peak flow meter to degree of asthma.

(ii) Again the muscle relaxant effect was not appreciated by most candidates. Those that scored often did so by referring to opening up the airways.

Question 6

(a) (i) In general this was a well answered question. Most linked anti-coagulants with blood and many were aware it was used to reduce risk of blood clotting.

(ii) More able candidates were able to answer this but a surprising number of weaker candidates left this unanswered.

(b) Very few candidates made the link between weaker bones and osteoporosis.

Question 7

(a) (i) This was universally well answered. However, the wide variety of spellings indicates that it was more a ubiquitous fact they knew rather than something the candidates had actually learned for the paper.

(ii) More able candidates were able to answer this and it proved to discriminate well with candidates that prepared well for the paper and those that had not.

(b) Encouragingly, this was answered correctly by nearly all candidates and clearly the link between urea and kidney waste has been taught well.

Question 8

(a) Well answered with very few misreading the point on the graph.

(b) More able candidates used adolescence or puberty and scored. Weaker candidates referred to teenager.

(c) Many scored all three marks for this question usually on the diet, exercise and disease/link to smoking.

Question 9

(a) Well answered by most candidates.

(b) Better candidates scored well here but in general few made any link to the Rhesus factor.

(c) Candidates were aware of the amount of blood given in a donation.

(d) This was a well answered question by nearly all the candidates.

SECTION C - MODULE B6

Question 10

(a) (i) Most candidates scored here.

(ii) Generally well answered.

(b) (i) Most candidates scored 2 marks for getting the correct height of each bar on the graph; however, many may have lost marks if the mark scheme had included the width of each bar as a criterion since in many cases this was variable. It may be useful for teaching purposes for Centres to make candidates aware of this for future work.

(ii) In general most candidates scored this mark.

(iii) More able candidates linked the high levels of coliforms to the boatyard building. A few candidates lost marks by referring to the sample site rather than the building in their answer.

Question 11

(a) This was a poorly answered question. Most linked the spread of the disease to airborne sneezing or close touch contact with other humans. Only a few linked cholera to water.

(b) Again very few successful responses. Those with correct responses usually scored through links to natural disasters or ideas on poor sanitation.

(c) (i) More able candidates were able to refer to genetic engineering or genetic modification.

(ii) More able candidates were able to give transgenic as the correct response.

Question 12

(a) (i) Surprisingly very few candidates were able to link the key word enzyme to the applications given in the question. This is a familiar word used in biological contexts but candidates appear to have been unable to recognise its use in everyday applications.

(ii) More candidates were able to score on this section, perhaps through a general knowledge of diabetes management.

(iii) Few candidates scored on this question and seemed unable to cope with the combination of temperature and pH factors.

(b) Only a very small proportion of candidates scored two marks on this part. Occasionally one mark was scored for the idea of breakdown of gelatine/protein. Most candidates gave weak expressions of dissolving and were unable to link to protease enzymes so failed to score.

Question 13

(a) (i) Very few candidates knew that yeast was used to ferment the sugar.

(ii) Very few candidates gave the correct answer of gasohol. Clearly this is an area that Centres need to address specifically in their preparation of candidates for the examination.

(b) (i) More candidates were successful and knew bacteria were involved.

(ii) Most candidates who scored on this gave the renewable/sustainable or not causing global warming. However a number of candidates referred incorrectly to re-using the fuel and did not score.

B632/02 Higher Tier

General Comments

The level of difficulty of the paper appeared to be appropriate for the ability range of the candidates, producing a good distribution of marks, covering almost 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. All candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. The quality of candidates' spelling, punctuation and grammar was good overall and there were only a few cases where it was difficult to interpret a candidate's writing.

Comments on Individual Questions

SECTION A - MODULE B4

Question 1

(a) Most candidates correctly answered both parts (i) and (ii). The most common answer for part (i) was respiration although marks were also frequently given for decomposition and less commonly for breathing. Some candidates appeared not to have read the whole question and suggested combustion (or burning) which could not be credited as it had already been mentioned. Although dissolving in water was an acceptable answer for part (ii), most candidates gave photosynthesis.

(b) Just over half the candidates could correctly name denitrifying bacteria. The most common incorrect answers were predictably nitrifying and nitrogen-fixing bacteria.

(c) Most candidates could suggest one way, other than by keeping moist, of speeding up the decay of plant material. Increasing the temperature, providing oxygen and adding decomposers or detritivores were all regularly seen as answers. Candidates should be aware that unspecific answers, such as 'the optimum temperature', will not score.

