Modertors' Report
Principal Moderator Feedback

Summer 2017

Pearson Edexcel GCSE In Science
(5SC04)

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Overview

The controlled assessment unit forms 25% of GCSE Science 2011 specification. Controlled assessments are based on specification statements or 'further suggestions for practical work'.

There are three parts to the controlled assessments: A, B and C. Part A is a planning task, Part B is an observations task and Part C is a conclusions task. A student must submit one mark from each part and these may come from a single controlled assessment task or a combination of more than one task. If using more than one task then best marks from each section can be amalgamated. For example, Part A from Biology, Part B from Chemistry and Part C from Physics, or any other combination of subjects. However, each controlled assessment task (CAT) must be completed even if the intention is to only submit a mark for one part. Controlled assessment tasks must not be set as single sections e.g. planning for the purpose of submitting part marks. All work for a controlled assessment task needs to be sent for moderation, rather than just the part for which the mark is being submitted. This enables moderators to evaluate all three parts of the controlled assessment tasks within the correct context.

There are no new Controlled Assessment Tasks (CATS) as May 2017 was the last opportunity for new entries for Science 2011. For details of re-sit opportunities please view the Pearson website.

General comments

The Principal Moderators are pleased to report that centres have for the most part interpreted the assessment criteria appropriately. There were some new centres that submitted work for moderation for the first time in this moderation window. There was generally good agreement with the marks awarded by many centres and this clearly reflected the time and effort taken by teachers who attended Pearson training events and familiarised themselves with the assessment criteria. Where marks did not agree this was usually through lack of standardisation across departments and between teachers. Where standardisation was explicit and shown to be a professional dialogue between all staff involved with assessment; the marking was usually more accurate and related specifically to the criteria. Some centres are still unclear about 'standardisation' and confusing this with internal moderation. Standardisation is a professional dialogue, usually early in the year, to make sure that all staff have a clear idea of the assessment criteria and are marking to the same standard. Internal

moderation tends to rely on one member of the department 'checking' the work of the rest. In a number of cases the 'internal moderator' was over generous and changed colleagues marks when there was no clear justification. If during standardisation, individual marks are changed it is important that this is made clear on the script so that the moderator knows which ones are included in the final mark.

Most centres undertook the task as set in the student brief. Teachers and technicians were advised to trial each CAT before presenting it to students. A number of centres sought advice from the 'Ask the Expert' prior to completing the CATS.

The majority of centres used the workbook provided by Pearson, at least in part. The sub-sections of the workbook provide structure for students in line with marking criteria for each section.
Some centres adapted the workbooks to provide students with more space for responses, but importantly, kept the wording the same; this is acceptable practice. Centres are reminded that the only workbook that can be used for the CATs is the one on the Pearson Secure Website. Using other published workbooks or changing the wording to provide extra scaffolding means the work does not meet the specification requirements and may result in it being refused and another CAT being requested.

Some excellent detailed work was also submitted on loose-leaf A4 paper, although moderators commented that in some instances work in this format lacked structure and focus and was not always annotated adequately. Where centres use lined paper they are reminded that Pearson also produce a 'brief', which gives these students the same support as those using the workbook. Again, however, this is the only form of structuring that is allowed and centres should not be adapting this to give more detail.

It should be noted that evidence to support a mark may be found 'out of place' but that this can only be credited within the same overall section, e.g. information about equipment or controls could be written in the overall plan and they should be credited accordingly. Careful annotation is essential for moderators in these situations. However, students cannot be credited in Part C for work they have completed in Parts A and B.

All three tasks were seen although the chemistry, was again, more popular than either the biology or the physics. Most centres submitted marks for a single task.

Submitting a combination of marks from different controlled assessments was less common and where this happen it tended to be from just two subjects.

Some excellent annotation was seen on scripts, demonstrating that some teachers have an excellent grasp of how to interpret and apply the generic assessment criteria. Unfortunately such good practice was not uniformly widespread across all centres. The work received from some centres had either no, or minimal annotation, or was just ticked in various places. Lack of annotation was particularly unhelpful where students submitted their responses on A4 paper and it was unclear which aspects of the criteria were being addressed in a particular paragraph. It should be noted that annotation is a JCQ requirement, which not only aids moderation but, more importantly, enables accurate assessments to be achieved. The most useful annotation seen used the coding's from the generic mark scheme assessment criteria, e.g. i.e. 1-2a, 3-4 b, usually written in margins or in the body of the work where the mark had been achieved.

