

**GCSE**

**Biology B**

Gateway Science Suite

General Certificate of Secondary Education **J263**

**OCR Report to Centres June 2016**

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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 specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

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

OCR will not enter into any discussion or correspondence in connection with this report.

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## **B731/01 Modules B1, B2, B3 (Foundation Tier)**

### **General Comments:**

The entry for this paper was relatively low and it did appear that the majority of candidates were entered for the correct tier. There was no indication that they were short of time in answering all the questions.

The standard of numeracy in this paper was encouraging but the gradient calculation was found to be difficult by many of the candidates. The structure and function of the eye seemed to cause the most difficulty, with the majority of candidates unable to label the eye or recall some of the functions of the parts.

### **Comments on Individual Questions:**

#### Question No

Q.1(a) Very few candidates could correctly identify both parts A and B, with the blind spot providing the greatest difficulty.

(b) Although this was slightly better answered than (a), a significant number of candidates reversed the two answers here.

(c) Some candidates could identify this as a genetic disorder but many incorrectly described malfunctions of different parts of the eye.

(d) This question was very challenging for most of the candidates with very occasional references to different images seen by each eye.

Q.2(a) Some candidates could correctly state auxin but there were many incorrect answers, often stating substances such as sugars.

(b) The answers often correctly showed the experimental set up but the most common error was to state that the seeds in the dark would not grow at all.

(c) Many candidates correctly stated that roots may be growing down towards gravity but few candidates realised that the results could be caused by the roots growing away from light.

Q.3(a) This question was well answered by many candidates with correct references to Nicola being vegetarian and wishing to lose weight and Paul requiring energy rich carbohydrates.

(b) The main issue for some candidates was the failure to differentiate between salt in the diet leading to higher blood pressure and the salt in the urine being an indicator of salt in the diet.

Q.4(a) A number of candidates focused entirely on the energy provided by the drinks rather than the action of the caffeine as a stimulant.

(b) Correct references to tolerance and dependency were seen in a number of candidates' answers.

Q.5(a) &(c) Well answered by most candidates.

(c) Again this was well answered with many correct references to legal protection and captive breeding.

(d) A number of candidates correctly referred to the time delay in the predator-prey cycles. Fewer referred to the lower numbers of the tigers.

Q. 6(a) The majority of candidates correctly identified insects.

(b) Correctly answered in most cases.

(c)i The proximity to the food supply was stated by most candidates.

ii Again this was well answered with many references to different feeding needs.

Q7(a) The calculation involving the gradient of the line proved very challenging for most candidates, however some could score in part ii by error carried forward.

(b) The difficulty in estimating the world's population was explained by most candidates.

(c) The answers explaining why the pollution has increased were often too vague to score, often just referring to increased emissions or more rubbish.

(d) The most common error here was for candidates to assume that pollution levels would simply continue to increase without any reference to the graph.

Qu8 This question proved challenging for most candidates with many simply restating the information from the question with little or no explanation.

Qu9(a) Both parts to this question were well answered.

(b) There were many simple references to growth rather than to cell division and differentiation.

Qu10(a) The weaker answers to this question showed some considerable confusion between cloning, genetic engineering and selective breeding. There were a number of candidates who could correctly explain selective breeding using the example given.

(b) The main problem here for some candidates was the confusion between the chromosome number of dogs with that of humans. Part (ii) was the least well answered and part (iv) the best.

(c) The main problem here was candidates failing to give comparative answers. Answers which simply stated 'to get oxygen and glucose and to get rid of carbon dioxide' did not score.

Qu11(a) The two parts of this question were quite challenging for the candidates. Some did appreciate the significance of the thickness of the wall of D and the need to reverse the heart in a transplant.

(b) There were some issues with incorrect numbers of zeros but most candidates could deal with this calculation.

(c) Again, this was quite well answered with many correct arguments for and against being put forward.

