

**GCSE**

**Environmental and Land-Based Science**

General Certificate of Secondary Education **J271**

**OCR Report to Centres June 2014**

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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.

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## **B681/01 Management of the Natural Environment (Foundation Tier)**

### **General Comments:**

Unit B681, Management of the Natural Environment is a common unit for all candidates undertaking the GCSE in Environmental and Land Based Science (J271). The paper utilises a mixture of question types; multiple choice, short answer, mathematical calculations and interpretation and longer response type questions. This latter group contain credit for quality of written communication. It is pleasing to see that candidates are now starting to complete fuller responses rather than simple lists or bullet points within these questions - allowing them to gain full credit for their knowledge.

The foundation tier paper was accessible to a wide range of candidates, although there were challenges within this cohort with regards to analysis, and description of trends. Foundation tier candidates also had difficulty in calculating simple percentages.

The paper is only currently available during the June session, which has meant a significant increase in numbers sitting the paper.

Specific comment is made on each question below.

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

- 1 A straightforward multiple choice question requiring two correct responses. Most candidates were able to correctly identify the potential for weeds to compete for nutrients and water.
- 2 Another two-response multiple choice question. Somewhat more complex, some weaker candidates suggested (incorrectly) that the glass attracted sunlight. High performing candidates identified the ability to closely manage the plant environment and that growth is more rapid.
- 3 A short answer question which proved to be a good discriminator and highlighted a gap in many candidates' knowledge. Organic production must use natural methods of pest control. Many responses incorrectly assumed that fertilisers were not to be used.
- 4 A question testing the knowledge of the size of soil particles. This was not well answered, many incorrectly stating that clay was the largest soil particle (rather than the smallest). Few candidates got all responses in the correct position.
- 5 Definition of biodiversity: This was answered well by most candidates attempting the question.
- 6 Adaptations that make rabbits successful. Answered well by most respondents, there was a wide variety of answers permitted linked to colour, diet, speed of movement, physical attributes and behaviours.
- 7 The Nitrogen cycle. This was generally well answered showing a greater general knowledge of the topic when compared to previous cohorts. Most were able to identify 'decay' and 'nitrification'.

- 8 Definition of a producer in a food web. While the correct response (wheat) was the most common answer given, a sizeable number of candidates named either the farm manager or cow as the producer, demonstrating lack of knowledge of the terms within this context.
- 9 Hazards in moving livestock. The responses were many and varied, but candidates gained credit for scenarios where there was the risk of injury to either the livestock or a person through their transfer. Acceptable answers including the risk of road accident or dangerous plant/ item in the field. Responses that described the sheep merely escaping from the field were not deemed to identify the hazard in enough detail. Fights between the new sheep and existing incumbents were also not deemed as being likely.
- 10 Crop rotation. A longer response question where quality of communication was also assessed. This same question also appears on the higher tier paper. Within the foundation tier this was not well answered; many responses did not appear to be able to articulate the concept of crop rotation and talked of turning plants around. Higher scoring candidates successfully answered why this technique is important and were also able to give a working example, both of which were required by the question. Many candidates did not attempt the second part of the question.
- 11 Recording weather conditions. Overall this question was attempted by most candidates; the variety of tasks and skills needed acted as a good differentiator between weaker and stronger candidates.
- a) A good proportion were able to answer why records of rainfall are taken - to ensure sufficient water is applied. Poor scientific responses which described the plant as "drowning" were not credited.
- b) Air temperature records. Most candidates were able to identify the highest temperature by looking at the graph (part i), although defining the largest range in the day was more taxing (part ii). A significant number were unable to describe how to calculate the mean temperature for an individual day- many explanations described the mean temperature for the month. A specific calculation was not required.
- Parts iv and v related to frost - candidates needing to count the number of days the temperature dropped below the bold horizontal line for part iv and show an understanding of the requirement not to plant out until after frost for the latter.
- c) Most candidates were able to identify two other weather conditions - the most common being wind speed, snow and humidity. The most common cause for not obtaining marks was to list something which was not a weather condition due to not reading the question carefully.
- 12 Another longer response question also assessing quality of communication. This question was poorly answered, many missing the emboldened word 'environmental' in the question. This resulted in many extensive answers on animal welfare and husbandry which gained little credit. Best responses gave a balance of advantages and disadvantages.
- 13 Data evaluation and interpretation with some elements common with the higher tier paper. Most candidates responded to part a) which required a description of the overall trends. A small number described all the changes but missed the request to describe the overall situation.

In part b) there were a wide range of potential scenarios, with the requirement for the candidate to suggest the reasons for the changes. This was less successfully tackled; some suggesting the growth in numbers of the conservation site was a bad thing as it reduced the total UK population. This question proved significant in evaluating the general knowledge in the concept of wildlife conservation.

Part c) required a simple percentage calculation (33%) which was found challenging by many taking this examination paper. Higher performing candidates were also able to identify that such a large percentage of the whole population being at one site left the species vulnerable.

Part d) was attempted by most candidates - most of whom saw the merit in setting up more conservation areas or replicating those conditions.

- 14 The final question on the paper gave the candidates the chance to describe soil testing techniques. While the majority of responses used a soil test kit, credit was also used for electronic testing equipment. Best responses gave clear instructions, used the correct chemical products and also provided details of multiple tests and locations. These would truly have been worthy of including within a soil test kit. Poorer responses left out vital stages but were still given credit for the level of detail (and chance of success) with the description. This was a good discriminating question and gave an opportunity for those who had physically undertaken this practical to shine.