Centres continue use the specific marking guidance for each controlled assessment task to aid their assessment decisions. The specific marking guidance only provides examples of responses that can achieve particular marks. There are other ways that students can meet the generic criteria and it is therefore important that the generic criteria are used to make holistic judgements about a student's overall performance. Some centres used the specific mark guidance as a mark scheme and therefore penalised acceptable answers purely because they were not the example given in the guidance.

Comments on the performance of students and the application of the assessment criteria section by section

In general, Parts A and B gave students across the ability range the opportunity to demonstrate positive achievement. The Conclusions section discriminated more in terms of the performance of stronger students over weaker students. More blank sections were seen in Part C of the workbooks compared with Parts A and B.

Part A Planning

Students are supplied with a hypothesis for 5SC04 but it is good practice for them to be asked to write it in their workbooks as this helps to remind them of what they are trying to investigate. It also allows them to refer back and make sure that what they write in the following sections, particularly when discussing conclusions, is pertinent and relevant.

The equipment section was well answered and many students gained all four marks here, with useful diagrams often supporting the mark awarded. However, some students missed out the key items. Weaker students occasionally found it difficult to explain the reasons for their choice of equipment.

The majority of students were able to identify some relevant variables to control and could describe how this would be achieved. Fewer students could develop their ideas and explain how to control the variables. In some cases students were awarded overly high marks for simple responses such as 'keeping things all the same' or 'keep it a fair test'. Some centres, via the annotation are still asking students to say why these controls are required, this is good practice but it is not required by the generic assessment criteria,

Some good responses relating to risks were seen, however, this area was often marked generously, for two main reasons.

The first is that a significant proportion of students do not fully understand the difference between a risk and a hazard. This meant that many discussed hazards, in detail but did not give clear risks. Risks are specifically to do with how a process, a reagent or a piece of apparatus could cause harm to an individual. For example hydrochloric acid is an irritant and therefore is defined as a hazard; this hazard does not change whether acid is in a cupboard or being used in the laboratory. However, when it is locked in a cupboard there is little or no risk because no one can be harmed. When the acid is removed from the cupboard and is in the hands of a 16 year old there is now a risk that they will get this irritant in their eyes and this could lead to

irritation, sore eyes, blindness, pain or scaring. Therefore to manage the risk they would need to wear goggles to prevent the harm/sore eyes etc. Preventing the risk is about preventing the harm. Wearing goggles will prevent the risk of the acid irritating the eyes; it will not prevent the acid from a being a) an irritant or b) a hazard (because it is still an acid). Many students seen in the sample were not discussing the risk (harm) and management (preventing that harm)

The second was where students failed to identify the specific risks of an investigation, although most mentioned the generic laboratory risks and rules. Centres should guard against awarding high marks for generic comments such as 'risks from breaking glass' or 'put all bags and stools under benches'. It is important that the risks identified are relevant and specific to the task and that there is a specific way of managing the risk to minimise its impact. Some students wrote, "be careful" or "work safely" which are not specific enough. Other students gave detail about what they would do if an accident happened e.g. sweeping up broken glass, administering first aid for burns and telling the teacher an accident had happened. These are not ways of managing the risks; rather they are dealing with the effects of poorly managed risks and therefore are not creditworthy within the generic assessment criteria.

Students can, however, be credited for saying there are no risks or little risk provided they give detailed explanations of why they consider this to be the case. The explanation should show they have a good understand of the term risk.

The majority of students could write an ordered method that would produce results and hence gain two marks. To gain the marks for 3 – 4 (a) and (b), students must explain why their method would test the hypothesis and explain why a particular range of measurements were chosen; this last aspect was not done particularly well and remains a problem for students and centres alike. This lack of clarity meant that a number of centres were generous with marks in this section. Responses like "I will do 5 concentrations of acid (for the Biology CAT) because this tests my hypothesis' are not sufficient as they do not say why the range was chosen or how this will test the hypothesis. For the range, it is not sufficient to just state the highest and lowest or give a list of the intervals. Students could be encouraged to start by discussing the reasons for their highest point or lowest point i.e. 20 cm is the lowest height I can drop the magnet from because the induced voltage will be small and the voltmeter will not detect it if it is too small. I will then go up in 20cm intervals, as this will give me enough points for my graph to show if there is a pattern between

height dropped and voltage. It will mean my final height does not go above 1.2 metres, which we can easily reach safely without standing on a chair. Students did, however score the 3 - 4 (b) mark more often than in the previous series.

Part B Observations

Students performed well in this section of the controlled assessment. In most cases 3 or 4 marks were scored for 'Primary evidence and recording', even when students found other areas of the assessment difficult to access. Tables tended to be well drawn with clear headings and units included. Many students also include processed evidence, e.g. averages, with their primary evidence, which is a logical thing to do. However, centres should remember to assess averaging and other mathematical processing in Part C. Centres are reminded that the marks are awarded for the students' ability to present their data and therefore pre-prepared tables or frameworks cannot be used.

