GCSE

Environmental and Land-Based Science

General Certificate of Secondary Education **J271**

OCR Report to Centres June 2017

CONTENTS

General Certificate of Secondary Education

Environmental and Land-Based Science (J271)

OCR REPORT TO CENTRES

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

General Comments:

The GCSE Environment and Land Based Science (ELBS) qualification is offered at both foundation and higher tier papers. The majority of candidates were entered in the appropriate tier and there were a wide range of responses and marks for the paper. However, there was also a significant number of questions where there had been no attempt to answer the question on this foundation tier paper. This will clearly limit the potential mark and candidates should be encouraged to provide an answer even if they are unsure.

Many candidates were well prepared for the range of questions and were able to attempt answers from a broad range of subject areas- showing a good understanding of the unit content by the teaching teams. There are still weaknesses in certain aspects, particularly the appropriate use of scientific and technical terminology. The concept of yield was not correctly applied in a significant number of responses. Questions that related to practical tasks (such as the moving of livestock), were understood by most learners, showing an engagement with practical tasks even if there were sometimes difficulty in communicating this within responses.

There are still weaknesses in answering the level of response questions and are often not writing in sufficient detail or using scientific terms to gain maximum credit. Candidates should be encouraged to include a range of information as well as to include more depth.

Poor handwriting makes it challenging to mark some responses and can lead to lost marks for these candidates.

Comments on Individual Questions:

Question No.

1.   A multiple-choice question relating to the adaptations of a wasp. More successful learners correctly identified the ability to eat a wide range of foods as key to survival in a range of habitats.

2.   This short answer question tested candidates' knowledge of the impact of temperature on mammal populations. Most identified that mammals were warm blooded but may still succumb to cold. Most able candidates understood the impact of predation on the species when other options may be limited.

3.a.   The impact of artificial ecosystems on biodiversity was not well understood as a general concept amongst this cohort.

3b.   Similarly, there was significant variance in the understanding of the intensive nature of production within an orchard. Some assuming that all intensive production systems will have climate control.

4a   Few candidates had difficulty in understanding the reduction in numbers of farm workers. A number did not accurately apply the scale quoting numbers in hundreds than in hundreds of thousands. The mark was credited to those who identified the decline.

4b.   A linked calculation to the graph used in the above question. A number of learners were not able to calculate the percentage decline in the workforce.

4c. A longer answer question where the quality of communication was also assessed and common to both tiers of the paper. A surprising number of learners, spoke of increasing numbers of workforce despite identifying the decrease in numbers in the previous questions. Many candidates did not understand the concept of yield and related their responses to profit (as less expenditure on wages) or using larger areas of land for production. The best responses identified technological changes in machinery, understanding plant growth and new cultivars.

5a. The majority of candidates were able to calculate the missing value in the table, the few that were unsuccessful did read the question sufficiently to complete the box.

5b. Calculating the proportion of water used within the land based sector proved relatively simple to the majority of candidates; most circled the correct response if they understood about percentages.

5c. Looking for two uses of water on a dairy farm, some responses showed an in depth knowledge of the subject.

5d. The second longer response question on the paper, some candidates failed to read the question accurately and gave examples of ways of managing water resources rather than the simpler identification of where suitable water may be obtained. Generally marks on this question were lower than expected.

6. A question with a significant range in the level of detail supplied within the responses. Many candidates identified with the practical nature of the task (moving livestock) and provided detailed considerations, including the health of the animal, others provided one word responses which were more difficult to assess within the context of the question.

7. Testing knowledge of alternative electricity generation systems, most candidates were able to identify wind turbines and solar panels, the use of water and crops (burning of biofuels) proved more challenging.

8a. The final longer response question focussed on a food web and the impact of the loss of a specific species. Most responses identified the impact on the hawk and similarly many also identified the impact on the Blue Tit's prey. Only a few speculated the impact further down the food chain or indeed the potential impact on the woolly aphis and ladybird who also linked to the willow tree. Generally well attempted by most candidates.

8b. A linked question, many interpreted that the Blue Tit was now endangered and therefore would be monitored by the RBST rather than the RSPB. The RBST is mainly focussed in the conservation of farm breeds.