## **B681/02 Management of the Natural Environment (Higher Tier)**

### **General Comments:**

Unit B681, Management of the Natural Environment is a common unit for all candidates undertaking the GCSE in Environmental and Land Based Science (J271). The paper utilises a mixture of question types; multiple choice, short answer, mathematical calculations and interpretation and longer response type questions. This latter group contain credit for quality of written communication. It is pleasing to see that candidates are now starting to complete fuller responses rather than simple lists or bullet points within these questions - allowing them to gain full credit for their knowledge.

The paper is only currently available during the June session, which has meant a significant increase in numbers sitting the paper. Within these numbers were a significant number from specific centres who did not score particularly highly, suggesting that their performance would have been better matched by the foundation paper. This section of the cohort aside, there was plenty of opportunity for the more able candidates to demonstrate and gain credit for their knowledge.

Specific comment is made on each question below.

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

- 1 A straightforward multiple choice question. Managed forest plantations are the most efficient use of land.
- 2 Another multiple choice question. Most candidates were able to identify that there is a risk on water recycling of herbicides in the run-off water.
- 3 Stages in risk assessment: this proved to be of little challenge to a significant number of candidates- a topic that appears to be taught well and probably practiced within numerous practical activities.
- 4 Genetic Modification in animals: Poorly understood within this cohort, credit was given for the isolation of genes/ insertion and the resulting less trial and error in the offspring. Poor responses focussed on plants or the physical size of the resultant animal.
- 5 Flocculation: Another topic where understanding was variable. Simple explanations such as aggregation of clay particles into lumps were given credit.
- 6 Reintroduction of Sea Eagles. Most good responses picked up that the bird was a top predator and used this as the basis of their answers. Most identified the issue over food availability, less the competition for nesting sites. Some also included answers that linked to the effect of more tourists coming to see the birds.
- 7 Landscape fabric. A simple short answer linked to water retention, reduction in erosion or reduction in use of chemicals. As the material sits at the base of the plant and does not cover it, it is unlikely to give much frost protection.
- 8 Soil conditions at the county show. This question was answered well (and in some cases extensively). Most were able to identify the effect of vehicles on compaction and drainage, with some good responses to the remedy (ploughing, drainage etc) but fewer were able to

articulate the issues relating to future field fertility. Many erroneously stated that the nutrients would be squashed out whereas the issues typically lie with the lack of air affecting the activity of organisms within the soil and the breakdown of organic matter etc. Lack of air spaces will also hinder plant growth and encourage root death.

- 9 Aging of the farming population. A series of questions requiring the analysis and application of data.

Part a) simply required the completion of the table. Many simply completed the figure which ensured the total was '100' but credit was also given to those who attempted to use the trending data for this age group to predict the missing figure.

Part b) required a commentary upon the trend seen. Various ways of expressing this were given credit all based on the mean age of farm owners increasing.

Part c), which asked the candidates to give a reason for the trend, was attempted by most candidates. Again numerous valid responses were given credit, relating to life expectancy, inaccessibility of funds for younger people to buy farms and lifestyle choices (relating to either younger or older people).

Part d) The implications of these changes - the least well answered section. A few identified the need for increased mechanisation, the risk of new farm practices not being adopted or indeed the need to hire more staff to carry out certain tasks. All valid answers linked to the data were credited.

- 10 Pyramid of Energy. A straightforward question requiring the candidate to explain why energy is not transferred efficiently between trophic levels. Responses seem to suggest that this has been well taught with most obtaining two marks.
- 11 Alternative fuels (biogas). Unlike the previous question, this was a topic that was not well understood by the cohort as a whole. While the question itself was aimed at the more able entrant, there were significant numbers who responded in a way to suggest this was not a topic they were confident about. Biogas production (Anaerobic digestion) is a method of utilising many of the wastes produced on the farm and composting them to produce combustible gas. The best answers identified the safety issues and the management needed to ensure an effective and safe process.
- 12 Crop rotation: A common question with the foundation tier paper, requiring a longer response and also assessing quality of communication. More able candidates were able to give a good account of the reasons for rotation but not all answered the second part, giving an example, which limited their potential mark.
- 13 A relatively straightforward question relating to a conservation organisation. Most correctly named an organisation but were more challenged to name two specific activities they carry out thus limiting their potential mark on this question.
- 14 Butterfly conservation. A set of data analysis based questions, some of which are common with the foundation tier paper.

Part a) required the candidate to explain the reason for the trends. Many failed to do this and described the trend itself whereas issues relating to habitat destruction, pollution and the management of the conservation area gained credit.

Part b), a calculation of the percentage of the species in the conservation area, proved to give little difficulty to most of the cohort; however many failed to see the significance of having such a large amount of the population (33%) in one location - the comment that gained the mark in b(ii)

Part c) was also common with the foundation paper; most in the higher tier identified the need for more conservation areas or the replication of this environment elsewhere.

Part d) was not answered well by many respondents; the focus on potential flaws in the sampling techniques used. Few candidates gave full enough responses to gain two marks.

- 15 The final question on this paper allows extensive writing for the candidate, credit being given for quality of communication too. While attempted by most of the cohort, the range and quality of response varied greatly. Most wrote in sentences rather than bullet points but there was an opportunity for many to have been more successful within this question by the careful reading of the scenario which gave a number of topics to comment upon. There was also a lack of appreciation by some of the weaker candidates about the scale of facilities that would be needed to accommodate and milk a dairy herd of 40,000 cows. The best answers were well structured and showed an understanding and application of a lot of concepts relating to animal husbandry, waste management, visual pollution and the requirements of a SSSI.