Question 2

(a) Fairly equal numbers of candidates gained two, one or no marks for giving two things transpiration provides water for. The expected answers of cooling, support and movement of materials such as minerals were all regularly seen. The most common incorrect responses were respiration and growth (though if a candidate had specified cell elongation the mark for 'growth' would have been given).

(b) (i) Around two thirds of candidates correctly calculated the percentage loss in mass as 24.48. Relatively few scored one mark; those not scoring two marks generally used the numbers provided in an incorrect formula. In these cases the principle of ecf (error carried forward) was not applied. Some candidates calculated correctly but then made an error rounding down to 24.4.

(ii) Most candidates were able to describe that transpiration increased with increasing air movement.

(c) Around two thirds of candidates could adequately explain why it was better to compare the percentage lost rather than just the mass lost, usually by explaining that the starting masses had been different. It was not enough to simply say that it was easier to compare them if you used percentages. Nor is it 'more accurate'.

(d) Most candidates correctly named xylem.

Question 3

(a) (i) Few candidates failed to score at all on this question, with over half gaining two marks. Although some explained how pesticides can lead to the death of animals higher in the food chain through there being a lack of food, most candidates gained their marks from describing bioaccumulation.

(ii) Most candidates were able to suggest one disadvantage of biological control, such as the predator itself becomes a pest, and a range of valid answers were seen.

(b) Over half of candidates were able to give one use of biomass, the most common answer being as fertiliser. A noticeable number of candidates did not heed the instruction to give 'one other' use than that as a fuel and gave answers such as 'provide energy' or 'for burning'.

Question 4

(a) Two substances in sewage that are broken down into ammonia, such as protein and urea, had to be given for the one mark. Few candidates were able to do this and instead gave responses such as faeces.

(b) Around two thirds of candidates were able to say in part (i) that apart from poor growth, the other sign of nitrate deficiency in plants is a yellow colour. That they are simply 'discoloured' was not enough. A similar number were able to give either potassium or magnesium in part (ii) as another mineral needed for photosynthesis. Phosphorous was a common non-scoring answer.

(c) When asked to describe how minerals are taken into plant root hairs, approximately half the candidates didn't appreciate the role of active transport and instead referred only to processes such as diffusion, osmosis or simply absorption. Those who knew that the process is active transport usually gained both marks for also mentioning the need for energy and/or movement against the concentration gradient.

SECTION B – MODULE B5

Question 5

(a) Although a majority of candidates gained the mark for explaining that the slower John blows out, the worse his asthma, many candidates simply reworded information already given in the question, e.g. 'how well he blows out shows how bad his asthma is'. Some candidates thought the peak flow meter measured lung volume.

(b) Most candidates in part (i) correctly gave the vital capacity as 4 litres. Almost as many gained two marks in part (ii) for calculating John's asthma value as 0.4 and correctly giving the asthma level as 'moderate'. Those few who calculated the wrong value usually gained the second mark for the asthma level (error carried forward). Part (iii) was a better discriminator. Although over half the candidates correctly explained that the drugs in inhalers widen airways, or that they do so by relaxing muscle, others did not score through unspecific answers such as 'the drugs make breathing easier'. Some candidates think that the trachea can widen and others that asthma is caused by mucus.

Question 6

(a) (i) More than half the candidates knew that an increased risk of blood clotting can be treated with heparin. Perhaps the most common incorrect choice was a decreased amount of haemoglobin but all alternatives were seen.

(ii) Around two thirds of candidates knew that haemoglobin carries oxygen. Some thought that it is involved in clotting.

(b) To gain the mark, candidates simply had to make the link between the context of what they were told about astronauts' health and what they should have known about osteoporosis, the link being that both involve weaker bones. Around two thirds of candidates made the link.

(c) This question was targeted at the top grades and accordingly only about a third of candidates scored, the minority of these getting both marks. To gain two marks they had to explain how the changes highlighted at the start of the question, for example low blood pressure, would reduce filtration in the glomeruli. A common error was simply to repeat what they had already been told without adding to it, e.g. 'they have kidney problems because their glomeruli don't work properly'.

Question 7

(a) (i) Around two thirds of candidates were able to select 0.5 litres from the list as the amount of blood removed when blood is donated. Quite a few of the others thought that 0.02 litres was the amount.

(ii) With lots of acceptable answers, most candidates gave one valid health problem that blood might be tested for. HIV/AIDS was perhaps the most common answer.

(b) (i) Most candidates gained the mark for explaining that Tony's blood can be given to any blood group.

(ii) Most candidates gained at least one mark, usually for explaining that the transfusion would be unsuccessful. However, only a few candidates correctly explained this in terms of antigens and antibodies and went on to gain the second and third marks.