8. A series of interpretive questions looking at results from soil samples. An encouraging number of candidates understood the difference between range (part a) and mean (part b).

Similarly the majority were able to identify the anomalous result in part ci and thus calculate a revised mean for part cii. Errors in part ci were considered within this revised calculation.

Surprisingly a number of candidates struggled to suggest a way of increasing the soil pH.

9. Providing little challenge for most candidates, most were able to identify the appropriate cultivation method titles from their descriptions.

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

General Comments:

The GCSE in Environment and Land Based Science (ELBS) offers paper at foundation and higher tier. Most candidates had been entered for the appropriate tier paper allowing greater opportunity for them to received appropriate credit for their responses. It is noted that there were a proportion of candidates who scored poorly of this higher paper, indicating that they may have performed better within the foundation tier.

Many candidates were well prepared for the range of questions and were able to attempt answers from a broad range of subject areas- showing a good understanding of the unit content although there are still some areas of weakness most notably within the interpretation of key land based terms. This will be highlighted in the commentary relating to specific questions. There are opportunities for candidates to develop a greater technical and scientific vocabulary which may help them in achieving additional marks.

As with previous cohorts, some candidates missed opportunities to obtain more marks by the brevity of their responses, particularly on those offering a potential 6 marks. Poor quality of handwriting makes it more difficult to mark some responses.

Comments on Individual Questions:

Question No.

1. A multiple choice question requiring the candidate to identify the most likely reason a farmer would choose to grow 'energy crops'. While all reasons were possible, the most likely reason would be the level of profit they would make. Most candidates understood this concept.

2. Ways of adding nitrogen to the soil was often well understood but poorly articulated in the responses provided.

3a. Looking at the biodiversity within a commercial orchard, the best responses identified the impact of reduced plant range and use of pesticides as being key factors. Simplistic and generic responses such as references to being un-natural were not given credit.

3b. As with the previous question, this proved challenging for some candidates, expected answers included the impact of pollution on the local ecosystem.

4a. Using the data in the graph, the more able candidates were able to calculate the reduction in the number of people employed on farms over the years.

4b. A common question appearing on both the foundation and higher tier papers, the majority of candidates were able to provide suggestions relating to the increase in yield, typically due to technological and varietal improvements. Most common errors included references to profit rather than yield or the interpretation of the graph to suggest that more labour was being employed.

4.c. This proved to be a more complex question for candidates to answer; thinking of the impact of less employment in the countryside. Simpler answers identified the migration to

towns, more complex responses identified the rise of weekend or holiday homes, the impact that would have on community life and businesses as well as the need to accommodate larger vehicles to work the land.

5a.   The majority of candidates were able to interpret the information to identify the species with the greatest numerical increase, most opting for the Greylag goose (largest % change). Some higher performing learners chose the Canada goose which in fact had the largest numerical change. Both answers gained credit.

5b.   Most responses identified the large numbers of Mallards and the relatively small change in population within the last sample. Some weaker candidates refers to absolute numbers rather than percentage changes.

5c   Similarly to the responses in 5b, some weaker candidates referred to the decline of 20 birds (out of a sample of 41) rather than the percentage changes in Goosander duck. Most responses showed a concept the general concept however.

6.   A longer response question, which was engaged with in an enthusiastic manner, some candidates writing a letter to the company about their objections. While some responses were extensive, many lacked references back to the local ecosystem in a scientific way, often talking in broad generalisations.

7.   A question which differentiated at a high level. More able students were able to describe what the flocculation of clay was, with the top performing candidates able to describe how it occurs.

8.   The majority of candidates were able to answer this multiple-choice question, identifying the need for oxygen and water.

9a   A question focussing on the efficiency of water use. Most responses contained credit-worthy points, although most identified only one or two ways of ensuring efficiency of use. Best responses identified (scientifically) the ways of identifying water demand, how it could be applied efficiently and how water could be recycled.

9b.   While water efficiency was well understood and articulated, the ways of managing potential floods was less well understood, many answers were single word responses although the best answers clearly showed knowledge of the topic and included some specific practical examples which might have been obtained from personal experience or the study of the local area.

10a.   A relatively simple calculation to identify the potential increase in yield of using GM technology. This proved to be accessible to the higher performing candidates.