## B731/02 Modules B1, B2, B3 (Higher Tier)

### General Comments:

- In general the paper was balanced and accessible to all candidates. There was little evidence to suggest that candidates had struggled to complete the paper as most candidates answered the final question. Also there were very few questions that candidates did not attempt.
- Answers were appropriate to the question and there was little evidence of guessing taking place. Questions which tested the quality of written communication were largely approached in a suitable manner by the candidates. Very few of these questions were no response answers and in some cases because of the correct use and interpretation of data, candidates were able to score well. However, candidates need to be aware of when a question demands the interpretation of data or information source, rather than just a description of it.
- The rubric of most questions was interpreted correctly. There was some evidence that candidates did not read the question carefully enough. In some instances candidates named structures rather than functions as the question had asked for.
- Candidates are improving their ability to apply their knowledge and understanding. Marks ranged from low teens to the high sixties and it is encouraging to see high marks are continuing to be obtained by the more able candidates.
- Encouragingly, most candidates seem well prepared to answer questions on energy flow in food chains. Some were able to apply their mathematical skills to calculations involved in energy efficiency, unfortunately a number of candidates applied these to the wrong part of the food chain and this limited their marks.
- There was much evidence of candidates using their own mnemonic to help them recall classification structure and this was pleasing to see.
- Candidates, as in previous exam seasons need to be more aware of making comparisons to avoid losing marks. Candidates should also be more alert to applying their knowledge to given situations in questions. They should not be put off when interpreting familiar scientific questions seen in unfamiliar contexts.
- Despite an extra page being included in the question paper for additional answer space, several centres had still allowed candidates to write a few words in an additional extra 4 page booklets. This meant blank pages were being needlessly scanned. It would be helpful if centres could ensure that invigilators only give extra booklets where absolutely necessary, as this does impact on the marking process as a whole.

### Comments on Individual Questions:

#### Question No 1.

Q 1(a). Candidates often misread the question and only named the parts. It was common for candidates to not recognise the retina's role in detecting light.

Q 1(b). A well answered question in the main.

Q 1(c). Most candidates were discussing about genes being different rather than alleles. Very few were able to apply their wider knowledge of fertilisation, meiosis or mutations with the causes of variation. Where one mark was gained it was generally for the idea of different alleles.

Q 1(d). Candidates often referred to binocular vision or explained long/short sightedness rather than about judging distance. Where candidates did score it was for the idea of two different images, few got the idea of "the more similar the images the further away the object".

#### Question No 2.

Q 2(a). Most scored this mark. Where they didn't, it was due to reference to human hormones.

Q 2(b). Many were credited with the mark for explaining positive geotropism. Some candidates were answering in terms of the ground/sun, others describing what happens to the shoot for phototropism. In these situations candidates were not credited.

Question No 3.

Q 3(ai). Almost all candidates gained this mark.

Q 3(aii). Again, many scored well here.

Q 3(b). Many scored the 50% mark. Very few candidates understood the explanation marking point here. Although they seemingly understood the cross had not identified clearly the genotype causing club thumbs in offspring. Most were simply referring to the parental genotypes.

Q 3(c). This was similarly answered, with many scoring the 50% but, even when doing appropriate Punnett squares/genetic crosses, failing to identify the offspring genotype that created the probability of the condition.

Question No 4.

Q 4(a). Well answered in the main.

Q 4(b). Candidates struggled to explain the design of this and many went into long descriptions of blind tests. Many understood the idea of a placebo being used to account for bias/psychological effects. Comparison of the 4 sets of results, however, was poor. A common misinterpretation was that the placebo was the most effective, as its reaction time was the highest. Some did not appreciate that if the reaction time is low, that equates to a faster reaction and as a result their explanations were not appropriate.

Question No 5.

Q 5(a). Most candidates got the idea of the decreasing habitat and many understood the consequence of increased competition. Fewer were able to link this to reduced variation or lack of successful breeding.

Q 5(b). Although well answered by most, it was still surprising that a number of candidates only gained one mark on this question. It was clear those candidates who were well prepared, had learned from similar past exam questions and had learnt an appropriate response, hitting all the key phrases and explaining pattern succinctly.

Question No 6.

Q 6(a). Most candidates got at least 1 mark, many both. It was pleasing to see many candidates using mnemonics as memory aids for the correct sequence.

Q 6(b). Not well answered. Very few candidates linked this to speciation. Many candidates described animals breeding with other animals to form hybrids. They did not link the adaptations to a changed environment making the features change so much they can't successfully interbreed. A minority of candidates were able to use terms like 'can't breed to produce fertile offspring' or the term 'speciation' and were able to score.

Q 6(ci). Most candidates scored this mark.

Q 6(cii). Again this was a well answered question.