Question 8

(a) Over half the candidates were able to explain that IVF occurs outside the body and so gained the mark. The others usually lost the mark for vague answers such as 'it happens in a lab'. The slightly more precise 'it happens outside the womb' was not acceptable either as normal fertilisation usually occurs outside the womb as well.

(b) (i) To gain both marks candidates had to explain that the success rate for IVF using donor eggs was always more successful than using the mother's own eggs and that this difference increased with age. Although candidates phrased their answers in many ways, this was perfectly acceptable, with around half the candidates gaining one mark and half gaining two.

(ii) About two thirds of candidates gained the mark for explaining why a couple might be unhappy with having a baby by egg donation. Valid answers either explained that the baby wouldn't genetically be the woman in the couple's baby, or gave religious or ethical reasons against the process. Non-scoring answers generally lost the mark through vague statements such as 'the baby isn't really theirs'.

SECTION C – MODULE B6

Question 9

(a) Around two thirds of candidates correctly explained that cholera bacteria are spread through water. The remainder gave other methods of disease transmission such as bodily contact, coughing and sneezing.

(b) Around two thirds of candidates knew that cholera often spreads as a result of natural disasters such as earthquakes or gave more specific answers such as damaged sewers. The remainder generally gave reasons such as 'living in dirty places' or 'overcrowding' which did not gain credit.

(c) Most candidates chose transgenic organisms in part (i) though less than half were able to name restriction enzymes in part (ii).

Question 10

(a) (i) Around half the candidates correctly named sucrase. Candidates who didn't score generally gave the names of other enzymes they knew such as amylase.

(ii) Around half the candidates correctly explained that the advantage of treating foods with sucrase is that the product is much sweeter or that less sugar is needed (to get the same level of sweetness). One common, but non-scoring answer, was that the product would be easier to digest. Other candidates gave answers that were on the way to gaining a mark but didn't give enough explanation, e.g. 'they are better for diabetics' or 'they contain fewer calories' or even simply 'they taste better'. Some candidates also thought that using sucrase meant that the food would contain less fat.

(b) (i) Less than half the candidates were able to explain that the acidic water would denature the enzymes. Many simply said that the enzymes just wouldn't work so well. Some candidates, perhaps thinking of chemistry, thought neutralisation was involved. Disappointingly too many candidates are still talking about 'killing' enzymes.

(ii) Around a half of candidates did not score at all, usually because they just repeated what they had already been told, e.g. that enzymes in the biological washing powder turned the gelatine to liquid. Around a quarter of candidates gained full marks for explaining firstly that the biological powder contained protease and secondly that this digested the gelatine. Around a quarter gained one mark.

Question 11

(a) Half the candidates correctly named the biofuel as biogas. Methanol was a common incorrect answer.

(b) (i) Two marks were available, firstly for the idea that biogas needs to contain enough methane to burn and secondly that too little methane gives an explosive mixture. Around half the candidates scored, with a third of these getting both marks. One common error was that it became explosive if the methane concentration was too high.

(ii) Over half the candidates gave a valid advantage of biogas over natural gas, usually for the idea of it being renewable or carbon-neutral. It was not acceptable to say that there is less carbon dioxide produced or that there is less pollution.

(iii) Less than half gave a valid disadvantage of biogas compared with natural gas, which is that it is less efficient, releasing less energy when burnt.

Question 12

(a) (i) Around a quarter of candidates knew that *Entamoeba histolytica* causes dysentery. Lots of other diseases were seen, malaria being one common one.

(ii) Around three quarters of candidates correctly ticked the second option that the role of the contractile vacuole is to remove excess water.

(iii) Only a small proportion of candidates were able to correctly answer this A* targeted question by explaining that *Entamoeba histolytica* does not need contractile vacuoles because it has a similar water concentration to its surroundings. The most common answer was simply that it lives in the human body and not in water, information lifted straight from the question.

(b) Most candidates correctly gave 30 as the answer to part (i) but only about a quarter picked up any marks in part (ii) which was targeted at the top grades. To gain both marks candidates had to explain that in the more concentrated salt solutions *Amoeba* took up water more slowly as there was less of a concentration difference with the surroundings. Of those gaining marks, two thirds gained one and a third gained two. Most candidates on the other hand simply repeated information from the graph with no explanation.

B635 Report on Gateway Science Skills Assessment

A General Comments

Although this is for some teachers and moderators the third year of this form of skills assessment, some centres are still making the mistakes common in the first two years. It is pleasing to report that there are many candidates who now produce good considerations of the topic in their Science in the News report, looking for and against and then using their research to come to a considered decision. Unfortunately there are still centres that seem to regard this aspect of the specification as irrelevant, consequently not preparing candidates with the necessary skills. Science in the News reports are then produced which do not embrace the importance of candidates researching arguments for and against. The reports are sometimes merely essays on the topic with scant regard for matching the Qualities.
For Science skills assessment, there are two components Can-Do tasks and Science in the News.