10b.   The description of how genetic modification may occur proved to be far more challenging although there is evidence that this had been taught well within selected centres where there was a correct use of the technical terms.

10c.   The final question on the paper asked learners for one advantage and one disadvantage of GM crops. Some responses were very generalistic and were not based on science although it was widely accepted that the long-term impact of this technology is not yet understood.

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. The majority of the questions were attempted by most of the candidates; however some candidates are still choosing not to even attempt the six mark questions. Candidates engaged in all aspects of the paper both the plant and animal sections and displayed a good understanding of the topics being examined. Candidates answered most of the data response questions well, although the weaker ones struggled with some of the mathematical aspects.
Candidate responses to the level of response questions have improved and they are now reading the question carefully and providing a response to all aspects although more scientific detail could be included. Poor handwriting makes it difficult, and in some cases impossible, to mark responses and can lead to lost marks.

Comments on Individual Questions:

Question No.

1a.   Candidates struggled with this question with many scoring no marks. They were able to identify the plumule and radical more often than the cotyledon and testa.

1b. This was answered well by the better candidates who were able to describe and explain the graph. Most candidates just described the graph but weaker ones did not use the terms seed germination and temperature, they merely described the shape 'it goes up then goes down'. A few candidates misunderstood the question and thought that the germinating seeds caused the temperature to increase.

2a.   A mixture of responses with potato blight and aphids being the most common incorrect answers.

2b.   This was well answered on the whole, although some candidates misread the question and listed the signs of poor health. Other candidates wrote down a long list of correct and incorrect responses with the hope that one might be correct. However, only the first two responses are marked so they need to think carefully and only give the number of responses that the question asks for.

3a and b.   Most candidates could interpret the information in the table.

3c.   Most candidates did not recognise the symptoms of phosphorus deficiency and gave a suggestion based on the levels of all three nutrients.

3d.   Most candidates attempted this question because they could name at least one organic fertiliser and state that it released nutrients. Fewer candidates scored higher marks because they were unable to describe other ways in which organic matter improves the soil. Some candidates misread the question and wrote about general soil improvements, including sand and

lime, rather than just those caused by the organic matter. No candidates made the distinction between potting compost and garden compost and just referred to compost.

4a. This was well answered with most candidates understanding the term 'predatory'. However, a significant minority thought that the large size of the predatory mite could intimidate or outcompete the red spider mite.

4b. This was mostly well answered with candidates using a variety of terms to describe chemical control. However, there were a number of candidates who failed to gain this easy mark.

4c. Most candidates selected the correct response.

5. This was poorly answered with candidates not recalling basic genetic terms. However, candidates scored better on part a) than part b). Very few candidates knew what the term phenotype meant and consequently there were a large number of 'no responses'.

6. Most candidates correctly chose response C, provide plenty of food and water, but far fewer knew that the rabbit needed bedding for a nest. Many candidates thought that the mother and babies should be checked regularly or that a health check should be carried out.

7a. Well answered.

7b. Well answered on the whole although some candidates gave an answer of 2.5 million because they had read the bar for 2012 not 2015.

7c. Well answered.

7d. This question produced a large number of responses which were awarded if they were reasonable.

7e. Many candidates misread or misinterpreted the question. Some listed the different types of show you could enter eg. Agility and others described how to make the animal look presentable. However, some candidates had clearly shown animals themselves and gave excellent responses.

8a. This proved very tricky as a mathematical calculation and few students got it correct.

8b. Some candidates misinterpreted the results and answered this in terms of the cost of feed; hence mash would be the best. Many candidates however, gave excellent responses.

8c. This was poorly answered with most candidates commenting on the fact that each hen ate different amounts of feed. A small number of candidates picked up on the limited number of birds and the better ones mentioned breed and repeats.

8d. Some candidates had learnt the structure of the hens digestive system and could answer this; others had not learnt it and struggled.

9.   Although it was clear that many candidates had set up an incubator, very few of them could write in detail about what they did. Some candidates got confused between incubators and brooders. The responses to the advantages of artificial incubation gained more marks.