Q 6(ciii). Although most scored this mark, several responses were seen where the candidate had misinterpreted the question, possibly because of making assumptions about the picture, describing about camouflage rather than adaptation to feeding.

Question No 7.

Q 7(ai). Generally a well answered question, although 2000 to 2040 was a good distractor and was frequently seen as well.

Q 7(aii). Most candidates scored here.

Q 7(aiii). Not a well answered question. The ability to calculate a gradient from a graph was not well understood. This 'How Science Works' skill needs developing. Some candidates lost a mark through carelessness in making sure they had the correct decimal place.

Q 7(b). There were many good explanations of sustainable development, unfortunately these didn't answer the question. Few grasped the idea of supply not being enough to meet the demand and even fewer about the idea of insufficient time for sustainable developments to replenish stocks to meet these demands.

Question No 8.

Q 8. Clearly candidates have been well taught on the ideas of energy flow in food chains. Responses are much improved on similar questions in previous examinations. Unfortunately, a large number opted to calculate the energy efficiency between sheep and humans rather than plants and sheep as asked for in the question. This significantly affected the marks scored on this question for these candidates.

Question No 9.

Q 9(ai). Many candidates made links between D and a thicker muscle wall. There was, however, still evidence of some confusion over what each part of the heart does.

Q 9(aii). Some candidates struggled with the applied nature of this question. Most who scored did so for the idea of putting it in back to front. Fewer got the mark for linking up the correct blood vessels.

Q 9(bi). Most candidates scored this mark.

Q 9(bii). Generally a well answered question but it did reveal some misunderstandings. Some candidates thought that the condition required a transplant or that the x-ray would be taken before birth and might lead to parents opting for an abortion.

Question No 10.

Q 10(a). Most candidates got the idea of reduced gene pool and hence susceptible to diseases points, but struggled with advantages. Some had the idea of asexual multiplying fast. There were quite a few who thought having just male trees was a disadvantage. However, there were many misconceptions here. Many candidates were discussing from a human benefits point of view, or focusing on the linked roots and sharing nutrients etc. Disturbing though, is how many candidates clearly do not understand that cloning is asexual reproduction and that it occurs naturally. In many the context of cloning seems to be limited to a technological process done by humans. Many stated that the trees would be unable to reproduce or reproduce naturally.

Q 10(b). Very few candidates got this and were focussed on ethical ideas or that it was faster/easier.

Q 10(ci). Again this was not well answered. Many just said it was more accurate, others referred to water content but did not identify that the water content is variable and it is this that leads to inaccuracies in wet mass measurements. Only a very small number of candidates got the idea of it measuring biomass.

Q 10(cii). Most candidates scored here. They seemed to remember that the organism has to be dead to measure dry mass.

Question No 11.

Q 11(a). Not very well answered. Most candidates were explaining in detail why it happens and what anaerobic respiration is rather than what oxygen debt actually is.

Q 11(b). Again this demonstrated a weakness in using the evidence and applying knowledge. Many gave vague answers about oxygen debt and anaerobic respiration but did not link this specifically to the graph and failed to mention that it was the oxygen needed to deal with the oxygen debt that the body is in. Some did score by referring to oxygen breaking down the lactic acid.

Q 11(c). Many candidates did understand that this was lactic acid but some then missed the need to describe/explain the graph, or if they did, only described it partially missing the decrease aspect.

Examples of incorrect answers included glucose/adrenaline/insulin/haemoglobin.

Question No 12.

Q 12(a). Another area that seems poorly understood. Many candidates divided the 928 by 3, and even more thought about base pairs and divided or multiplied by 2 or stated there are 4 bases and divided or multiplied by 4. Others calculated correctly but forgot to give an explanation.

Q 12(b). Candidates did not score well here. This was mainly because they tried to give an over-complicated answer rather than a simply referring to different shape, different function or job.

Q 12(c). Generally a well answered question, although several did get replication confused with other processes, like mitosis and meiosis.

## **B732/01 Modules B4, B5, B6 (Foundation Tier)**

### **General Comments:**

The entry for this foundation tier paper was very low in comparison to the higher tier paper and a wide spread of marks were obtained. However, it appeared that the majority of candidates were entered for the correct tier.

It is encouraging to see that the standard of numeracy in this paper continues to improve but there are still areas that are restricting candidates' marks.