A total of 104087 candidates entered either for Science B625 or separate Biology(B635), Chemistry(B645) and Physics(B655).
The table summarises the number of candidates in each specification.

Specification	Subject	Number of candidates
B625	Science	81244
B635	Biology	9336
B645	Chemistry	6914
B655	Physics	6593

It is pleasing to report that there is an increase in the number of candidates doing separate Sciences.
It is possible that 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. Some centres continue to ignore this important point. Failure to do this makes the Moderator's job more difficult.
Centres are reminded that if a piece of work is resubmitted in a following year, the Science in the News report cannot be added too, 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.

B 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. Despite the column on the form, dates for the Can-Do tasks are not essential. There were still some arithmetical errors in Can-Do tasks. If moderators find any mistakes in the sample, the centre will be asked to check the arithmetic of the whole sample. Centres must use the Can-Do tasks listed

in the specification and on the Skills Assessment Record. They cannot devise their own. For a separate science, e.g. Chemistry, all the Can-Do tasks must be from the Chemistry list.

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 have been added each year. Some centres still use unapproved and unsuitable tasks. If they do not fully match the requirements of a task, candidate marks will suffer. If a centre has a good idea for a task, it must be approved by OCR in advance of its use (see Science Support Booklet p27).
A task set for P1, for example, cannot be used for Biology and a task from P5 or P6 cannot be used for Science. Centres still disregard this instruction. Although the task about mobile phones in P5 may seem suitable for P1 because mobile phones are mentioned in P1d, candidates will not have covered the additional theory in P5.

There were some problems where centres were attempting to double enter from Entry Level but this was less significant this year.

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.
All Science in the News reports are to be written under controlled conditions where the teacher can sign the Centre Authentication Form (CSS160) with confidence.
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 background knowledge. The teacher must not give any opinion on the question for the task. However, they may read through the stimulus material and explain any scientific words.

OCR provides a writing frame which should only be used with lower-attaining candidates. Centres are allowed to use their own writing frames providing they are generic i.e. not specific to the task and is applicable for all tasks. There are still a few centres trying to use non-generic writing frames which provided too much help to candidates.

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 for Quality A. 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 them which are for and which are against the argument is giving too much help.

Research time

Each Topic requires the candidates to undertake some research for themselves in a period of approximately one week. This research could be carried out in school, either in the laboratory or a computer facility or it could be done at home. 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 a range of materials from which the candidates can select to get started with their task. However, it was felt that in some centres the candidates had been provided with a complete list of source material for use thus removing the necessary element of choice and selection on the part of the candidate

for relevant aspects. The best reports came where students had the freedom to investigate the question set selecting their own sources.
Where there are a large number of candidates in the sample it is reasonable to expect

- a range of source materials used
- different processing to be done in Quality B, for example, not all candidates having the same bar chart
- candidates answering the question in different ways.

Supervised session

The Science in the News report is written up under controlled conditions following the completion of the preliminary research. A time of 1 hour is suggested but the centre may extend or reduce the time if required. If more than one lesson is needed, the work must be collected in from the candidates at the end of the first lesson and stored securely until the second session. During the supervised session, candidates are required to work independently.

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

Candidates can bring into the supervised session charts/graphs that they have completed as well as a completed bibliography, thus reducing wasted time during the session. They may not bring in word processed or hand written reports.

Some candidates are using word processors to produce their reports.
Centres are reminded this is acceptable providing the centre can ensure:

- that no complete or largely complete report is brought into the supervised session in any electronic format
- no completed 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 not be accessible 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 submitted.

It was an increasing trend, this year, to see word processed reports where almost the whole report had been pasted in electronically from websites without any acknowledgement as if it was the writing of the candidate. Awarding Quality F marks is impossible.

Under no circumstances should any Science in the News tasks be drafted, marked and subsequently redrafted. What is produced at the end of the supervised writing session has to be submitted. If there are deficiencies, candidates should be told how to improve next time and given another task to do. There was still clear evidence that drafting and redrafting, or teachers advising candidates to make additions, went on in a small minority of Centres. This is totally unacceptable.
Evidence of drafting and redrafting of candidates' reports or too much coaching will lead to the work not being accepted for moderation and being reported to the Malpractices committee.

C Can-Do Tasks

Can-Do tasks are an important part of the Gateway Science specification. They are motivational for students at all attainment levels. These tasks ensure that practical Science is an important aspect of teaching for this specification. Some of the tasks can also ensure that ICT is used appropriately.

