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# GCSE Science

# Controlled Assessment

Science A SCA4P

Additional Science AS4P

Further Additional Science FAS4P

Biology BL4P

Chemistry CH4P

Physics PH4P

Report on the Examination

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4400

June 2015

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Version: 1.0

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## 1 General Structure of the Controlled Assessment Unit

The total number of raw marks for the CAU is 50. This comprises 20 marks for Section 1 and 30 marks for Section 2.

In May 2015 the Set D ISAs should have been used. This year only a handful of centres submitted ISAs from previous sets or from Set E. It is vital that centres submit the correct ISA: the date on which they can be moderated is printed on the front cover of each ISA paper.

For Further Additional Science only those ISAs from set 3 with the suffix 'a' must be used. A few centres used an ISA with suffix 'b' in error.

The Set D ISAs for the above subjects have now expired and may be used for practice.

The Set D ISAs for these subjects consisted of:

Specification Code	Subject	Component Code	Titles
4405/4406	Science A	SCA4P	BU1.4 Planting Density CU1.4 Polymer Strength PU1.4 Bouncing Balls
4408/4409	Additional Science	AS4P	BU2.4 Diffusion CU2.4 Temperature & Rate of Reaction PU2.4 Thermistors
4410	Further Additional Science	FAS4P	BU3.4a Pollution CU3.4a Water Softeners PU3.4a Centripetal Force
4401	Biology	BL4P	BU2.4 Diffusion BU3.4a Pollution BU3.4b Biogas
4402	Chemistry	CH4P	CU2.4 Temperature & Rate of Reaction CU3.4a Water Softeners CU3.4b Fuels
4403	Physics	PH4P	PU2.4 Thermistors PU3.4a Centripetal Force PU3.4b Centre of Mass

Centres may allow students to carry out as many ISAs as they wish: for each student however, only the one ISA that resulted in the highest mark for each subject should be submitted for moderation. Entries for moderation in May each year must be made by February 21st. Marks must be submitted by May 7th each year.

All of the experiments worked well. The only practical difficulty that some centres had was in CU3.4a Water Softeners, and this was as a result of the particular hardness of water in their area.

Many centres made good use of their coursework adviser in order to ask advice on alternative methods of carrying out the experimental work. It should be remembered that the method given in the Teachers' Notes is only a suggestion; teachers may use any method that they consider appropriate, having first carried out a risk assessment.

## 2 Support for the Controlled Assessment Unit

- **Feedback meetings over the last academic year**

AQA's Teacher Support Department has run a number of different meetings all over the country to review the performance of students in examinations. These meetings have included a study of the CAU, and have helped centres to prepare their students for the CAU.

- **Web conferences**

A series of web conferences has been made available in which both written papers and coursework have been discussed.

- **Teacher Standardisation Meetings**

The AQA Moderation Team has put on a number of half-day standardisation meetings for teachers. At these meetings, teachers are provided with standardising material and are able to ask questions about the ISAs.

- **Controlled Assessment Unit (CAU) Advisers**

Each centre has been allocated a CAU adviser. Centres are informed of the name and contact details of their adviser in September each year. Centres who do not have these details should contact the Science Department at AQA Guildford. The CAU Adviser contacts the centre at least twice a year to offer their services. Many centres made good use of their advisers this year. Centres that had problems at the moderation stage were nearly always centres that had not made contact with their adviser.

## 3 Internal Standardisation and the Centre Declaration Sheet

It is a requirement that, if more than one teacher at a centre is responsible for the marking, a procedure of internal standardisation should be carried out. The easiest way to do this is to use the Teacher On-Line Standardisation (TOLS) provided by AQA on the web site.

This year it was apparent to moderators that in some centres internal standardisation had not taken place. This could result in the marks of some students at the centre being changed.

A number of centres clearly had carried out internal standardisation. However, **it was not always clear whether the revised mark had been used**. It is recommended that the original marking should be in red, and internal moderation should be marked in green. Centres should make clear the final mark that has been submitted.

Centres are required to complete a Centre Declaration Sheet confirming that internal standardisation has taken place, and to submit this to the moderator. Moderators reported that in some cases centres had failed to do this, and had to be reminded to submit the form. This slows down the moderation process and in extreme cases may lead to the delay in the issue of results to a centre.

## 4 Provision of ISAs

Teachers are provided with the Teachers' Notes for each ISA up to two years before the ISA is submitted for moderation. The Teachers' Notes contain details regarding the subject content and context of the ISA, and a suggested method. This enables teachers to plan in advance when an ISA will fit into their teaching scheme. The actual ISA tests and corresponding Mark Guidance schemes are issued to the Examinations Officer via the Secure Key Materials (SKM) section of e-AQA.