The topic of immobilised enzymes seemed to cause the most difficulty, with the majority of candidates unable to state how enzymes can be immobilised or recall the advantage of doing this.

### **Comments on Individual Questions:**

#### Question No

Q.1(a) Most candidates scored on this question although the most common error was to link the entry of water to the xylem.

(b) Well answered by most candidates.

Q.2(a)i Incorrect answers such as 'dead' were quite common but the idea of wilting was understood by a number of the candidates.

ii Most candidates appreciated the need to water the plant.

(b) Many answers here referred to vague terms such as food, goodness or nutrients rather than focussing on the mineral content of fertilisers.

(c) This was well answered by most candidates.

(d) Answers to this question highlighted the need to make comparative comments with candidates failing to score marks by simply stating that plants in the shade get no light and so do not grow.

Q.3(a) Most candidates commented on the adverse conditions, lack of water or cold temperatures. A smaller number could go further and link the wind to larger water loss or the lack of water and cold temperatures to a reduction in photosynthesis.

(b). The most common error here was candidates simply repeating the information from the question. Some did go further and referred to the lack of oxygen.

(c).i Well answered by many, with references to the increase in recent years, the fluctuations and the decrease until recent years.

ii Although the word proves was emboldened few candidates appreciated the difference between proof and a correlation. Answers often repeated those given to the previous question.

Q.4(a) Well answered by most candidates.

(b) Despite the information provided and the clear nature of the specification statement, this question was not well answered with many candidates referring to testes being in the scrotum at a warmer temperature to produce sperm or for protection.

Q. 5(a) Most answers identified a break or fracture but only the better answers referred to the type of break or the bone damaged.

(b).i Correctly answered in most cases.

ii The main issue here was that candidates ignored the part of the question asking 'how' the risk changed and concentrated on 'why'.

(c) There was some confusion between ventilator and dialysis although most candidates knew the function of a pacemaker.

Q6(a) i Although the question clearly asked for two ticks some candidates only ticked one of the correct answers.

ii A minority of candidates could correctly recall the function of the coronary artery.

(b) The format of the bar chart clearly confused some candidates but many could identify an advantage or disadvantage of taking the drugs. Some went on to link this to the overall reduction in the number of problems. Very few candidates, however, referred to the mode of action of either of the drugs.

Q7(a) Many candidates could correctly calculate the percentage for Sanchez and link it to the information in the table.

(b) Many candidates referred to breathing, anaerobic respiration, lactic acid production etc. but few simply said that the respiration rate will increase.

Qu8(a) Most candidates answered correctly.

(b) This was less well answered with athlete's foot being a common incorrect answer.

(c) Well answered by most.

Qu9(a) Many answers simply referred to 'air ruining it', but some did score the 'stop explosion' marking point.

(b) The most common error here involved candidates stating that the alcohol will be evaporated or burned.

Qu10(a) Correct answers here referred to the rotting of food or animal/plant waste, whereas weaker answers simply stated 'waste' or rubbish.

(b) Many incorrect answers referred to toxic or poisonous.

(c) Most candidates scored the first marking point by choosing C but the reasons given were often too vague to score further.

Qu.11 Answers often gave similarities and differences between the two curves but few managed to explain the comparisons. If they did, they often explained the rise in phytoplankton by the increase in temperature.

Qu12(a) Very few candidates could answer correctly here with incorrect answers stating cooling them, melting them, heating them etc.

(b) Some candidates did appreciate the need to refer to a temperature and a pH in their answer.

(c) A small number of candidates commented on the increased cost of heating to the higher temperature.

(d) Again many candidates were let down by their biological knowledge of immobilised enzymes and few stated that they are easily recovered and reused. Some candidates did state that free enzymes have a higher activity.

Qu13(a).i Well answered by most candidates although some did refer to the change in sightings and not the population.

ii Candidates again found the idea of analysing the evidence and commenting on the nature of the survey quite challenging.

(b)i & ii Fairly well answered by most although the fact that the largest change in (i) was a decrease clearly distracted some candidates.

iii & iv There were some good answers to both of these questions, often backed up with figures and calculations.

## **B732/02 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. Candidates appeared to have had sufficient time to complete the paper, with the majority attempting most of the questions. In many cases the handwriting of the candidates caused problems as it was difficult to make out exactly what they had written.