They are not expected to differentiate candidates at Grade C and above.

The tasks can be used throughout KS3 and KS4 and candidates at an earlier stage will clearly benefit from having their positive achievements rewarded. All the teacher needs to do is to record the tasks each candidate achieves. For a task to be credited it must be carried out as individual work. Groups of candidates cannot work collectively to complete 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.

It is pleasing to see that candidates are taking these seriously and centres are reporting the benefits of motivation of candidates at all levels but especially with lower-attaining candidates.

D Science in the News

Approach

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

From September 2008 there were some slight changes to the mark descriptors. The use of these new mark descriptors caused no problems this year.
The mark descriptors 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 reporting back to students on their early tasks so they can improve for the final one. When the sample is requested by the moderator, a little time should be spent annotating the maximum 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. Several centres had clearly not internally standardised the marks and consequently the rank order was not valid. In such cases the sample had to be returned to the centre. This is not desirable for the teachers at centres, 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. However, candidates who do not do any research for themselves 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 each of the sources is fully referenced so that it can be checked. It is also essential that the source is clearly identified where it has been used in the report.
Without detailed referencing it is very difficult 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 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 carried out. 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 from their sources or the OCR stimulus material.

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…'*. The trends quoted must be correct. 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 stimulus material.

There are still many examples of candidates carrying out processing, even quite advanced processing, without identifying any trend. This cannot be awarded 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 done by the candidate. Processing could be drawing a graph, pie chart or bar chart from the data, calculating averages or percentages, or extracting and using data from a graph etc. All processing must be correct. A poorly drawn graph with incorrect scales or incorrect average calculations will not gain credit. Teachers are reminded that, for the sort of data obtained, bar charts are often more appropriate than line graphs.

Still few candidates progressed 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, however, they did not fully understand what they were trying to do. This is an increasing and unwanted trend where teachers are giving far too much direction to candidates to undertake processing which they don't understand.

The moderator does expect to see different approaches to the same task from different candidates within the centre.

Quality C (Evaluation of the data)

The accuracy, reliability and validity of data are important aspects of Science National Criteria and they are assessed in Science through the Science in the News task. There are still some reports where these are 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 reliability of different sources and explain why one source is likely to be more reliable than another. To award more than 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)

Again social, economic and environmental aspects of the topic are an important part of Science National Criteria. Some centres did not develop these aspects sufficiently with their candidates during the teaching process.

Not all Science in the News tasks provide the same 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.

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.

Quality E (Justifying a conclusion)

All of the tasks are posed as questions and therefore an answer must be given. Most candidates now are giving an answer and a reason which allows the award of 2 marks.

To award 4 marks the candidate needs to show that they came to their answer using what they have found out. That is why it is essential to refer back to sources although full references are not needed.

For 6 marks a candidate needs to decide which source is more significant in helping them to come to their answer. Few candidates do this.

Quality F (Quality of written communication)

Centres were quite good at assessing this Quality. However, 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.
For 6 marks there are few errors and a good use of scientific and technical vocabulary.

The assessment should be made of what the candidate has written and so a report which is largely pasted in from websites will not score well.

E Summary Comments

The moderator does everything to support the decisions of centres. Providing the average marking is within plus or minus 4 marks no change is made as the centre is deemed to be 'within tolerance'. Where the marks are outside tolerance and adjustments have to be made, the work is always considered by at least two moderators. To summarise, if a centre is within plus or minus 4 marks no change is made but if the average is, for example 5 marks, 5 marks would have to be deducted.

Moderators are encouraged to provide useful reports for Centres. The moderation was accomplished efficiently and effectively. The team of moderators, team leaders and senior team leaders worked hard and efficiently to complete the process in the limited time available.

The importance of Cluster group meetings, attendance at OCR INSET meetings and meetings arranged in-house, all provided centres with an appropriate awareness and understanding of the new framework. Centres should have copies of the revised Science Support booklet (which is also available on Interchange).

Many Centres continue to use the free OCR Coursework Consultancy service. Each year a Centre can submit good quality photocopies of three marked Science in the News reports to OCR. They will then receive a written report from a senior moderator on the quality of the marking. This means centres can use this as part of their internal moderation and then enter candidates for moderation with some confidence.

F 2009 Grade Thresholds for B625

The distribution of marks for Science in 2009 was very similar to the distribution of marks for 2008 with a small increase in the mean mark.