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

General Comments:

A large number of candidates are still being entered for the incorrect tier. There were some excellent responses by stronger candidates who gave detailed scientific answers including technical terms, however some candidates were scoring less than 10 marks on the whole paper and leaving a large number of questions blank. Most candidates attempted the six mark questions and the better ones wrote in detail, often continuing their answers on the additional paper. Most candidates engaged in all aspects of the paper both the plant and animal sections and displayed a good understanding of the topics being examined. Candidates answered the data response questions well, coping with both the mathematical elements and including data in the analysis.

Comments on Individual Questions:

Question No.

1a.   Most candidates gave the low level response of 'protecting the seed'.

1b.   This question was well answered with the brighter candidates giving detailed explanations referencing denaturation of enzymes.

1c.   Most candidates gained this mark, although a number referred to humidity rather than water. A number of candidates still think that carbon dioxide is needed by seeds.

2a.   Most students recommended 'Rooster Booster although many of them did not pick up the second mark for knowing that tomatoes need high potassium. They preferred to give a general response relating to all of the nutrients.

2b.   This was a straightforward question that most candidates answered correctly.

2c.   Most candidates attempted this question because they could name at least one organic fertiliser and state that it released nutrients. There were a number of excellent responses that scored higher marks because they were able to describe the benefits of a good crumb structure. Some candidates misread the question and wrote about general soil improvements, including sand and lime, rather than just those caused by the organic matter. No candidates made the distinction between potting compost and garden compost and just referred to compost.

3a. Well answered.

3b.   Many students correctly completed the Punnett square but found producing the ratios much trickier. Those students who gave ratios frequently failed to describe what the ratio showed. For example a ratio of 3:1 for the phenotype would be a better response if the candidate had also noted purple:white.

4.   Few students knew how tissue culture is carried out and tried to gain marks by merely describing the pictures. Some students got mixed up between taking cuttings and tissue culture.
5. Very few candidates recognised the cloche although most knew what it would do.

6.   Candidates lost marks here for failing to read the question. The stem has certain important words emboldened to try and prevent this happening.

7a.   Candidates are very good at reading off charts and picking up the correct responses. This question was answered really well.

7b.   Most candidates knew what spaying was but struggled to write it down in a scientific definition which then restricts the marks they can achieve. The issues surrounding spaying were well documented but most candidates struggled to distinguish between the biological, ethical and welfare issues arising. There were a large number of arguments for and against.

8a.   Most candidates knew what inbreeding was although far fewer knew about line breeding.

8b.   Well answered.

8c.   Many answers were well structured with the three sections dealt with separately and the advantages and disadvantages of each discussed. This led to high marks being awarded, although, marks were not awarded for the reverse argument.

9a.   Many candidates struggled with this calculation because it required two or three different steps.

9b.   This was poorly answered with most candidates commenting on the fact that each hen ate different amounts of feed. A small number of candidates picked up on the limited number of birds and the better ones mentioned breed and repeats.

9c.   A significant number of candidates did not know the function of the crop and gizzard, merely repeating what they knew about human digestion.

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

General Comments:

There was a much smaller candidature this year as the specification nears its end. Standards remain high, although questions involving maths remain an issue for many candidates.

Comments on Individual Questions:

Question No. 1

1(a) Most candidates were able to identify the cherry and one other leaf but few were able to recognise all four.

1(b) Weaker candidates tended only to refer to the cherry having flowers , given from the previous question. Better candidates talked about autumn leaf colours and fruit with a number talking about the interest created by attracting wildlife.

1(c) A number of candidates seemed not to understand the term "task" and gave answers covering the things trees need to remain healthy such as sunlight , space etc.

Question No. 2

2(a) Most gained the mark for water but the symptoms for lack of nutrients and sunlight were frequently confused.

2(b) This was the question most frequently not attempted on the paper. A number of candidates seemed not to understand what was meant by balancing an equation and new elements were often added to the equation rather than numbers.

Question No. 3

3(ai) The most common error was to think that the cylinder mower was a rotary.

3(aii) No issues.

3(aiii) Well answered.

3(b) The most common given advantage was the lack of a cable while the disadvantage was that petrol ran out or was expensive.
Question No. 4

4(a) While most candidates could give a few general reasons for protective cultivation few could distinguish between the specific role for each of the suggested methods. A lot of candidates seemed to think that glass increased light levels.

4(bi) As usual, number of candidates did not attempt this simple maths question or commonly failed to give the units.