The majority of candidates attempted the of response questions. A large proportion of the candidates provided very long answers that tended to repeat what they had already said and in some cases contradicted their answers. They should be encouraged to use the number of lines within a question as a guide to the length of answer required.

This was the first year candidates had been provided with additional pages on the paper to use instead of adding extra answer booklets. Many candidates made good use of these pages especially when answering the level of response questions. However in some cases these pages were ignored and answer booklets used instead.

### **Comments on Individual Questions:**

#### Question No.1

Q1(ai) Most candidates answered this question correctly. A few candidates incorrectly chose cell C.

Q1(aii) The most common answer seen was flaccid however to gain the marks the candidates need to correctly identify that the cell was plasmolysed. Another common mistake was to use the term dehydrated.

Q1(b) Candidates often confused active transport with diffusion or osmosis. Only the more able candidates answered correctly in terms of concentration gradients and energy. Some managed to contradict their answer by stating that the movement was against a concentration gradient from an area high concentration to low concentration.

#### Question No.2

Q2(a) This question discriminated the different levels well, the less able candidates would mention that transpiration and photosynthesis were affected by the different conditions but not actually say that the rates increased or decreased. Only the more able candidates used the correct terminology linked to evaporation from the leaves or enzyme activity. A large proportion of the candidates described the processes of photosynthesis and transpiration without actually linking them to the conditions.

Q2(b) Many candidates tended to answer in terms of rotting requiring oxygen and water without mentioning bacteria. Of those candidates who stated that bacteria were involved few realised that they would not be able to respire or reproduce many simply said they would not survive.

Q2(c) Most candidates identified xylem and phloem although the incorrect spelling of phloem (phylum or phyllem) meant that some lost this mark. A common misconception is that phloem transports minerals.

Q2(di) Most candidates showed that they understood that the statement could not be completely supported by the data.

Q2 (dii) Only the most able candidates realised that although the tree rings were increasing in size there was no actual evidence to link the change to global warming. The candidates that got one mark tended to state that there were other factors such as water or mineral availability that might have caused the change.

Question No.3

Q3(a) Most of the candidates identified the fact that the seaweed reflected red light but very few went on to explain that the seaweed could survive by absorbing the blue light for use in photosynthesis as the blue light reached greater depths. Many candidates compared the light reflected by brown or green seaweed which was not required.

Q3(b) Very few candidates seemed to understand the term element with the majority referring to the different minerals required by the plant. Few could make the link between the elements found in glucose and the need for nitrogen to make proteins.

Question No.4

Q4(ai) Candidates often lost the mark for ending their label line well within the bone instead of on the outer edge of the bone. Centres should discourage the use of arrows when labelling diagrams as it is often difficult to judge where the arrow head is pointing.

Q4(aii) More candidates were able to identify the position of the bone marrow. Although some did incorrectly think they would gain the mark for pointing an arrow in the general direction. However as the end of the line was not within the bone marrow itself no mark was awarded.

Q4(b) Most of the candidates identified the two joints and explained the differences. Although some gave vague answers for the ball and socket joint in terms of wide range of movement instead of movement in more than one direction or plane. Candidates could not be awarded marks for stating the hinge joint moved in two directions unless they clarified this by using the term forwards or backwards. Candidates should also be discouraged from giving answers about the knee joint moving  $180^\circ$  or  $90^\circ$  as neither are entirely true.

Q4(c*i*) The majority of candidates correctly calculated the answer.

Q4(c*ii*) Most of the candidates knew that the bones became more brittle while less mentioned the idea of them being less dense. Many incorrectly thought it was something to do with cartilage.

Question No.5

Q5(a) The majority of candidates identified the need for a by-pass operation although a number of them thought a valve replacement was needed.

Q5(b) Most of the candidates were able to write about the effects shown in the graph, a common error was to assume that the number of patients with dangerous bleeding would be reduced by using the drugs. Many candidates found it difficult to extend the information about warfarin and aspirin given in the question to explain why they caused the effects.

Q5(c*i*) A large number of candidates failed to follow the instruction which asked them to place one tick instead they put ticks in several boxes. The most common misconception was to assume that blood group O has antigens A and B but no antibodies.

Q5(c*ii*) Most of the answers seen were vague comments about rejection, clotting or the immune system attacking the blood. Few candidates could use the term agglutination and explain in terms of the correct antibodies and antigens joining together.