## **B682/01 Plant Cultivation and Small Animal Care (Foundation Tier)**

### **General Comments:**

Most candidates had been entered for the appropriate tier and there were a wide range of responses and marks for the paper. However, there was also a large number of no response marks awarded where candidates failed to even attempt the question.

Simple marks were lost because candidates did not read the stem of the question carefully so did not write creditworthy answers. For example, candidates wrote about pesticide C in question 6b when the question clearly asked about pesticides A and E. In addition, most candidates did not include data in their answers even when they were asked to do so in the question.

Candidates are still struggling with the level of response questions and are often not writing in sufficient detail or using scientific terms. They should also be encouraged to include a range of information as well as to cover some in more depth. Many candidates are just repeating the same information in different ways merely to fill up the space.

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

- 1a Most candidates correctly identified the tool as a hoe. The other three tools were incorrectly identified by equal numbers of candidates.
- 1b Many students correctly identified that the hoe should be used for weeding. The use of a hoe to make a seed drill and produce a fine tilth were also given credit. Many students referred to vague tasks such as digging or turning the soil and weaker candidates are still using the term mud rather than soil.
- 2a Few candidates recognised the process of pricking out with most incorrect answers referring to thinning and some to potting on.
- 2b Stronger candidates referred to pricking out being used to reduce competition with some mentioning what the seedlings would be competing for. Weaker candidates simply stated that it allowed more room to grow or provided fresh soil.
- 2c Most candidates were able to carry out the simple calculation. The most common mistakes were 4 or 6 trays.
- 3 This was an overlap question and was answered well by most candidates. Some candidates are still getting confused between garden compost and potting compost. Although a mark was awarded for the idea that the addition of compost will allow the plants to grow faster, stronger candidates knew that this was due to the compost containing nutrients. Few candidates mentioned that compost improved soil structure.
- 4 This question was poorly answered by the majority of candidates. There were a large number of no responses and most of the candidates that did complete the question gave a description of sexual reproduction including wind and insect pollination. A few candidates understood the meaning of asexual reproduction and wrote some excellent responses relating to bulbs, tubers, rhizomes and runners. Credit was also given to descriptions of taking cuttings and it was clear that these candidates had carried this process out.

- 5a Over half the candidates could not work out a simple percentage and consequently did not score marks on this question.
- 5b Most candidates correctly identified flower A as being wind pollinated, however candidates are still getting very confused with the concept of sexual reproduction in plants. They are unable to correctly identify the male and female parts and confuse 'seeds' with pollen writing about seeds being blown by the wind. There were also a lot of responses relating to seed dispersal which is not on the specification. Good answers wrote about anthers and stigmas hanging outside the flower or, as a reverse argument, wrote about why flower B would attract insects for pollination.
- 6a The majority of candidates were able to interpret the table correctly and identified E as the most effective pesticide. The most common incorrect answer was C because it has the most +£ when added together.
- 6b Good candidates referred to each of the properties of the pesticide in the table in order to gain the full three marks. Common mistakes occurred when candidates did not distinguish between toxicity to pests and toxicity to pollinating insects and instead referred vaguely to toxicity to insects. Weaker candidates did not understand that it would be a disadvantage for the pesticide to be toxic to pollinating insects. The most common misconception was to do with how quickly the pesticide breaks down with students failing to appreciate that, from the farmers' point of view, it is a disadvantage for this to occur too quickly.
- 6c Many candidates did not understand this question and gave answers that explained how a farmer could increase a crop's yield. Stronger candidates referred to controlling temperature and humidity and methods to reduce the number of pests. There were a large number of no responses.
- 7 Most candidates gained two marks on this. The most common mistake was where candidates placed the bean in the dark to cause etiolation without realising that this would not allow healthy growth. Credit was not given for sun unless it was qualified with light or heat.
- 8 Most candidates gained all three marks on this with the majority stating that the housing would be suitable for a hamster. A significant minority of candidates wanted to use it to house guinea pigs. Some responses did not gain credit because they did not provide enough detail. For example, size alone is not creditworthy; it needs to be qualified with a statement such as 'it provides enough space for a small mammal to live'. Some candidates lost marks because they did not give two distinct reasons for the housing's suitability.
- 9 Some candidates clearly had experience of handling exotic animals; however even those who didn't were able to answer this successfully because many of the marking points are relevant for any small mammal. Some candidates lost marks because they made vague statements about holding the gecko carefully rather than being specific about making sure it was held securely but without squeezing too hard.
- 10a This question was answered well with most candidates correctly identifying food A as the one that would encourage selective feeding. Some candidates did not read the question carefully and did not choose either food A or B and mentioned meat or vegetables, describing the benefits or problems with these.
- 10b Stronger candidates appreciated the need for a balanced diet or the correct levels of nutrients. However, many weaker candidates did not use correct scientific terminology referring to the food not containing the 'goodness' the animal needs.