Science departments are entitled to be given one printed copy of each ISA and Mark Guidance, which they should keep secure within the department. Other copies should be printed off as and when required for issue to students.

## 5 Operation of ISAs

There are several stages in the process of administering an ISA.

### 5.1 The task

For Science A the Teachers' Notes provide teachers with a hypothesis which should be given to students. A few centres attempted to change the hypothesis, but this is unacceptable for Unit 1 ISAs as the hypothesis is printed at the start of each ISA paper.

For Additional Science, Further Additional Science and the separate sciences the Teachers' Notes describe the area of investigation by means of the statement 'Students should be told to investigate a factor that affects ...'. Students then need to think of and research an appropriate hypothesis.

The Teachers Notes' also suggest two or three suitable contexts for the investigation. Teachers may use one of these contexts or substitute one of their own.

Some centres provided unsuitable contexts for their students, or contexts that were so generalised that students found difficulty in relating them to their investigation.

Other centres gave such detailed contexts that it limited the students' ability to respond to the final question in Section 2 of the ISA.

### 5.2 The research

Students are then required to research a method, including a risk assessment, for testing the hypothesis, and to research the context of the investigation. Students are allowed to make notes on the Candidate Research Notes (CRN) sheet, which is downloadable from the AQA web site.

The CRN may be completed under limited control, ie it does not have to be completed under direct teacher supervision. Centres should remember that the only notes that students are allowed to use when completing the ISA paper are those which they write on the reverse side of the official AQA Candidate Research Notes sheet. This year some centres were allowing their students to use extra paper: **this is not permitted.**

Please note that during the research aspects of the CAU students are expected to abstract key information from their sources in order to make brief notes on the Candidate Research Notes. They can then use these brief notes to help them to construct their full answers in the ISA paper. Students who copy verbatim from source to Research Notes and then on to the ISA paper, without any personal input, **may be putting themselves in a position where they could be accused of plagiarism.**

Some centres were awarding marks for statements that students had written on the CRN but had not written on the actual ISA paper. **This is not allowed.**

### 5.3 The blank table for the results

Once students have completed their research and researched a method for the investigation, they should be asked to complete a blank table ready for the research. **This must be completed under high control**, ie under direct teacher supervision. This year some teachers allowed students to draw a blank table on their Candidate Research Notes. **This is not acceptable**, as the blank table must be completed under high control, and the Candidate Research Notes may be completed under limited control.

The table should be able to accommodate all the data that the student is actually going to measure and/or record during the investigation. There is no need for columns to be provided for repeats, means or any derived values. These may be included in the table if the teacher so wishes, but there are no marks awarded for their provision.

Students should be encouraged to use full titles for the headings on the table, eg 'Length of leaf', not just 'Length'; 'Time taken for the reaction to complete', not just 'Time', 'Volume of oxygen produced', not just 'Volume'. Units should also be included.

There is no time limit for drawing the blank table but **it must be completed before the practical work is started**. It may be done at the same time as Section 1 or on a separate occasion.

The best way for students to construct their table is to draw it on a blank sheet of paper. If this is subsequently used to record to results of the practical work, then it must be annotated by the teacher to confirm that it had been marked before use.

This year some teachers allowed students to draw the blank table on the section1 ISA paper. Although this is permissible, it must be remembered that **Section 1 must not be given back to students after its completion**.

Many teachers now adopt the policy of either photocopying the original blank table before returning it to the student, or after collecting the blank table issuing the student with a blank table provided by the centre. Either of these strategies is perfectly acceptable.

The mark for the table (0, 1 or 2) should be entered in the right-hand margin adjacent to the last question in Section 1 of the ISA. Failure to record the mark for the blank table this year led to some teachers arriving at an incorrect total mark.

### 5.4 The ISA paper - Section 1

Section 1 of the ISA must be completed **before** the practical work is undertaken.

- **The hypothesis**

In all ISAs apart from the Unit 1 ISAs for SCA4P, students were required to suggest a hypothesis together with a reason why they chose it.

Students were generally able to offer a sensible hypothesis, but often struggled with supplying any reason as to why they had chosen that hypothesis.

- **Research sources**

In all ISAs students were required to identify two sources that they had used for their research. It is important that moderators should be able to access the quoted sources.

Therefore, if a book is quoted, the student should normally name the **title and author**. Alternatively the ISBN could be quoted.