Question No.6

Q6(a) Many candidates found the percentage change calculation difficult one common error was to divide the difference by the mass after the race rather than at the start. Those that correctly calculated the percentage change often lost the second mark by not providing a full explanation as to why Sanchez was unlikely to win the race.

Q6(b*i*) Most candidates answered this question well, often referring to large surface area and villi. Some candidates only referred the length or thin walls without mentioning short diffusion pathways.

Q6(b*ii*) Candidates find the concept of water balance by ADH difficult, some excellent answers were seen. However some candidates assumed the water passed directly to the bladder from the digestive system and that it was not absorbed into the blood.

Question No.7

Q7(a) Most candidates could identify the best conditions for the immobilised enzyme to work.

Q7(b) Very few candidates provided a complete answer to the question most incorrectly thought that the enzyme would denature at 60°C. When mentioning cost many failed to qualify their answer by explaining it was the cost of heating the process or that it required less energy.

Q7(c) Candidates tended to provide at least one of the marking points usually the idea of higher activity levels for the free enzymes, using their knowledge to provide an advantage for immobilised enzymes proved more difficult.

Q7(d) Although most candidates realised that less sugar would need to be added they assumed this would be cheaper as they had not taken into account the cost of manufacturing.

Question No.8

Q8 There were a number of excellent answers seen to this question however many candidates failed to provide a complete answer that was clear and concise. They often talked about predator prey relationships which was irrelevant in this case. There were also lengthy explanations for the similarities which had not been asked for. The most common answer was a level two answer that provided a similarity and a difference between the two graphs. These answers often failed to get into level three as they made vague comments about weather conditions or temperature differences, without stating if the temperatures were higher or lower at the time of year they were comparing.

Question No.9

Q9(a) Most candidates correctly identified the advantages but they assumed the disadvantage was the level of methane which they linked to global warming. Not realising that the methane was needed if the biomethane was to be used as a fuel.

Q9(b) Few candidates grasped the concept of anaerobic respiration occurring due to the lack of oxygen. Many incorrectly assumed it was the presence of excess water that allowed the bacteria to survive.

Q9(c) Although many candidates showed some understanding of optimum conditions they failed to provide a complete explanation of why gas production was reduced outside the optimum range. If they answered in terms of enzymes they were required to include ideas about fewer collisions rather than just energy levels. Many still have the misconception that bacteria denature or that enzymes die.

Q9(d) Many candidates assumed this was to do with pollution levels rather than the idea that low levels of methane will explode.

Question No.10

Q10(ai) Most candidates correctly identified restriction enzyme although some used similar words that could not be credited such as restrictive or restricted.

Q10(aii) Fewer candidates identified ligase with lipase being a common incorrect answer.

Q10(b) Explaining why the same enzymes are required proved to be difficult. There were vague comments about not fitting but at times they referred to the enzymes not fitting rather than the DNA. Some candidates incorrectly thought it would cause mutations. Another common error was to talk in the negative without making it clear that they were explaining what would happen if different enzymes were used. The use of the term complimentary was rarely seen.

Question No.11

Q11(ai) Most candidates failed to answer in terms of lack of evidence most simply described possible trends. They did not realise that only two surveys done several years apart would not provide enough data for a clear trend.

Q11(aii) The majority of the candidates failed to grasp the concept that such statements cannot be justified if there is no data on temperature.

Q11(bi) The majority of candidates identified 2005 as the correct year.

Q11(bii) Candidates tended to incorrectly state that there must have been more birds seen but as the population increased after this date that was unlikely. They also mentioned technology which again would have meant that the confidence levels would be unlikely to have decreased

the following year. Few candidates understood that it was due to less variation in the data collected.

Q11(ci) Most of the candidates were able to provide one side of the argument by explaining that only the population of seabirds increased however they failed to say that Sam was not completely right as all birds in the survey did not change much.

Q11(cii) Very few candidates understood that using percentages allowed a comparison between groups of different sizes. Most of the candidates answered in terms of the problems with calculating the actual population size which gained no credit.

## B733 Controlled Assessment

### General Comments:

Overall centres have shown a good understanding of the requirements of the controlled assessments in the science subjects. The marking criteria have been mostly applied appropriately and it is good to see a large number of centres putting annotations on the scripts in the appropriate places to show how and why they have awarded the marks. Work submitted for moderation was generally well organised with all of the required paperwork submitted by the centres for the moderators' consideration.