- 11 Many candidates correctly recognised A, the caecum, as part of the rabbits digestive system. There were no common misconceptions with all the other three incorrect answers being chosen by equal numbers of candidates.
- 12 This question was answered well with most candidates scoring at least 3 marks. Many candidates appreciated why animals might be kept for different purposes, with particular reference to dogs. Stronger candidates included fish for decoration, rabbits for food and rats for research. Many candidates referred to the chart and incorporated data in their answers referring to dogs and fish having the largest and smallest numbers. Few candidates understood how the animals would be looked after for different purposes. Weaker candidates merely stated the advantages and disadvantages of different pets; for example cats need less attention than dogs as they are more independent and do not need to be taken out for walks. Some students lost marks by writing in length about just one aspect of the question, eg the benefits of having dogs as pets without reference to any other animal.
- 13a Most candidates made some reference to smaller breeds of dog living longer than larger breeds although some found it hard to express this in a creditworthy response. Few candidates referred to data from the table despite being prompted to do so and hence lost one mark.
- 13b Many candidates found it hard to interpret the chart to decide when the different breeds moved from one life stage to the next. The most common mistake was to move to old age from age 8 (or equivalent in dog ages).
- 13c This question was answered well by most candidates with most scoring 3 marks. Stronger candidates referred to specific problems encountered by pets as they approach old age such as arthritis, diabetes, cancer, deafness or poor eyesight. Candidates lost marks by not distinguishing between specific checks that the vet and the owner would do. Weaker candidates did not make a distinction between specific checks due to old age and general checks on eyes, ears and teeth that should be carried out on all dogs irrespective of age.
- 14a Most candidates were able to read off the chart and correctly give the correct masses.
- 14b Weaker candidates did not appreciate the concept of small, medium and large breeds. The most common misconception was the fact that the dogs grew from small to large breeds as they got older. Only a few candidates referred to genetic differences, exercise or diet.

## **B682/02 Plant Cultivation and Small Animal Care (Higher Tier)**

### **General Comments:**

Many candidates are still being entered for the incorrect tier and there were some very low level responses with many finding the more challenging questions at A and A\* inaccessible. Candidates are still struggling with the level of response questions, writing in limited detail and failing to use the correct scientific terminology. Many candidates struggled with basic mathematical concepts and often find it difficult to apply techniques to unfamiliar situations.

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

- 1 This was an overlap question and was answered well by most candidates. Some candidates are still getting confused between garden compost and potting compost. Although a mark was awarded for the idea that the addition of compost will allow the plants to grow faster, stronger candidates knew that this was because the compost contained nutrients. Few candidates mentioned that compost improved soil structure.
- 2a Most candidates were able to perform the simple maths and work out the cost of the pesticide.
- 2bi This question proved to be more challenging. Most students did not refer to the table to find how long the pesticide was effective for in order to help them carry out the calculation.
- 2bii This was very challenging and few candidates were able to use both answers from the previous question to perform the calculation.
- 2c There were a number of no responses on this question with many candidates failing to understand the meaning of the term crop storage. Candidates included responses about how crop yield can be increased with information on fertilisers and greenhouses. However, there were some excellent responses relating methods to reduce the growth of bacteria or prevent pest spoilage.
- 3 This question caused difficulties for many candidates. Again there were a large number of no responses. Candidates did not understand the methods of asexual reproduction and explained the process of pollination and fertilisation instead. More candidates were able to explain the advantages and disadvantages of asexual reproduction with stronger candidates mentioning reduced gene pools, lack of variation and spread of disease.
- 4 A significant minority of candidates were unable to work out a simple percentage, with a large number making no attempt at all.
- 5 Most candidates were able to explain what was happening at stage one although candidates were still getting confused between anthers and stigmas. A small number of candidates also confused seeds and pollen. Although candidates understood stage two some did not gain the mark because they did not make it clear that the pollen is transferred to a different plant. Few candidates understood the purpose of the bag in stage three to prevent cross pollination. Most thought it was to improve the rate of photosynthesis.
- 6 Of those candidates that attempted this question, most gained at least one mark for describing some feature of the graph. The best candidates understood and explained how the graph could be used by farmers to determine when it would be economical to spray.

- 7 Few candidates knew how aphids fed with most thinking they ate the leaves. There were many different responses to how the aphids transferred the virus including on their bodies like pollen.
- 8a/b Few candidates were able to name capillary matting but many could explain how the plant used the system to absorb water. However, some candidates thought that the water would move from the pot to the tray.
- 8c Most candidates were able to carry out this simple calculation although some gave the answer as 94.8 rather than 94.80. They were given credit for this but candidates should be encouraged to use the correct form in future.
- 9 This question was answered well by most candidates with most scoring 3 marks. Stronger candidates referred to specific problems encountered by pets as they approach old age such as arthritis, diabetes, cancer, deafness or blind. Candidates lost marks by not distinguishing between specific checks that the vet and the owner would do. Weaker candidates did not make a distinction between specific checks due to old age and merely general checks on eyes, ears, teeth that should be carried out on all dogs.
- 10 Most candidates scored at least one mark for this although many did not appreciate the concept of dog breeds and stated that Jane's dog would be a medium breed rather than a small breed. Others suggested that the dog was older than it was which would account for its larger size. Good candidates gave a balanced argument including why Jane was concerned and why the vet wasn't. Most candidates also referred to the graph and used the data to support their answer.
- 11a This calculation proved difficult for most candidates because it involved a number of different steps. The most common incorrect answer was 4 days.
- 11b Those candidates who answered this mostly gained 3 marks. They were able to discuss the advantages and disadvantages of adlib and ration feeding but just gave mirrored arguments for each. Candidates often expanded on one point in detail rather than mentioning a variety of points. For example, candidates wrote in detail about adlib feeding encouraging weight gain or being less time consuming rather than giving a balanced argument. A significant minority of students did not know the difference between these terms despite them being in the specification. Other students lost marks because they wrote about feeding in general without specifying whether they were referring to ration or adlib.
- 12 Most candidates scored one mark on this by referring to the greater variety of prey in the diet of a wild bird. Few candidates appreciated the fact that wild birds would eat a greater proportion of the animal and gain nutrients for these.
- 13 There were a significant majority of candidates who did not gain marks for this with the most common incorrect answers stating that vitamins and minerals would be reduced.
- 14a Few candidates answered this with any scientific detail. Most gained a mark for the idea of the sperm and egg fusing, but few were able mention how the sperm enters the egg or the fusion of nuclei. Many wrote about 'the baby' developing with few using the term embryo.
- 14b Very few candidates knew where fertilisation took place with the uterus being the most common misconception. However, other responses included the ovary and even the stomach.