4(bii) Many candidates found this a challenging calculation.

4(biii) Most candidates gained the first mark by identifying that non-biological was cheaper but few made a second comparison to gain the other mark.

4(biv) Again while many gained the mark for some comment about effectiveness few gained the second mark for a further consideration.

Question No. 5

5(a)   The role of vitamin D and causes of anaemia were least well known.

5(b)   A general lack of precision resulted in few fully correct answers there was a lot of "eating the right foods but not too much".

Question No. 6

Very well answered.

Question No. 7

7(a) A lack of detail producing few level 3 answers. A number of candidates failed to mention safety which limited the levels available.

7(bi) Some very good responses identifying the changes at specific body masses.

7(bii) Some careless reading of the scale.

7(biii) A number of candidates seemed to be reading the daily mass gain rather than the body mass.

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

General Comments:

There was a much smaller candidature this year as the specification nears its end. Standards remain high however.

Comments on Individual Questions:

Question No. 1

1(ai) Well answered.

1(aii) Few candidates could give two valid reasons for using the cylinder mower although most gained a mark for talking about a shorter cut.

1(b) No issues

1(c) A few good answers but many candidates found this question challenging.

1(d) While many candidates gained the first mark for calculating how much grass seed was needed few gained the second mark for realising the seed was sold in kilogram packs so they had to go onto work out how many 1kg packs were needed and the cost of these.

1(e) Well answered with most candidates getting at least one mark and a significant number both marks for mentioning both light and heat.

Question No. 2

2(a) A number of candidates seemed not to understand the term "task" and gave answers covering the things trees need to remain healthy such as sunlight , space etc.

2(b) Very few level 3 answers although this was a common level of response answer target up to C grade. Candidates did not know their tree species and many answers were limited to "some trees have coloured leaves in autumn and flowers in spring."

Question No. 3

3(a) No issues.

3(b) Well answered although several candidates only gave a single example of automation to support their answer.

Question No. 4

4(a) A significant numbers of candidates covered the reasons wild species become extinct such as predation or hunting rather, why some farm animal breeds have become endangered. Weaker answers for why the breeds need to be preserved included "because we might need them in the future" without giving examples of future uses, such as breeding in disease resistance or hardiness for outdoor rearing or very commonly they are rare because we are eating them!

4(b)   Some confusion with embryo transfer and genetic modification and between eggs and embryos, there were a lot of embryos being fertilised.

Question No. 5

5(a)   Most answers were limited to "the mother needs more food to support the growing baby", only a few candidates went into more detail such as protein for the babies growth or calcium for milk production.

5(b)   Some excellent answers although weaker candidates said "AI is cheaper" without explain why.

5(ci)   The only issue was the lack of precision in a few of the answers with responses such as "producing offspring the same as the mother".

5(cii) No issues

Question No. 6

6(a)   Most candidates correctly identified the trend for increasing resistance with increased sales of antibiotic but only a few spotted that as sales declined after 2012 resistance remained high.

6(b)   Poorly understood with many candidates referring to the animal becoming immune to the antibiotic or the bacteria becoming "used" to the antibiotic.

6(c)   The only issue was a few candidates using the wrong axis for their calculations.

6(d)   Few good responses with most candidates saying antibiotics will be used less. What we were looking for was some explanation that antibiotics would only be used when needed not prophylactically or that new antibiotics or alternatives to antibiotics will need to be found.

Question No. 7

Very few level 3 answers. While most candidates could give general ways hormones influence reproduction few could name actual hormones and their roles, required for higher level answers.

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

The course work this year tended to be quite varied with most of the established centres producing well-constructed portfolios which fully addressed the marking criteria. The best centres produced a variety of work contextualised for each element to match the candidate's natural ability. This approach enabled candidates to perform tasks which were motivating and allowed them to access marks appropriate to their ability.

Some centres have again been very ambitious in the way they contextualised their work, resulting in fascinating and really original scientific skills evidenced portfolios. These contained extensive annotated photographs and video clips which were annotated in a detailed most constructive way. The resulting Scientific Investigations were of an exceptionally high standard.

Centres are strongly advised to take note of their own centre moderators report feedback which is intended to offer specific guidance to the centre. This report provides advice to support continued improvement and encourages centres to adapt and modify their practice if required.