Grade boundaries for 2009

	Grade threshold							
	Max. mark	A*	**A**	B	**C**	D	E	**F**
Can-Do tasks and SinN	60	55	**51**	46	**42**	37	32	**27**

Grade boundaries for 2008

	Grade threshold							
	Max. mark	A*	**A**	B	**C**	D	E	**F**
Can-Do tasks and SinN	60	53	**49**	44	**40**	35	30	**25**

Grade boundaries for 2007

	Grade threshold							
	Max. mark	A*	**A**	B	**C**	D	E	**F**
Can-Do tasks and SinN	60	55	**50**	45	**40**	35	30	**25**

Marks in bold were determined by consideration of the Grade Descriptions listed in Appendix A of the Science Specification, and also by the quality of the work submitted when compared with the work from last year and with A 219 (21st Century Science Skills Assessment).

Since the same work can be submitted for Science in the News for Science and separate sciences the same boundaries apply for B635, B645 and B655. Approximately 68% of the Biology candidates entered for B635 rather than B636, 57% of the Physics candidates entered

for B655 rather than B656 and 55% of the Chemistry candidates entered for B645 rather than B646.A great deal of care was taken to ensure that performance by the two routes was comparable in each case.

The grade thresholds have been decided 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. Some adjustments may be expected as experience with the mark descriptors grows.

B636 Report on Gateway Additional Science Skills Assessment

A General Comments

In this, the second year of this unit, the majority of centres coped well with the assessment tasks and applied the marking criteria accurately. There were however, some problems and a significant number of centres had to have their marks scaled, a few by a large amount. Other than over-generous marking, which is covered under the headings of the different components, the following caused problems in some centres.

- A mistaken choice of task. This occurred when a centre chose a task from modules 5 and 6 of a subject for use in Additional Science. These modules are not part of Additional Science and so this choice is forbidden. More seriously a few centres submitted a task for the wrong subject when entering for a separate science subject. This is the same as trying to use a result in a Biology examination to gain marks in Physics.
- Lack of internal moderation. If one teacher marks more generously than the others, it can result in the work of the whole centre being scaled down even those candidates whose work was correctly marked.
- Lack of annotation. Whilst annotation of students work is not compulsory, it is easier for a moderator to support a centres decision if the centre points out what the candidate has written which deserves that mark. This is particularly important if the decision is a borderline one.

B Administration

The paper work from most centres was in order and created no problems. There were, however, some centres where things did not go smoothly. These were the things which caused problems on more than one occasion.

- A missing candidate record sheet meaning that the mark for Practical Skills was unclear.
- Wrong addition of the marks for the three components, leading to a CW amend form being needed.
- Different marks entered on the candidates work and on the MS1 form with the same result.
- A copy of the MS1 form which was so faint as to be illegible.
- A missing centre authentication form. The lack of this form can result in results being withheld.

These problems delay the process of moderation and communication with centres was sometimes very difficult with many requests being needed to acquire the correct paperwork. It is a good idea if centres include, with their sample an Email address which enables the person responsible for the assessment to be contacted.

Supervision of Candidates

There is no need for close supervision for the gathering of information for the Research Study. Indeed this research may be done at home if desired. Nor is there any need for supervision of the collection of data for the Data Task, other than the normal precautions during practical work.

The supervised sessions, however, do have to be supervised. Whilst examination conditions are not necessary the supervising teacher must be confident that the work is the candidates' own to enable the Centre Authentication form to be signed.

The work does not have to be completed in one hour and, if necessary, it can be completed over two sessions. If work is completed over two sessions then work should be collected in and reissued for the second session. The work should not be marked or assessed in any way between sessions nor should candidates be given any other assistance.

Redrafting of work is forbidden and inappropriate assistance can be considered malpractice.

C Research Studies

It was good to see a wide range of Research Studies being used this year. Centres took advantage of the different studies available in each subject area.

The marking of these studies was usually reasonably accurate and nearly always within tolerance. Where there was generosity it was usually in the assessment of quality A.

This year the great majority of candidates produced their studies by answering the five questions separately. This is a more reliable way of ensuring that all the salient points are covered than answering the whole study in essay format.

Quality A: Collecting Information

It is important to remember that the sources used by candidates must be referenced in or at the end of the Study. Even an excellent piece of work answering all the questions in great detail can only score a maximum of 2 marks for this quality if no sources are referenced.

Sometimes marks of 6 were given by centres which presumably knew that their candidates had accessed suitable sources. However, if there is no evidence there can be no credit.

This was the least accurately marked of the four qualities even though it is the easiest to get right.

If sources are given in full in a bibliography at the end, then 4 marks can be scored provided it is clear that they have been used. If it is indicated, within each question, where the information came from then 6 marks can be scored. If sources are only linked to questions not to the information given then 5 marks is appropriate.