If students lost marks in this section it was usually because they failed to include a piece of secondary evidence or more commonly did not discuss the quality of the source of the evidence they collected. The generic assessment criteria state that secondary evidence should be collected and recorded. Some excellent practice was seen where relevant secondary evidence had been collected in the form of data, e.g. results from other groups of students, graphs or factual information. In a few cases students discussed secondary evidence, but did not send it therefore it was not possible to award a mark for recording. It is acceptable for centres to provide a range of sources of information from which students can select the material that they consider to be the most appropriate. Comments must be made about the quality of the sources of secondary evidence to gain two marks for this section; however comments about the quality of the sources were often quite weak, missing altogether, or were about the quality of the data and not the source.

Many of the scripts seen had discussions based on the reliability and accuracy of the data, rather than how reliable and trustworthy the source of the evidence was. Comments like 'the sources results follow the same pattern as my own', 'produced the same conclusion as me so means they are reliable' or 'there are no anomalies in their results' are about the data not the source. To achieve the mark students should look at where their data is coming from e.g. a university website or Wikipedia could lead to comments like 'I think the University of … website is a reliable source because the university has a reputation to uphold and therefore is very careful about what is published on its site' or 'Wikipedia can be updated by members of the public therefore the information is not always checked or reliable'. Generally students find it difficult

to discuss the source when evidence is from classmates as it is difficult not to talk about results being similar to their own etc., which then becomes about the data. Where the secondary source is, for instance, a technician or teacher they are more able to discuss the source e.g. 'the technician is a qualified scientist with lots of training who completes experiments all the time and so is a reliable source'.

It is often easier for students to use secondary evidence in Part C if it is quantitative, but of course, this is not essential.

Part C Conclusions

This section does discriminated well between students of different abilities, although students, in some centres, are tending to use stock phrases that do not always reflect their data or show their understanding and therefore cannot be credited. Weaker students gained the fewest marks, especially when workbooks were not used.

A large number of students demonstrated that they were able to process and present evidence well. In many cases processing requires little more than averaging collected data or re-ordering data to show a clear trend. Centres should, however, check that processing has been done correctly, as there were a number of cases where students' averages were wrong, yet had been credited.

Line graphs and bar charts were frequently drawn correctly even by weaker students. In some instances, however, full credit was given even when there were obvious errors in scaling and labelling axes, or plotting points. There were few examples of students choosing to draw the wrong type of graph. There were a few centres where students had not processed the evidence and had erroneously been awarded four marks.

The quality of evidence section was challenging for weaker students, particularly 3-4 (a). It was apparent that many students had not looked at their evidence with sufficient care, and made sweeping comments about anomalies. Obvious anomalies were sometimes ignored, yet the text claimed that they had been dealt with. It was also apparent that some students did not know how to deal with anomalies appropriately and this is a broad issue that needs to be addressed. Other students gave a text book explanation of how they would deal with anomalies but then didn't or said there where none when there were. Centres are reminded that the 1 – 2 mark (b) statement requires students to comment on the quality of their secondary evidence, but this aspect was not always addressed particularly well with full marks awarded without reference to this criterion. This is made more difficult when the secondary evidence does not include data. Many students had used their secondary

evidence to process and plot alongside their primary data. This is not only good practice but enabled them to see anomalies in their secondary data and deal with them more appropriately to gain 3-4(b). Students who had used data from technicians or other students usually performed better in this section, as they understood the data they were discussing. Where the data was from a website they were not always as able to discuss this in the context of quality and many had data that, although related, was different enough to make it difficult for them to discuss with understanding.

Some excellent conclusions were seen where there was a detailed discussion of relevant scientific ideas and the hypothesis had been referred to appropriately. However, moderators felt, in some instances, that assessments were generous because responses were brief and clearly lacked the detail needed to match the criteria for 5 and 6 marks. Some were just a repeat of a sentence from a book, which showed that the student clearly did not understand in the context of their data. In particular for 5 -6 (a) and (b) the use of scientific ideas needs to be present to explain the conclusion. This is an area where centres need to give time in formative work prior to taking the task, to practice the points already mentioned. Students should be encouraged to look carefully at their evidence for mathematical relationships. At a low level this could include a comparison of quantitative evidence or at an intermediate level reference could be made to data points. At higher levels this could develop into comments about the impact of one variable on another, such as '*if x is doubled, y is doubled'*, or reference to the gradient of a graph. Many students were, however, able to score 3 or 4 marks. The biggest area of challenge for students was in identifying the mathematical relationships in the data and therefore getting beyond 3-4 (b) in the 'b' strand of conclusions.