- 15 There were a few excellent responses to this question, referring to line breeding, homozygous recessive characteristics and gene pools. Many candidates gave low level responses talking about characteristics being inherited by parents without specifically mentioning the idea of selective breeding.

## **B683/01 Commercial Horticulture, Agriculture and Livestock Husbandry (Foundation Tier)**

### **General Comments:**

Candidates' performance this year was very much on a par with previous years. As in previous years those candidates with actual practical experience were clearly identifiable due to the quality of their responses.

Centres should always ensure candidates have access to a calculator and ruler during the exam. If a candidate's handwriting is likely to become illegible under exam conditions centres should consider using a scribe to ensure their students get the best mark possible for their efforts.

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

- 1 While few candidates knew all 4 trees, most were able to name 2. Candidates should always use a straight line to link to their answer with this style of question, accurately marking wiggly lines proved very difficult.
- 2a Several candidates gave answers which were too general, such as "to help plants grow". While photosynthesis was the expected answer we also accepted 'to produce food'.
- 2b Almost all candidates gained full marks; the few that didn't read the question carelessly and gave answers such as sunlight.
- 2c Quite a few answers involved moving the greenhouse, which was not accepted. Most gave lighting for the first mark, fewer were able give some example of shading to reduce light levels.
- 3 This scored well with the cylinder mower being the least well known.
- 4 No issues, although a few candidates thought P was potassium.
- 5a Very well answered.
- 5b As is usual with any maths questions foundation candidates found this a challenge. Credit was given for a partially correct answer, so candidates should always be encouraged to show their calculations even when using a calculator.
- 6a Not well answered; many candidates thought there was no competition for water or nutrients in a pot or that weeds do not grow in a pot. Most realised that plants in pots may need to be potted on and that you could move pots around the garden but there were few other acceptable answers.
- 6b Many candidates did not understand the term compost. Peat is not compost nor is sand or silt. Peat itself contains few nutrients. Many candidates also confused potting with "garden compost".
- 7 Some excellent descriptions of what to look for when checking the health of livestock. It was clear which candidates had hands on experience of working with livestock and were able to speak from that experience. Weaker candidates were able to describe but did not explain or simply listed the basic health checks.

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- 8a A much better attempted maths question, although it was clear that many candidate did not have access to a calculator.
- 8b A good range of answers although candidates should be warned about using general terms such as “effective”.
- 9 Some excellent answers; most involved moving pigs although any animal would have been acceptable. Better answers covered safety including PPE.
- 10a Few correct answers; again some candidates lost out on a potential mark by not showing their calculations.
- 10b While the question was designed to allow the candidates to compare the different feed supplements credit was given for candidates who discussed the importance of the components of the diet such as sugar or protein.
- 11 There was some confusion amongst candidates with this question with some candidates thinking that a cow could get another cow pregnant. Most candidates identified that this was a sign that the cow was “on heat” or “in season”. Few gained the third mark for suggesting the implications if the farmer missed this sign.
- 12 Attention to feeding and breeding were the two most popular methods discussed. Better answers explained how nutrition and breeding could be used to improve yield. Other good answers covered reducing stress in the cows, giving adequate water or regular/ more frequent milking.

## **B683/02 Commercial Horticulture, Agriculture and Livestock Husbandry (Higher Tier)**

### **General Comments:**

Candidates' performance this year was very much on a par with previous years. As in previous years those candidates with actual practical experience were clearly identifiable due to the quality of their responses.

Centres should always ensure candidates have access to a calculator and ruler during the exam. If a candidate's handwriting is likely to become illegible under exam conditions centres should consider using a scribe to ensure their students get the best mark possible for their efforts.

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

- 1 This was a two mark question asking for "problems"; unfortunately most candidates only gave one problem.
- 2 A simple question but several candidates found it a challenge, with rhizome and tuber being frequently confused. Candidates should always use a straight line to link to their answer with this style of question, accurately marking wiggly lines proved very difficult.
- 3a Well answered, the main error was for candidates to add or subtract 160 from the correct answer.
- 3b The main issue with this question was the use of too general answers such as "biological does not harm the plant" or that "chemical is more effective", candidates should be encouraged to use more scientific terminology.
- 4 Some excellent answers although several students thought that glass was the better insulator. When giving advantages/disadvantages candidates should be encouraged not to give converse responses to the same point.
- 5a Most candidates gave warm and moist conditions for two marks but few gained the third mark for either poor ventilation or high plant density.
- 5bi Most candidates gave at least 3 good answers. A common error was to think that a high area of leaf affected was a good thing.
- 5(b)(ii) The majority of candidates gave answers which suggested correctly that the control was there to give some comparison of the effects of the various treatments. A few candidates did not get the mark because they gave answers such as "to see what doing nothing did", or to "make it a fair test".
- 6 A challenging question. Of the few candidates that were aware of the role of auxin most gave answers that were to do with its role in tropisms rather than in suppressing lateral bud development.
- 7 Although there were some good descriptions of general pruning few candidates were able to work out the specifics of how to prune a bush which flowers on two year old wood.