If a web site is quoted, the student should refer to the **web page**. Some students were giving insufficient detail regarding their sources. Statements such as ‘My exercise book’, ‘My teacher’ or ‘The experiment I did last week’ are not sufficient, as the moderator cannot access these. Similarly, simply stating ‘Wikipedia’ is insufficient, as are references to the centre’s intranet.

- **The proposed method**

All of the ISAs contained a question in which the students were required to write their plans for the practical work, including the risk assessment. This question also took account of the Quality of Written Communication (QWC) skills.

Students generally responded well to this question. However, the best answers came from those students who used the bullet points in the question as paragraph headings in their account.

Students may name all the relevant pieces of equipment throughout their account; however it is easier for both the students and the teacher marking the work if the equipment is shown in a list at the start.

Teachers were generally good at interpreting the marking guidelines for this question, and in making annotations when marking the work. Many teachers wrote words such as ‘Equipment’ or ‘Measurements’ in the margin next to the relevant section of the account. This was most helpful to the moderators.

- **Other Section 1 questions**

- **Comparing results**

Several of the ISAs contained a question asking students to explain the benefits of comparing their results with those of others.

A common mistake was for students to talk about calculating a mean. This would have been correct if the question had been asking about **sharing** results, but not correct for **comparing** results.

- **Experimental difficulties**

Some ISAs had questions that asked candidates to think ahead to any difficulties that they might experience in collecting the results. These questions were generally well answered in terms of identifying the difficulties, but not so well answered with regard to what could be done to overcome these difficulties.

- **Preliminary work**

ISA BU3.4a asked students how preliminary work could be useful in finding a suitable value for one of the control variables. Although most students could identify an appropriate control variable, they were often unclear in describing how a preliminary experiment could be used to find a suitable value.

- **Alternative methods**

ISA CU2.4 asked students to describe an alternative method that they could have used, together with an explanation of why they chose not to use this alternative method. Some students described an alternative method that would investigate a **different hypothesis**. This is not allowed.

## 5.5 The practical work

This activity is conducted under limited control, and students may therefore work in groups. It is important that each student should take part in this practical session. Any student who does not take an active part in this stage **cannot score any marks for Section 2** of the ISA.

In Section 1 of the ISA, students will have written down their chosen method, and the teacher may allow them to carry out the experiment. Alternatively, if the teacher deems that the method is unsafe, unworkable or unmanageable, then the teacher may substitute an alternative method. This may be the method given in the Teachers' Notes, or one of the teacher's own devising. This does not limit the marks which a student can receive for writing the method in Section 1 of the ISA. If, in the opinion of the teacher, the method was perfectly good, the student can still be awarded up to full marks for the method.

Note the teacher may only provide the student with a method **after** the student has completed Section 1 of the ISA.

Method plans given to the students at this stage should be similar to the one provided in the Teachers' Notes, ie it should simply outline the technique: it should not include details such as the number of repeats, or the interval or range of the independent variable. This year, some centres were providing students with Method Sheets that provided too much detail. If students are provided with a printed worksheet, **a copy of this should be submitted to the moderator**. Failure to include method sheets sometimes made it difficult for the moderator to confirm the centre's marks.

Whichever method is used, centres must complete an **ISA Explanation Sheet** that gives details to the moderator of how the investigation was carried out. In many cases this year this was not done. Consequently moderators sometimes had great difficulty in confirming the award of marks in Section 2 of the ISA. One ISA Explanation Sheet is required for each **different** way in which an ISA has been carried out.

A teacher should produce an ISA explanation sheet for each experiment at the time that the practical is completed. It should be kept to send to the moderator should it be required.

## 5.6 The experimental results

It is important that each student should, wherever possible, obtain his or her own results. **Only if this proves impossible** should a teacher issue a student with a copy of another student's results.

This year moderators found a small number of instances where all the students at a centre had been using the same set of results. This is not generally acceptable. There may be occasions when it is necessary to pool the results of several students in order to be able to identify a pattern. An example of this might be a fieldwork investigation. In such cases however, it must be made clear to the moderator which of the results that particular student had been responsible for obtaining. This is most easily done by including the student's own table of results as well as that of the combined group.

## 5.7 Displaying the experimental results

Students must draw a suitable graph or bar chart of their results. **Categoric** variables should be displayed on a **bar chart** and **continuous** variables should be displayed on a **line graph**. If however one of the variables is a discrete variable, teachers may accept either a bar chart or a line graph. If a student finds that there is no correlation between the independent and the dependent variable, then in order to qualify for the 4th mark in drawing a line graph, the student should annotate the graph to this effect, eg by writing 'No line possible'.