Those centres which have been adjusted need to take action to ensure they avoid downward moderation next year by acting on their moderator's report feedback.

This year has seen some excellent work from very able and committed candidates. Weaker candidates have been able to develop a sound understanding of Environmental Land-Based Science. Weaker candidates have performed well in all three elements resulting in coursework portfolios which show clear evidence of their hard work, competence in skills and the application of scientific knowledge. A great strength of the specification is that it enables candidates of all abilities can make worthwhile positive achievements.

Some centres still fail to ensure that each element of their portfolios contain a clear heading taken from the appropriate years controlled assessment task followed by their own heading, carefully contextualised.

As in the past, Centres achieving the best portfolios and meeting close agreement with the moderators were those who made the candidates fully aware of the marking criteria, and had explained these criteria fully to the candidates before starting work. Candidates then used this knowledge at every stage of portfolio production enabling them to address the marking criteria in a logical sequence. They then supported the criteria with evidence including some first class photographic and videos.

Moderators generally saw few coursework portfolios which contained work that was irrelevant or of poor quality irrespective of the candidates' ability. Portfolios resulted in a record of work showing positive learning experiences with many highly motivated candidates performing exceptional work. Some centres still submitted scrap books which were inappropriate for such coursework even for the weaker candidates.

Centres still tend not to allow sufficient time for each element to be delivered at an appropriate depth to fully address the content of the marking criteria. Controlled assessment is worth 60% of the final award and time should be allocated when panning the scheme of learning for this. The production of the candidate portfolios should be seen as an opportunity to reinforce or teach much of the specification content through first hand practical work. Time needs to allow candidates understanding to be developed in enough depth for them to produce high quality portfolios and gain better understanding of the subject.

Much more time should be devoted to the Practical Scientific Skills to enable candidates to be more competent in the activities. This aids their understanding of the specification content. This then provides an excellent preparation for investigative work by allowing the candidates to become confident with their skills. Ensuring they can produce worthwhile investigations which can evolve naturally from a good skill base giving the confidence required to stimulated enquiry and a motivated approach to their Scientific Investigation.

Portfolios were originally designed to be electronic. Although, some centres submit some work in paper format it is strongly advised that centres use electronic format where ever possible. Weaker candidates gain a sense of pride from producing work which looks good. This again is evident in samples seen by the moderating team. The work produced by the candidates show the enjoyment derived from the course and in particular those candidates who traditionally struggle with their controlled assessment now can produce informative and attractive reports.

Almost all centres produced their portfolios in an electronic format but then 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. These centres were asked to re-submit to allow moderators to read the presentations and allow accurate moderation. 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 was 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.

As previously stated 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 along with their own contextualised version.

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

Centres must use the electronic downloadable candidate record card to ensure each element is aggregated correctly and avoid unnecessary mistakes. This year saw far fewer centres with arithmetic errors.

Element 1 Practical Scientific Skills

Centres should be congratulated for the way candidates addressed these skills and the marking criteria which appeared in most cases to have been applied accurately. The way the tasks have been contextualised was in general 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. The range and imaginative ways centres have recorded skills is most pleasing and the advantages to candidates learning is most evident.

Centres are advised to carry out the skills in the first year of the course. Those with weaker candidates might consider doing more than four and selecting the best so enabling candidates with attendance problems to gain at least some marks for four skills.

Far too many centres use photographs that are standard for the whole class. Photographic evidence should be specific to the candidate so it can be annotated in detail and discussed in their evaluation.

Such evidence is motivational and makes the candidate think about why they perform a task and how they might amend or alter in the light of their experience. This is an invaluable life- long skill in every way.

Skill (a)   demonstrates practical and scientific competence

Much of skill (a) is only assessed by the teacher observing the candidate at work. It is however important that candidates incorporate an annotated   series of photographs or 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. Too many centres still fail to fully develop this area and evidence is often poor or general class photographs are used without evidence or the skill being performed by the specific candidate is not identified.

Skill (b)   Collect and process primary data

Most centres did this skill 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 i.e. 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. A few centres simply produced tables of observations not supported with data and were moderated downwards. Photographic information and annotation can help and motivate candidates and enhance overall learning.