However, a minority of centres are still submitting work that does not meet the full requirements of the courses. In particular;

- It is very important that marks are carefully checked before they are submitted. Moderators have noted a number of clerical errors this year where the marks submitted are not the same as those on the scripts sent to the moderator. This not only causes delays in the process but, if not corrected can result in incorrect marks being awarded to candidates.
- It is important that centres send the marks to OCR and the work to the moderators within the time frame set by the board. Unfortunately some centres are failing to meet these deadlines.
- It is important that the cover sheet for the work is completed correctly and, in particular, that correct candidate numbers are shown on scripts.
- All controlled assessments are valid for one year only. This is clearly indicated on the tasks that can be downloaded from the OCR web site. Some centres have submitted tasks for the wrong year. Some have submitted work from a previous year and others from next year's tasks. It is important that all centres make sure that the tasks they are undertaking are for the current year. The only tasks that are valid for 2017 are available on the website and clearly marked.
- All centres need to provide a copy of the CCS 160 Centre Authentication form with the candidates' work. On this staff are declaring that they have conducted the tasks under the required conditions as laid down by the specification. Controlled assessments require candidates to research, plan, carry out and review the tasks set and, other than for the practical work itself, this needs to be done independently. Even if candidates work in groups for the practical task they must complete their written work on their own and not work collaboratively.
- The amount of support that can be offered to candidates by the centre is the same regardless of the specification, the type of centre or the ability level of the candidates. Writing frames of any kind are not permitted and there should be no opportunity for candidates to produce a draft for review followed by a final piece of work for submission.

Previous reports have given considerable guidance on the application of the marking criteria, how to avoid common errors and the requirements for the award of high marks. Centres are advised to consult previous reports in addition to the notes given below as many of the comments below repeat advice that has been given previously and which is still being overlooked by a few centres.

### Comments on specific Skill qualities:

**Researching:** Candidates generally scored well on this Skill quality and the marking criteria were usually well applied. In the main candidates have used a wide range of sources in their research although, not surprisingly, the majority of these are from internet sources and few references are given from books. If web sources are used then full urls need to be provided so that these sources can be checked. If books are used then page numbers should be given as well as title and author.

In previous coursework, before controlled assessments were introduced, there was a requirement for candidates to consider the validity of sources. This **is not** part of the current marking criteria. Candidates are required to select information from their sources that is correct and relevant to the specific bullet points in task one that they are addressing and do not need to spend time considering where the information has come from. They should not use wholesale cut and paste from the sites although they may quote specific points, if referenced appropriately in the text. The inclusion of irrelevant material will reduce the mark available. For high marks candidates are also required to show which sources are relevant to the different parts of their notes. The easiest way to show this is by numbering the sources and putting numbers in the appropriate places within the text.

**Planning:** This Skill quality often begins with a hypothesis, except in the science specification, together with supporting science to explain and justify the hypothesis. This is only one part of the marking criteria and centres need to bear in mind that the marking is best fit not hierarchical. However, for high marks it is expected that candidates will demonstrate a suitably high level of understanding of the underlying science behind the task. This year there was a significant amount of misunderstanding of the science associated with the cold packs task for additional science, further additional science and chemistry.

Candidates sometimes find it difficult to obtain high marks when they do not address the task set. For example in the aerobic exercise task candidates will clearly obtain lower marks if they plan a task involving anaerobic exercise.

The methods written by candidates are now often of a high quality and frequently contain diagrams to support them. However, an appreciation of possible sources of error and how to control variables is still a weak area for many candidates. This is particularly true in biology tasks where there are many variables to control, for example how to maintain a constant pace in an exercise task.

Many candidates also do not consider the resolution of the equipment they choose to use, as is required in the marking criteria for 5-6 marks.

### Collecting Data:

This is often a high scoring Skill quality but some centres are still awarding high marks when there are errors in headings and units. In particular, for full marks, candidates should not put units next to each data point in the table but should include these in the headings. For the purpose of this Skill quality, the level of precision is taken to be an appropriate and consistent number of decimal places for the recorded data.

Occasionally there has still been evidence of centres penalising candidates for failing to present processed data correctly, for example, averages being shown to a varying number of decimal places. Also some centres have awarded high marks when not all raw data has been included, for example, failure to record initial and final temperatures and only recording temperature change.