Quality B: Interpreting Information

The interpretation of the science involved in the study is key to this quality. Understanding is key to interpretation. It was noticeable, this year that many candidates were quoting from websites which effectively gave the answer to some of the more straightforward questions.

If the quote is directly relevant to the question, some understanding is implied and a mark of 4 would be a fair judgement. However, to gain a higher mark it must be clear that the student fully understands what they are writing. This would be demonstrated if the candidate were writing in their own words or if they added some relevant comment to a given quote from a website.
It was sometimes the case that candidates were given marks of 5 or 6 for answers which were demonstrably copied directly from websites.

It should be noted that, where not all questions have been answered or where questions have only been partially answered, marks of 5 and 6 are unlikely to be appropriate.

Quality C: Developing and using Scientific Ideas

Here we are looking for the ability of the candidate to go further than the requirements of the specification. It may be that some discussion of a current scientific debate is required or an explanation of a scientific idea at a greater depth than that required by the specification. Whatever is required, the response must fully answer the questions posed.

As above the student must demonstrate an understanding of the points being made. Quotes from or lists derived from sources are never worth the higher marks, scoring 4 at most. There was again a tendency in some centres to give high marks for quotes from websites which seemed to answer the question concerned but which didn't demonstrate the student's understanding of the points being made.

Quality D: Quality of Written Communication

As last year centres usually marked this reasonably accurately.

Where adjustment to marks was necessary, it was usually because the teacher marking the work had mistakenly credited the student with marks for the English copied from a source. When this language was compared to the students own English in different questions there was a clear mismatch.

Credit should only be given for the students own use of English. Where the work is almost entirely copied from the internet and other sources it is difficult to justify a mark of more than 2.

D Data Tasks

It was again good to see a wider range of Data Tasks used though not as wide a range as was the case with the Research Studies. The 'old favourites' such as Bouncing Balls still appeared regularly.

Where scaling was necessary it was usually because of over-marking of the Qualities assessed in the Data Task. In the case of large scalings this was almost universally the case. The Qualities which caused the greatest difficulties were Qualities B and C and to a lesser extent Quality E, though all Qualities were over-marked on occasion.

Quality A: Interpreting the Data

The graph should be the easiest thing to score marks on. In the majority of cases it was but in some centres the marks given were too high.

The main areas where candidates lost marks were:

- not drawing a suitable 'best fit' line (or curve)
- drawing a graph which was too small
- drawing a graph with axes the wrong way round
- plotting points inaccurately
- joining a graph to the origin where inappropriate.

Marks lower than 4 were rare but centres are reminded that; a best fit straight line should have an equal number of points on each side unless anomalies are being excluded; a graph should occupy at least half of an A4 grid; the controlled variable should always be on the 'x' axis; points should be plotted accurately; and it is not always appropriate to draw a graph going through the origin (it is sometimes actually wrong).

There were cases where the raw data was not included with the work. This meant that plotting could not be checked and limited the mark available.

Quality B: Analysis of the Data

Missing data was sometimes a problem with this skill too. The most usual 'processing' used to gain two marks is the averaging of three attempts at each value. If the data are not included then this mark can sometimes not be achieved. This means that, even with a complete description of the trends the maximum mark available is 3.

Marks of 4 were frequently gained in this skill but, equally, marks higher than 4 were often given without justification. Additional processing which leads nowhere should not be given credit, nor should the spotting of an anomaly where a point does not lie on a smooth curve.

The additional processing which is done needs to show something which is not immediately obvious from the raw data or it needs to show that what seems to be reliable data is in fact invalid in some way.

It was clear that some centres gave their candidates ideas as to what additional processing could be done. In most cases the candidates did not understand why they were doing it and made no use of the information which they could have obtained. They were, however, sometimes given credit for 'following instructions'.

This is a high order skill designed to discriminate between candidates of high ability. A candidate should see the opportunity for additional processing for themselves without assistance from the teacher. In good centres more able candidates succeeded in gaining 5 or 6 marks with no outside assistance.

Quality C: Evaluation of the Data

There are two strands to this Quality, the data and the experimental procedure. The attention of centres is drawn to the title and the word DATA which appears in it. Analysis of the data obtained should be the main aim of the candidate. If the reliability of data is not addressed then the maximum mark achievable is 3, no matter how thorough the treatment of weaknesses in the method.

It is not sufficient to say 'we used the fall back data and that must be reliable because it was provided by OCR (it is not even accurate to say that, as unreliable results are always built in to the fall back data). It is equally not sufficient to say we used a computer simulation and computers do not make mistakes.

A more common error was to say that the data must be reliable because we did three repeats and doing five would make it more reliable. Repeats may make the average more reliable, they do not make the raw data more reliable. Many candidates stated that their data was reliable when more than one values was clearly divergent. It was often the case that marks of 5 or 6 given by the centre had to be reduced to 3 or even 2.