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 procedure. For 5 and 6 marks, candidates need to do more than state outcomes or problems encountered. They should evaluate the task suggesting reasons for the problems that may have been encountered or the resulting outcomes.

A few centres again this year 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. The evaluation of the data is important but the skill procedure is equally of importance. The task is really a way for candidates to acquire the skills needed to carry out the full investigation in a safe and effective way.

Candidates need to be encouraged to develop a constructive self-critical approach. To fully discuss and show this when analysing data, looking at how they performed their skills and showing how and why they might in future improve the task.

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 tasks 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. Candidates can always do more than four skills and enter the best ones.

Good Practical Skills were almost always followed by good investigations.

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 are tailored to them. Centres should plan to carry out the investigations at a suitable time of the year, so

candidates can collect sufficient useful data. Selecting tasks which match the candidates ability helps ensure candidates can meet the criteria in a way suited to the candidates own style. Topics such as ecology or growing crops work best and enable good specification coverage. Where candidates devise slight variations on the field work or grow different crops, all candidates can gain positively from shared learning experience.

A major problem is when all candidates perform a similar investigation, collecting the same or very similar data. This makes 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 to produce investigations which could be presented to the teaching group to motivate and extend the learning. This ensures that the controlled assessment 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 were contextualised in an imaginative way and were interesting and rewarding to read.

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 centres still produce laboratory based plant biology investigations where individual planning is almost impossible to identify or be accessed by the candidates. Far too many candidates only collected limited amounts of secondary data and then failed to demonstrate how this data informed their individual plans. For candidates to obtain 9 or 10 marks any potential procedural difficulties need to be identified clearly within the plan and candidates need to discuss and justify how they will ensure precision and make clear to the reader their justification for the process. Teachers are strongly advised to annotate the degree of help provided for this strand. Candidates must write in a way which assumes the reader has no knowledge of the topic.

Where it is difficult to show originality centres need to annotate to justify with good reason why high marks are awarded for individual work.

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. Photographic information or time lines can be invaluable. Annotation, discussion and explanation of such evidence helps candidates and moderators.

Strand C   Processing and analysing data

This strand is still addressed too simply and data collected in unexplained ways and is not used appropriately. To gain more than four marks, candidates need to ensure that they have data

which shows at least one trend/pattern and that they 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. They are not explained but simply described or stated and at quite a basic level.

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. They then should link it to the prediction and the scientific model on which the prediction was based.

It is important that where very able candidates are selecting a topic and planning their investigation that they select topics for investigation which are complex enough and will allow them to fully address the higher marking criteria. Equally weaker candidates are advised to focus on a task which offers an opportunity to clearly achieve valuable marks and not waste time on criteria which are well beyond their ability. Clearly this needs sensitive guidance and no harm comes by attempting the higher mark bands if time allows.

Worryingly too many candidates are unable to draw a simple chart or graph and do not label or number their axis. Where done correctly they are so often illustrative but not really used .The best work for all abilities comes where candidates identify interesting points by additional annotation. Some high grade candidates do this by referencing particular photographs.

Strand D   Evaluating the procedure and evidence

This strand is still the most frequently over marked strand or a strand where even able candidates fail to address the marking criteria accurately and in sufficient depth.

It was quite difficult to identify strand D and evaluative comments had to be found from within strand C.

Candidates often suggest improvements to the investigation or make statements about inaccuracy or anomalous results. Often, they fail to fully explain with reasons 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. Modifications and amendments should to be justified and discussed as reasoned arguments and concluded appropriately. For some reason the most able candidates are not happy discussing the investigations in a constructive and critical way, a skill so necessary in any life science. Again use of secondary data or photographic evidence is an invaluable way for candidates to support their evaluations.

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 page showed 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 and the best work tended to be in Word or PowerPoint and where 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. This needs to be addressed and with modern photographic systems should not be too difficult. Candidates should be encouraged to use more individual photographic evidence in their portfolios.

Strand F   Determination, initiative and interdependence

Almost all centres appear to award these marks fairly. It was pleasing to see the number of diligent, highly motivated candidates who might not be the most academic, being rewarded for their dedication, whereas, some obviously very able candidates only gaining intermediate marks. Centres should be congratulated for the way this strand is marked.