- 8 The ranges of arguments, for and against genetic engineering, were well covered but few candidates gained level 3 because they stated the arguments without explaining them or giving examples.
- 9 The main area of confusion was that bacteria get “used” to antibiotics.
- 10 Some excellent answers covering the full range of methods including breeding, feeding, health and general management.
- 11 Generally well answered although a few candidates chose to talk about the role of a specific nutrient in the diet rather than the actual supplements eg ‘Protein is important to help the growing lamb’. While credit was given for this type of response it was limited to a maximum of two marks.
- 12a Unusually well answered for a question involving calculations. Candidates should be encouraged to show working out as credit can be given for these even if the final result is incorrect.
- 12b A few candidates missed out on this mark by not using the data to support their answer.
- 13 To gain level 3 on this question candidates needed to cover the environmental and economic considerations for both intensive and extensive systems. A significant number of candidates did not cover all areas or wasted time discussing ethical and welfare issues.

## **B684/01/02 Environmental and Land-Based Science Portfolio**

This is the second year of the new specification and the overall quality of coursework portfolios presented was, in most cases, of a pleasing standard; many centres have been much more ambitious in the way they contextualised their work, resulting in fascinating and really original scientific skills and investigative work some of which has been to an exceptionally high standard. It was pleasing to have so many new centres that may not have been as familiar with the marking criteria as centres that had delivered the previous specification, yet in general they all made a good attempt at delivering pleasing and interesting portfolios. Some new centres found application of the marking criteria difficult and will need to take careful note of their moderator's report feedback. The specification really accommodates candidates of all abilities with some excellent profiles being submitted from very able candidates and weaker candidates have been able to show positive achievement and perform well in all three elements, demonstrating achievement to the very best of their ability and experiencing great learning opportunities. A great strength of the specification is that candidates of all abilities can make worthwhile positive achievement, learning and applying life-long skills.

Centres achieving the best results and meeting close agreement with the moderators were those that clearly made the candidates aware of the marking criteria. The candidates then used them at every stage of portfolio production enabling them to address the marking criteria in a logical sequence and then supported the criteria with evidence including some first class photographic and video evidence.

Moderators saw few coursework portfolios which contained work which was irrelevant or of poor quality irrespective of the candidates' ability, portfolios resulted in a record of work showing positive learning experiences and some highly motivated candidates.

Centres must take care to allow sufficient time for each element to be delivered in sufficient depth to fully address the marking criteria. The coursework is 60% of the final award and candidates need time to fully address the marking criteria. The production of the candidate portfolios needs to be seen as an opportunity to reinforce or teach much of the specification content through first hand practical work and this needs time to allow understanding to be developed in enough depth for candidates to produce high quality portfolios and gain real understanding of the subject.

Portfolios were originally designed to be electronic and although some centres submit some work in paper format it is strongly advised that centres use electronic format wherever possible. Weaker candidates gain a sense of pride from producing work which looks good and this has been most evident in samples seen by the moderating team.

Almost all centres produced their portfolios in an electronic format but many submitted these as paper copies. In some cases up to eight power point slides were submitted per A4 sheet making them almost impossible to moderate. This must not be done in the future as the work is difficult to read and moderate effectively. Some very imaginative work was produced and it was a pleasure to read, however where the work was in paper format the clarity was compromised and the effort of the candidates not shown at its best. Where some parts of the work is produced on paper the work may be scanned and incorporated in the e- portfolio.

Centres must remember that the portfolio is part of a Controlled Assessment and need to take care to incorporate the controlled assessment task heading in each piece of work and then use their own contextualised version.

Please be aware that the controlled assessment examination paper is for a specific entry period. Remember to check that you are following the appropriate controlled assessment paper and note that some revision may take place each year.

## **Element 1 Practical Scientific Skills**

Centres should be congratulated for the way candidates addressed these skills and the marking criteria appear, in most cases, to have been applied accurately. The way the tasks have been contextualised has in general been excellent and has shown practical scientific skills being used in a professional way. Centres are producing marks which are well differentiated and reward excellent practice appropriately.

### **Skill (a) Demonstrates practical and scientific competence**

Much of skill (a) can only be assessed by the teacher observing the candidate at work. It is however important that candidates incorporate an annotated series of photographs or a video clip, to show the skill being performed. This evidence can then be used in producing the reflection of the task in the evaluative statements.

### **Skill (b) Collect and process primary data**

Most centres did this in a detailed and appropriate way; where tasks did not lend themselves to collecting “a range of graphical techniques” candidates gave numerical values for observations eg activity of livestock or depth of colour in leaves. This enabled candidates to produce relevant and informative graphical information. Some most interesting and appropriate qualitative observations were recorded and converted into a form to produce meaningful quantitative data of a high professional standard.

### **Skill (c) Evaluate methods used and data collected.**

The evaluation should be seen as a critical but constructive reflection on the practical skill tasks and procedures. For 5 and 6 marks candidates need to do more than state outcomes or problems encountered, and to evaluate the task and give reasons for the problems encountered or resulting outcomes. A few centres treated the four tasks as mini investigations, spending time writing these as full scientific experiments; this is not necessary.

Candidates only need to address the risk assessment in context of the task, followed by annotated visual evidence supported by the data and the evaluative comments should be clearly linked to the practical skills performed in the task. The evaluation of the data is important but the skill procedure is equally important; the task is really a way for candidates to acquire the skills needed to carry out the full investigation.

The practical scientific skills should be seen as the foundation for delivering key aspects of the specification. Centres may perform more than the required four and then select the best four for submission. This would help delivery of the specification and where centres have problems with absence this increases the chance of candidates having four skills. It should be remembered that even a low mark for a skill is better than not completing all four task and losing valuable marks. In the case of challenging learners, attempting skills as soon as possible when delivering the course not only motivates the learner but allows candidates maximum opportunity to access the marks.