Reliability of data is most easily addressed by comparing the results gained in the three repeats required in most data tasks. Where only one value is taken, proximity to a best fit line is an alternative. The data themselves must be discussed to gain marks of above 3.

Validity must be discussed to gain marks higher than 4. To be valid, data must first be reliable. If the data is reliable but does not give an expected conclusion then it is not valid. For example, a best fit line may not go through the origin as expected or a value calculated from the data may not agree with a known value. If data is not valid it must be due either to the method/apparatus or to 'operator error'. This gives the candidate the opportunity to discuss the procedure part of the task.

Quality D: Justifying a Conclusion

This was, in general, marked more accurately than the previous two Qualities though there were exceptions. A conclusion of sorts has been given in the form of the pattern described in Quality B. This quality involves justifying that conclusion.

Where candidates were marked too generously it was usually because they had written about the theory involved in the phenomenon observed but had not explicitly linked what they had written to the data which they had obtained. An examination of the criteria will reveal that, at each level, the word DATA is included. If neither the data themselves nor the pattern described in Quality B are referred to in this answer, then it is difficult to award high marks even if the science used is of high quality.

The problem seems to be that candidates learn the theory necessary before embarking on the Task and then regurgitate it (with greater or lesser accuracy) in answer to question 4. If it is correct, the centre awards it 6 marks even if no reference whatsoever is made to the data or to the pattern observed in the investigation.

To gain marks at the highest level in this skill it is necessary that the science used is correct, fully understood and explains the data obtained in the experiment completely.

Quality E: Planning further Work

The plan must be sufficiently detailed to allow another person to carry out the intended experiment. In all cases it is possible to use the investigation already carried out as a basis for the plan. It is, then, often not necessary to describe all the apparatus needed. What must be included is:

- the variables which to keep constant and which to vary
- how to ensure that variables are kept constant
- the range of values to be used for the controlled variable.

Only if there is sufficient detail in the method given, can marks in excess of 3 be obtained. Marks higher than 4 are achieved by considering the importance of the new information which would be obtained. There is usually a question to lead candidates in the right direction.

Where this skill was generously marked it was either because the method proposed did not give sufficient detail of the variables and their control or because the method wouldn't work.

E Practical Skills:

This is a mark given by the centre as a summary of the practical skills demonstrated by each candidate over the period of the course.

The intention is to gain a general impression rather than to have a snapshot of the skills on a particular occasion.

Many centres had a good range of marks but it was surprising to see how many centres had a complete cohort all scoring six marks.

F Separate Sciences

The problems and successes noticed in work submitted for the separate sciences were the same as for Additional Science in both Research Studies and Data Tasks.

The overall scores tended to be higher because, in general, candidates were of higher ability.

The tasks used were, in the main, those from modules 3 and 4 of each science but it was pleasing to note that some of the tasks from modules 5 and 6 were beginning to be used.

Many of these skills exercises provide interesting ways of delivering and enhancing the separate science units. I hope to see them used more next year.

G Other Matters

Centres are thanked for the diligent work which the vast majority put into the assessment of the work of their candidates. Where this is done moderators can support the decisions made by centres and the process runs smoothly

Where it is necessary to adjust the marks of a centre the work is looked at by at least two moderators.

If the adjustment is large it is looked at by at least three including the Principal Moderator.

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.

Grade Boundaries

Grade	A*	A	B	C	D	E	F
Mark/60	54	49	43	38	32	26	20

Grade Thresholds

General Certificate of Secondary Education
Biology B (Specification Code J643)
June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
B631/01	Raw	60	-	-	-	38	31	25	19	13	0
	UMS	69	-	-	-	60	50	40	30	20	0
B631/02	Raw	60	43	36	29	22	16	13	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B632/01	Raw	60	-	-	-	31	24	17	11	5	0
	UMS	69	-	-	-	60	50	40	30	20	0
B632/02	Raw	60	43	35	27	20	14	11	-	-	0
	UMS	100	90	80	70	60	50	45	-	-	0
B635/01	Raw	60	55	51	46	42	37	32	27	22	0
	UMS	100	90	80	70	60	50	40	30	20	0
B636/01	Raw	60	54	49	43	38	32	26	20	14	0
	UMS	100	90	80	70	60	50	40	30	20	0

B635 & B636 - The grade thresholds have been decided 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
J643	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
J643	18.0	46.8	74.0	91.0	96.6	98.6	99.5	99.9	100.0	13115

13233 candidates were entered for aggregation this series

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

Statistics are correct at the time of publication.

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