As mentioned above, writing frames must not be provided and, if provide, can result in only very low marks being available to candidates as they have not constructed their own data table.

### **Managing Risk:**

Most candidates now appreciate what is involved in carrying out and recording a risk assessment for an experiment. The weakest aspect remains their ability to evaluate the risk associated with a task, as required in the 5-6 marking criteria. This is particularly the case when a task is very low risk. Candidates vary from writing virtually nothing to coming up with a range of highly unlikely risk scenarios. It was surprising to see a number of candidates referring to the risk of mercury from the use of a thermometer when most modern thermometers do not contain mercury.

In order to score highly, candidates need to identify some hazards that are specific to the task and not just generic, they then need to identify the risk associated with these hazards and suggest ways to both avoid and deal with these if they occur. These suggestions need to be specific and appropriate for high marks and not just comments such as "tell the teacher". The likelihood and severity of these risks should also be identified and, if a numbering system is given to the risks, then some key to explain what the numbers mean should be given. An overall comment about the level of risk for the whole task is important particularly for a very low risk experiment.

The level of risk should be realistic for example, not all risks should be graded as high otherwise the experiment would be too dangerous to do in a school context.

### **Processing data**

Most candidates obtain averages for their data and produce graphs of varying quality. For high marks candidates need to produce a line of best fit and show a quantitative consideration of uncertainty. Although not penalised by the marking criteria, centres are encouraged to talk about range bars rather than error bars as error bars require a much higher level of processing than simply looking at the range of repeat values.

As mentioned in previous reports the marking criteria relating to scale in the graphs includes choosing a scale that maximises the size of the graph paper. Plotted points should occupy at least 50% of the graph paper. Candidates should be taught that graphs do not have to go through (0, 0) if it is not appropriate.

With regard to the use of complex mathematical techniques these are only part of the marking criteria "where appropriate". For example, calculation of an energy change is an appropriate complex mathematical technique in cold packs but calculating a gradient in the cheese making task is not.

### **Analysing and interpreting**

Most candidates were able to identify trends effectively and to link these both to their own data and data from a secondary source. Anomalous points were usually identified if present although few candidates used levels of uncertainty to explain why they classified points as anomalous. For high marks candidates analyse the level of uncertainty and this should be linked to the trend, for example discussing whether the line of best fit (trend) goes through all range bars.

In some tasks the trend was not well linked to relevant scientific understanding, particularly in the cold packs task where there was often confusion between the temperature change and the energy change. The science needed to explain the trends must be of a high level to support the award of high marks.

## **Evaluation**

Again this was well marked by most centres but overall tends to be a lower scoring Skill quality.

Candidates often need more space to answer question 4 of part 3 than is available on the standard part 3. Centres may provide candidates with a reworked version of part 3 with more space available for answers if they choose to, as long as the wording is identical to that provided in part 3. This can be easier for candidates than using additional paper.

The marking criteria require candidates to consider both the data and the method and for high marks these ideas should be linked. Suggested improvements to the method should be explained in terms of how they would provide better quality data.

Question 4 of the task requires candidates to evaluate their method, their data and to make comments about risk. Many candidates fill the space available but focus primarily on just one of these issues and consequently can only score low marks.

Although most candidates have learnt how to produce range bars from their data few understand what these range bars represent and how they relate to an evaluation of the data.

The marking criteria require candidates to consider both the data and the method and for high marks these ideas should be linked. Suggested improvements to the method should be explained in terms of how they would provide better quality data.

Comments about risk do not contribute significantly to the mark for evaluation but can be used to further support the mark awarded in the risk Skill quality but as a general rule it would be unlikely for a candidate to obtain more than two marks for the risk Skill quality if their only consideration of risk was in part 3.

## **Conclusion**

Question five of part 3 requires candidates to link their data to their hypothesis, or the hypothesis given in a science task. Few candidates complete the question by explaining their answer. For high marks this should also show appropriate scientific knowledge and understanding.

Question 6 provides the opportunity for candidates to link their experiment to their research and a demonstration of this is required for high marks in this Skill quality.

Evidence for this Skill quality can be obtained from any part of the task. Centres are encouraged to clearly annotate the text to show where evidence is used from other sections.

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