## **Element 2 Scientific Investigation.**

Centres should take particular care when selecting a topic for investigation to select a topic which provides an opportunity for candidates to perform an investigation that is original to them, and in particular plan to carry these out at a suitable time of the year, so candidates can collect sufficient useful data. Selecting tasks which match the candidate's ability helps ensure candidates can meet the criteria in a way suited to the candidate's own style.

A major problem is when all candidates perform similar investigations, collecting the same or very similar data making it difficult for moderators to identify the originality of the work. It is essential that candidates collect their own primary data and clearly acknowledge where they use joint primary data. Where centres carry out more than one investigation this will have a great benefit motivating all candidates within the teaching group, producing investigations which could be presented to the teaching group to motivate and extend the learning, ensuring that the coursework is an affective learning tool and not just a task to meet the assessment requirements of the specification. Some centres still performed investigations which were more suited to a course in biology and only just acceptable for environmental and land based science. Some topics investigated this year were contextualised in a most imaginative way and were really interesting and certainly provided some ideas for moderators to try for themselves.

### **Strand A Planning, using appropriate secondary data**

Much of this mark depends on teachers giving credit for truly original work; it is quite difficult to justify high marks when all candidates simply follow a typical field course activity. In this case some individual aspect of the visit needs to be planned and addressed within a more general fieldwork study. Too many candidates only collected limited amounts of secondary data and then failed to demonstrate how this data informed their individual plans. To obtain 9 or 10 marks any potential procedural difficulties need to be identified within the plan and candidates need to justify how they will ensure precision and make clear to the reader their justification for the process. Teachers are advised to annotate the degree of help provided for this strand.

### **Strand B Collecting primary data.**

Generally centres applied the marking criteria appropriately, although in a few instances teachers confused collecting large amounts of simple data with collecting an extensive range of accurate and precise data. It would be helpful if candidates showed or explained how they collected data and procedures used to minimise error. The use of appropriate units is also essential.

Data needs to be tabulated and clearly labelled and dated.

### **Strand C Processing and analysing data**

To gain more than 4 marks candidates need to ensure that they have data which shows at least one trend/pattern and are able to make a relevant comment about the trend shown by their data. For marks of 7-8 the conclusion should be clearly linked to a scientific model, answers in this area tend to be vague and poorly supported by scientific knowledge and lack depth of understanding. The criteria for 9-10 marks is very demanding and candidates are expected to analyse their data in a discursive way and fully explain the outcome, linking it to the prediction and the scientific model on which the prediction was based.

It is important that where very able candidates are selecting and planning their investigation they select topics for investigation which are complex enough to allow them to fully address the higher marking criteria.

### **Strand D Evaluating the procedure and evidence**

This strand is the most frequently over marked strand or a strand where even able candidates fail to address the marking criteria accurately and in sufficient depth. In some instances it was quite difficult to identify strand D and evaluative comments had to be found within strand C. Candidates often suggest improvements to the investigation or make statements about inaccuracy or anomalous results but fail to fully explain why such results are anomalous and why modifications to the investigation might improve the accuracy of the outcomes. Such comments are often superficial and not clearly linked to the investigation or its outcome and the related science.

The comments need to be seen as a skill which has already been developed in the practical investigative skill assessments and can now hopefully help in the production of reasoned and explained evaluations. Modifications and amendments also need to be justified and discussed as reasoned arguments and concluded appropriately.

### **Strand E Quality of scientific communication**

Most reports were presented effectively and followed the format suggested within the marking criteria. In a few instances, particularly where power points had been transferred to paper for submission, page numbers appear to have vanished although the content showed page numbers which related to the work on the relevant page.

The marking criteria were generally accurately applied for this strand.

It would be good to see much more imaginative presentation; the best work tended to be in Word or PowerPoint and candidates made effective constructive use of photographic evidence, ideally collected themselves. A worrying number of centres simply used limited internet sources common to all reports or a group set of photographs.

### **Strand F Determination, initiative and interdependence**

Almost all centres appear to award these marks fairly and it is pleasing to see the number of diligent, highly motivated candidates who might not be the most academic, being rewarded for their dedication and some obviously very able candidates only gaining intermediate marks. Centres should be congratulated for the way this strand is marked and the effort is usually so obvious, especially with some academically weak candidates who give so much determination when working on their investigations.

Some centres' investigations appeared to have been rushed and were lacking in depth and detail, with some candidates having performed practical scientific skills to a far higher standard than those shown in the main investigation. This was a shame as the ability of the candidates was clearly much higher than the marks candidates had the time to access. The investigation is an important area and careful choice of topic/topics and planning is required for candidates to gain the marks available.

### **Element 3 Work-related Report**

This year has seen an improvement in the overall quality of the reports, and centres have encouraged candidates to address the marking criteria more effectively. It was very evident that, where centres had prepared candidates prior to their chosen enterprise, candidates were able to gain marks more effectively.

Reports sometimes lacked clear structure; they were often vague and lacked depth and detail. Candidates need to make more original comment so that the reader is better informed and understands more about the nature of the enterprise and the chosen job roles discussed. In some instances the reports consisted of work on a topic where information had been gathered from the internet and simply copied and pasted into some form of report. Teachers and candidates need to carefully study element 3 in the controlled assessment paper. The main aim is being able “to carry out research into the way in which science and technology are used in the work of an organisation in the land and environmental sector and the role of a practitioner within this organisation.”

Some centres used school based enterprises and although this could be a suitable topic it is often difficult to obtain sufficient primary data from a practitioner. Where the nature of the group or administration difficulties occur in school, school based enterprises could be acceptable, however the report needs to be related to a similar type of commercial organisation and an employee need to visit the group to discuss their role within the organisation with the candidates. Candidates need to collect primary data during this visit to the centre.