There are a few special cases, mainly in biology, where it is acceptable to draw a dot-to-dot graph line. For example, suppose you were measuring the pulse rate of a person every hour, on the hour, throughout the day. You have no way of knowing what the pulse rate was between these readings, and therefore the Society of Biology recommends that a dot-to-dot line should be drawn. If the teacher feels that the investigation carried out by the student comes into this category, then an annotation to this effect should be made.

As with results tables, students should be encouraged to write full titles on the graph or chart axes. The mark for the graph (0, 1, 2, 3 or 4) should be entered in the right-hand margin adjacent to the last question in Section 1 of the ISA. Failure to record the mark for the graph led to some teachers arriving at an incorrect total mark.

## 5.8 The ISA paper - Section 2

Section 2 of the ISA paper contains questions concerning the experimental results that the students have obtained.

Students are permitted to use their Candidate Research Notes again for this section. If the teacher has given the student a different method from that which was planned in Section 1, the student may also use any method sheet that the teacher provided.

This is in order not to disadvantage such students compared with students who were allowed to carry out their own method.

- **Do your results support the hypothesis that you investigated?**

It is important to remember that the hypothesis they investigated is the one for which they carried out the practical work. This may not be the same as the original hypothesis that they wrote about and planned to test in Section 1.

Most students answered this question well, but in some cases students ignored their own results and simply assumed that the hypothesis had been supported. It is important that when teachers mark this question they check each student's individual results to ensure that the response is correct.

- **Anomalous results**

Some questions asked whether the students had any anomalous results, and to include examples to support their answer.

Generally the teacher can confirm the student's response by looking at the plotted graph. Remember however that it is always a matter of judgement as to whether or not a point is sufficiently far from the line of best fit as to be regarded as anomalous.

The main reason for students failing to get maximum marks for this question was failure to quote data from their results in sufficient detail.

- **Errors and uncertainties**

In a question that asks students to suggest the cause of the largest error or uncertainty, teachers need not try to evaluate the relative levels of uncertainty: all that is required is that the student should suggest a measurement that is likely to have a significant level of uncertainty.

In answering such questions this year, most students could suggest an appropriate cause, and could usually go on to suggest a way of reducing the uncertainty. However, few students could then go on to explain why the suggested remedy might work.

Some questions asked about the type of error that may be present, eg random or systematic.

Students should know that random errors are nearly always present in an investigation. By carrying out repeats and calculating a mean, the effect of random errors may be reduced.

Students should also know that for systematic errors the experiment should be repeated using a different method or using a different set of equipment.

Zero errors on instruments are a special kind of systematic error, and students should know how to test for zero errors and what to do about them if they are found.

- **Range**

In a question that asks about the range of one of the variables, students may quote either highest to lowest, lowest to highest, or the difference between the two extremes. Whichever method they choose, they should also include units: many students failed to do so this year.

- **Repeats**

Some questions asked whether or not the student carried out any repeats, and to explain why they did or did not do so.

Credit should be given to students who either plan to do repeats before doing the practical work or who realise the need for repeats after collecting the results.

Moderators sometimes found that students claimed to have carried out repeats, when in fact they had not, and vice versa.

Some questions asked about how repeated readings could be used to obtain more accurate results. In such cases, students are expected to describe in detail how a mean could be calculated and to appreciate that the calculation of a mean could reduce the effect of random errors.

- **Reproducibility**

Some questions asked whether or not the results of others showed that the student's results were reproducible.

In many cases centres failed to submit a copy of the results of others to the moderator, which made it extremely difficult to confirm that the students had been awarded the appropriate mark.

Again this year, some students compared their own results with those from the Case Studies rather than with another supplied set of results. This is not permissible.

- **Resolution**

Many students appeared not to understand the term, often confusing it with range or interval. Of those students who did state an appropriate resolution, many omitted the units.

Students need to appreciate that the smallest scale division on a measuring instrument needs to be smaller than the smallest measurement they are making.

## **Case Study Questions**

- **Sketch graph**

In all ISAs this question required students to draw a sketch graph of the data in the table in Case Study 1.

Many students put a numbered scale on the axes. This is not a requirement and may be ignored when marking. It is not necessary to include any units on the axes. However, the mark for the line must not be awarded if the axes are not correctly labelled.

- **Case Studies 1, 2 and 3**

In all ISAs this question required students to decide and explain whether the data in the first three Case Studies supported a given hypothesis.