The evaluation of the conclusion section was probably the one that students found the most difficult. Only the most able students scored well on this so evaluation remains a real discriminator of ability. It is important that students use all the evidence available to them when writing about the conclusion i.e. both primary and secondary. Comments were often too simplistic, particularly when suggesting how the evidence could be improved. When students used the workbook they often wrote some creditworthy comments as a result of having the guidance provided at the top of the section in the booklet. Statements such as 'do the experiment better', 'do more repeats' or 'do the experiment more accurately' were not uncommon and such stock answers do not show that the student understands the issues related to the particular task in question. Indeed, some students who suggested further repeats had already

carried out a suitable number of repetitions. Some students felt that 'getting more information from the internet' would be useful but did not say what sort of information and why it was necessary. It is important that students are not getting credit for 'stock' answers as these highlight their lack of understanding of the section and often their specific data. In some instances these low-level comments had been awarded high marks. References to scientific ideas are needed for the 3 – 4 (a) mark and for 3 – 4 (b) students need to suggest how to improve and extend their evidence. It was noted that where the workbook had not been used, weaker students scored poorly here. Again there were a number of stock answers like 'do more results' and 'increase the range of results' but it was often not clear why it would be useful to increase the range or what the range could logically be increased to. The structure provided by the workbook assisted students in structuring their response and they were more likely to score at least one mark, if not two.

Some students and occasionally teachers still seem to be confused about the difference between evaluating the conclusion and evaluating the method and for good measure wrote the same thing in both sections and had it awarded in both sections.

There is usually greater opportunity for weaker students to gain marks when evaluating their method. The emphasis of this section is an evaluation of the method in terms of the equipment used and the procedure. In some cases students and centres interpreted this as another opportunity to discuss the evaluation of the conclusion. Many students could state a strength or weakness in their method and suggest how to improve it. This section proved to be more accessible, however some students wandered off the point and gave examples of strengths/weaknesses that were irrelevant to the task. Some said 'it was easy' or 'I enjoyed it', as strengths. These are clearly not strengths of the method. Others discussed how they had followed their method or controlled their controls, this is more about their ability to follow the method than the method itself and therefore is not creditworthy. Students found it easier to identify weaknesses. Although there were some who said that the weakness was that they didn't follow the method or control their variables. For example "I didn't measure the volume accurately so I will improve this by using a measuring cylinder". The method (from the overall plan) said they were going to control the volume using a measuring cylinder. Therefore not using it was not a weakness of the method, just poor practice. Students should be discouraged from making comments such as 'use better equipment' or 'use a computer' when discussing possible improvements to a method. Improvements should relate to the method used and should be justified. Very few students specifically discussed how

their method could have produced anomalies and how changes to that method would minimise anomalies and improve the quality of the evidence. Very few students scored either 5 -6 (a) or 5-6 (b), as the quality of their discussions was too weak to merit this.

Administration

The deadline for the submission of work to the moderators was 15th May 2017 and it was pleasing that the majority of centres sent their samples of work by the deadline with a significant number more than a week early. However, some centres were considerably late in submitting samples to moderators. It was frustrating in some cases to have work arrive, by the correct date, but for the moderator to then find the sample was incorrect. There were still a notable number of centres failing to include the work of the highest and lowest scoring students in addition to the randomly selected sample of students. There were also some samples where selected students had been withdrawn and the work of the next available students had not been sent, this meant there was insufficient work and more had to be requested. This causes delays in the moderation process. This meant that moderators had to contact centres to request the missing work. Most centres were then very good at getting this work to the moderators. However, there was a small minority of centres who initially ignored this request. There were a significant number of aggregation errors on the Controlled Assessment Record Sheet (CARS) as well as errors where the marks on the scripts did not match those on the EDI printout. This too holds up the moderation, as moderators need to be clear which mark the centre wants considered. In many instances this was a simple clerical/transcription error but there were also cases where centres had sent the wrong piece of work.

The majority of centres used the Controlled Assessment Record Sheet (CARS), although this were not always accurately completed. This sometimes made the moderation process more difficult, especially when more than one task was submitted, as it was not clear which marks, from which piece of work, the centre was submitting as part of the final mark.

Further support

There are a number of ways that centres can access further support;

Science Subject Advisor

Ask The Expert

Training events

Sample controlled assessments

Assessment guide

Details for all of these can be found on the Website.

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