The best work came from centres where candidates visited an enterprise and were able to spend time with an employee and collect extensive information during the visit or subsequently secondary data from related web sites. Where candidates can visit more than once, this clearly benefits the quality of the report.

Some centres effectively linked the report to the centres work experience week and gave the candidate good pre visit preparation ensuring all candidates were aware of the marking criteria and had full access to them, enabling them to collect and observe key factors.

### **Strand A Collecting primary data**

- (a) Collecting primary data The quality of primary data tends to depend on the nature of the visit. Candidates need to be prepared well in advance of their visit and carefully plan the type of information they need to collect. To access high marks the data needs to be sufficiently detailed for the reader of the report to be fully informed.
- (b) Reference to sources Most candidates are listing references in the bibliography but often fail to identify them within the report, often lacking full detail and being dated.
- (c) The data needs to be clearly linked to what happens at their enterprise and be discussed not simply stated with no relevance.

### **Strand B Collecting secondary data**

- (a) Collecting secondary data. For 1-4 marks candidates need to collect secondary data and clearly link it to the enterprise and the chosen job role. For marks of 5-8 marks candidates need to select and use the secondary data, discussing its importance, application and validity to the chosen enterprise and job role. Simply copying of impressive secondary data is of no value, to gain marks candidates must use and discuss the information fully relating how and why it is relevant to the enterprise studied.
- (b) Reference and sources As with primary data, candidates must take care to use the references within their text; these should be detailed and dated. Visual material is often overlooked and should be included.

### **Strand C Work carried out.**

In far too many reports candidates failed to inform the reader where the enterprise was, what it did, which job role they were looking at and how it related to the whole enterprise/organisation. In skills (a), (b) and (c) the main criteria for interpreting work within this section is that candidates need to be aware and fully understand the meaning of :- 'Relevant Statement and Identifies'. The marks for 5-6 need candidates to explain in detail and not simply mention the Role of employees, and their contribution within the organisation must be explained.

The purpose of the work, and how it fits into the wider organisation, tends to be poorly understood; candidates clearly need to be guided to the role of organisations and how they might affect employees and consumers within the work place. Some enterprises are much easier when it comes to seeing these important and tenuous connections, and candidates need to have the role of the broader links and their importance explained before the visit and the production of the report.

For 7 and 8 marks the term analyses is poorly understood. Candidates need to be able to discuss fully the role of employees, the purpose of the work and its importance beyond the workplace. Candidates should discuss fully and clearly, explaining the factors influencing the location of the organisation and its impact on society. A good example is a Garden centre providing leisure, education and a place for family social activity. The skill of discussion is clearly only applicable to the most able candidates; however weaker candidates should still attempt to address this even if it only helps them to access the criteria for 5-6 marks.

### **Strand D Skills used in the work place.**

Candidates are required to identify technical skills and identify the expertise needed by an individual within a work place and to be aware of the training and qualifications needed by the personnel. The main problem in this section is that technical skills are not well identified or their importance understood, and so they are often poorly explained, not really linked to the work place and the terms *explain and analyse* not understood by the candidates. Centres need to make candidates aware of the sorts of technology used at the enterprise prior to the visit and not simply take understanding for granted.

### **Strand E Scientific Knowledge applied in the workplace.**

As in last year's report this area is poorly addressed. Candidates need to understand an aspect of science and also be aware of the financial and regulatory factors that impact on the workplace. This key strand tends to be covered very superficially and many reports simply contain a reference to disease or health and safety with very little reference to the underlying science and how it impacts on the effective operation of the enterprise. Any science is often described and not explained in sufficient depth for 5-6 marks.

For 7-8 marks candidates must analyse the science and clearly explain its importance to the enterprise. As previously stated analysis is a challenging concept and the skill needs to be developed prior to writing the report.

Financial data is often difficult to obtain and detailed personal information is not necessary, but candidates are expected to show an understanding of the importance of financial and regulatory factors on the effective operation of an enterprise.

### **Strand F Quality of the presentation.**

The best reports were produced as power points and candidates clearly addressed all marking criteria in a logical way. Candidates need to understand that they are not required to produce elaborate power points, but need to make an effective communication about the organisation by

producing a logical report which makes full use of pictures and diagrams to help the reader understand the organisation without visiting it, and uses the correct scientific and technical terminology. The report has to be understood by someone who is not familiar with the area or the enterprise.

### **Administration of the coursework.**

Centres are strongly advised to complete coursework well ahead of submission deadline of 15<sup>th</sup> May. Each candidate record card should be completed from the downloadable record card from the interchange and used in its electronic form to ensure correct aggregation of the marks. Moderators found far too many arithmetical errors this year from centres that had not used the electronic version of the record card. Moderators also require a copy of the centre MS1 and CCS160 these can both be loaded into the administration tab of the repository.

### **Annotation of coursework.**

This is most helpful; some centres add this to the reports electronically whilst other find it easier to produce a brief set of comments for each candidate. Both are very effective and help the moderation process. Most centres have made good progress with this and although another task to do avoids any misunderstanding as to how marks have been awarded.

Presenting work in electronic format is much better for candidates and certainly is far more cost effective for centres especially when work is electronically produced and then sent as reams of paper. The repository is an efficient and effective way of submission of course work and can always be backed up with CD and/or memory flash drive.

Centres need to ensure that electronically submitted work has work in candidate folders, named and with candidate number, the candidate record card and each file clearly labelled. Centres should be congratulated for their hard work. Please also check the moderator's report to the centre where constructive advice has been provided to help the centre move forward.

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