Most students were able to score at least one mark for simply stating whether or not two out of the three Case Studies supported the hypothesis. However, only the better students were able to score more marks by giving a more detailed analysis of the data.

Centres should note that unless the student can state correctly whether all three Case Studies support the hypothesis, they cannot score more than one mark.

- **Case Study 4**

In all ISAs there was at least one question that asks students to inspect and comment on the data in Case Study 4. The data for Case Study 4 is more complex than that of the other Case Studies and therefore only the best students were able to score maximum marks.

- **Context**

In all ISAs the final question on Section 2 of the ISA paper concerned the context which the students had researched. In many cases centres were awarding marks too generously.

Moderators saw many responses that were extremely vague but had been awarded the full three marks.

Students should be looking for a context in which the results of their investigation (which includes both the research and the practical work) may have a practical application.

## **6 Marking the ISA test**

In the majority of centres the moderator's marks agreed closely with those of the centre. However, a small number of centres needed to have their marks adjusted after the moderator decided that one or more of the candidates marks were out of tolerance.

One of the main reasons that centres had their marks changed was because of **a lack of internal standardisation** (see section 3).

### **6.1 Recording marks**

AQA provides teachers with a Mark Guidance scheme for each ISA. Teachers are required to use their professional judgement in marking the test, and to mark each question holistically, using the generic mark guidance to arrive at a best-fit mark. This marking is subsequently moderated by AQA.

One of the main difficulties encountered by moderators was the manner in which teachers marked the scripts. Teachers are requested to **mark in red ink**, and to **enter a subtotal in the right-hand margin** at the end of each part of each question. This is the policy used by examiners when marking exam scripts. The total for each section should then be entered in the box at the end of the section, and this mark transferred to the front cover. Failure to record in this way led to many addition errors being made by centres.

## 6.2 Annotation

The Additional Guidance below the Generic Guidance suggests typical answers that a student may provide. However, if a student provides an answer that, in the judgement of the teacher, correctly answers the question, then credit should be given. In such cases the teacher should provide annotation to indicate the reasons for the judgement. The level of annotation on the scripts varied greatly. It is an Ofqual requirement that teachers should annotate the work to show where and why marks have or have not been awarded. Some centres were excellent in this respect; others put no annotation on at all, leaving moderators wondering why marks had been awarded.

A simple and quick way of providing annotation when the teacher thinks that it is a marginal decision as to whether or not the mark should be awarded is the use of the '**D**' for **doubt**. The way in which this should be used is explained in the Guidance and Standardising Material for ISAs. More centres this year adopted this policy and in doing so made it much easier for moderators to approve their marking standards. All centres are encouraged to use this strategy in the future.

## 7 Administrative matters

Some centres were extremely late in making entries. Usually this was because they had not realised that applying for a subject award does not automatically mean that the Controlled Assessment Unit will be moderated: a separate code needs to be submitted to request moderation. Moderators reported that although some teachers were either slightly severe or rather lenient in their interpretation of the mark guidance, the majority were within tolerance.

## 8 Submission of work to the moderator

### 8.1 Centre Mark Forms

Centres are asked to **circle the student with the highest score and the student with the lowest non-zero score**, on the Centre Mark Forms. This makes the process of student script selection for the sample much easier for the moderator. If centres can easily provide a rank order list, this is much appreciated by the moderators. Many centres unfortunately failed to indicate the students with the highest and the lowest non-zero mark.

### 8.2 Collating the work of a student

Centres should ensure that all the required components of each student's work are **stapled together in the top left-hand corner**. Plastic wallets or folders should not be used. The required components are:

- Section 1 of the ISA
- Blank table for the results
- The student's own results
- The results of others (if required)
- Section 2 of the ISA
- The student's graph or bar chart
- Candidate Research Notes

It is of great help to the moderator if the items are arranged in the order above, with Section 1 on the top, as this will show at a glance, the centre number, candidate number and the marks for each Section.

- The Centre Declaration Sheet and ISA Explanation Sheets must also be enclosed with the sample.

Most centres this year did remember to include the Centre Declaration Sheet, but failure to include this document could result in a delay to the results for that centre being made available.

## **9 Conclusions**

In general, moderators were very pleased with the efforts that centres had made in both the execution of the ISAs and in their preparation of the sample material. The marks were spread over the full range available.

### **Mark Ranges and Award of Grades**

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.

### **Converting Marks into UMS marks**

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

[UMS conversion calculator](#)