This year only a few centres investigations appeared to have been rushed and lacking in depth and detail with some candidates having performed practical scientific skills to a far higher standard than those shown within the main investigation.

Do remember the marks available are high and sufficient time needs to be allocated to this element.

The investigation is an important area and careful choice of topic/topics and planning is required for candidates to gain the marks available. Congratulations to those centres who deliver the investigation as part of a one year course. Moderators are aware of this and find using a simple crops like radish or winter lettuce or even wheat seedling work well. Ecology organised for September also appears to be good but can be difficult to organise.

Soil based investigations can provide a good topic and can be performed in the long UK winter. Drainage and soil temperature can be a possible topic if suitable resources are available.

Element 3   Work-related Report

Again this year has seen some further improvement in the overall quality of the reports. Centres have encouraged candidates to address the marking criteria more effectively. It was evident that where centres had prepared candidates prior to their chosen enterprise, those candidates were able to gain marks more effectively.

Reports sometimes lacked clear structure, 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 too many 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 tasks. The main aim is: "*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.*"

Only a few centres used school based enterprises. Although, they can be suitable 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 a visit to or from 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., The quality of the report benefits where candidates visit an enterprise more than once.

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. This enables them to collect and observe key factors.

Strand A   Collecting primary data

    (a) <u>Collecting primary data</u>   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) <u>Reference to sources</u>   most candidates are listing references in the bibliography but often fail to identify them within the report. They often lack 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 to their report.
It is often hard to see candidates fully using the information or demonstrating its importance within the context of the report as a whole.
The best work especially from weaker candidates is where candidates are encouraged to prepare possible questions prior to a visit.

Strand B Collecting secondary data

    (a) <u>Collecting secondary data.</u>   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. Too many candidates simply copying secondary data is of no value. To gain marks, candidates must use and discuss the information fully, relating it to how and why it is relevant to the enterprise studied.

    (b) <u>Reference and sources</u> 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 and used within the report. Where it is used it needs to be referenced.

Strand C   Work carried out.

In far too many reports candidates failed to inform the reader where the enterprise was sited. They often used a small google picture lacking any useful information as to where the enterprise was within the UK. The job role candidates were looking at was not made clear or how this role related to the whole enterprise/organisation.   In skills (a) (b) and (c), the main criteria for interpreting work within this section is candidates need to be aware and fully understand the meaning of 'relevant statement' and 'identifies'. For 5-6 marks, candidates need to explain in detail, not simply mention, the role of employees including their contribution within the organisation.

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 area. For some enterprises, it is much easier to see these important and tenuous connections. Candidates need to have the role of such links and their importance and context explained before the visit to the enterprise and the production of the final 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 would be a garden centre

providing leisure, education and 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. They need 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. They are often poorly explained and not really linked to the workplace. The terms *explain and analyse* are 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. Candidates need to research such technologies and demonstrate an understanding of their importance.

Strand E   Scientific Knowledge applied in the workplace.

This area is often very 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. 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 very simply and not explained and lacks 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 and 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. This report should make full use of pictures and diagrams to help the reader understand the organisation without visiting it. It should also use 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 controlled assessment well ahead of the submission deadline of 15th May. Each candidate record card should be completed from the downloadable record card from the website and used in its electronic form to ensure correct aggregation of the marks. Moderators found fewer arithmetical errors this year. However, still some centres had not used these electronic records resulting in basic errors of aggregation.

Annotation of coursework.

This is most helpful; some centres add this to the reports electronically whilst other find is 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. This annotation helps to avoid any misunderstanding as to how marks have been awarded.

A big thanks to those teachers who do extensive annotation this is much appreciated by the moderators and helps to ensure accurate informed moderation.

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 a CD and or memory flash drive.

Centres need to ensure that electronically submitted work in a folder named with the candidates name and candidate number. The folder should include the candidate record card and have each file clearly labelled.

Centres should be congratulated for their hard work. Please also check the moderators report to the centre where constructive advice has been provided to help the centre move forward.

I am delighted that so many centres have remained with this course and are continuing to produce such interesting and worthwhile portfolios. The candidates deserve continued praise for their hard work and dedication. Support staff technicians and teaching staff should also be praised.