



General Certificate of Secondary Education

Science: Centre Assessed Unit

Science A 4461 (SCYC)

Science B 4462 (SCYC)

Additional Science 4463 (ASCC)

Biology 4411 (BLYC)

Chemistry 4421 (CHYC)

Physics 4451 (PHYC)

Report on the Examination

2008 examination - June series

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Dr Michael Cresswell, Director General.

Centre Assessed Unit

General

This report covers the second submission for moderation of the Centre Assessed Unit (CAU) for the new specifications in GCSE Science. Because of the confidential nature of the Investigative Skills Assignments (ISAs), which are still currently operational, it cannot deal with specific references to particular ISAs, but rather deals with the overall general performance of the component this year. Centres that have particular questions about specific ISAs should make enquiries of their Centre Assessed Unit Adviser.

1. Structure of the Centre Assessed Unit

The total number of raw score marks for the CAU is 40. This comprises of 6 marks from the Practical Skills Assessment and 34 marks from the ISA.

The ISAs may be used for more than one subject. Six were available last year and these were also available for use this year. A further 16 ISAs have been made available this year.

Moderation is only carried out once per year. Requests for moderation should be submitted by February 21 each year, using the appropriate code:

- Science – SCYC – one ISA from B1, C1 or P1
- Additional Science – ASCC – one ISA from B2, C2 or P2
- Biology – BLYC – one ISA from B1, B2 or B3
- Chemistry – CHYC – one ISA from C1, C2 or C3
- Physics – PHYC – one ISA from P1, P2 or P3

Centres may also request that the marks for this component are carried forward from one subject to another appropriate subject. For example, if a candidate has previously submitted an ISA in B1 for moderation for Core Science, this mark may be carried forward for subsequent certification in Biology.

If a centre wishes to transfer the ISA to a different subject after making the initial entry in February, this may be done without charge up to April 21.

Marks must be submitted by May 5 each year. It is the total mark out of 40, PSA plus ISA, that must be entered on the Centre Mark Form.

2. Practical Skills Assessment (PSA)

The criteria for the award of these 6 marks are based on 6 can-do statements. These may be assessed at any time during the course when candidates are carrying out practical work. The mark should represent the typical achievement of the candidate by the end of the course.

Centres are not required to submit any records or justification for their arrival at the final mark, as this component is not moderated. The intention is that the component should be formative and motivating, especially to the lower ability candidates.

Centres appeared to have made a fair and realistic assessment of their candidates. As would be expected if the candidates had shown improvement over the course, the majority of the marks awarded for this component were weighted towards the top of the mark range.

Although no written evidence or justification for the marks is required, conversations with centres have revealed that the vast majority of teachers have either designed their own record form for this or have adopted the suggested format shown on page 32 of the Guidance and

Standardising Material for ISA and PSA – Issue No. 1. This booklet was given to delegates at the mandatory Teacher Standardising Meeting. New editions of this will be available at meetings this autumn and can also be requested from the Subject Office in Guildford.

The mark for the PSA should be entered in the appropriate space on the reverse of the Candidate Record Form.

3. Investigative Skills Assignment (ISA)

This component comprises 34 of the 40 marks available for the CAU. Candidates carry out an investigation based on one of the ISAs set by AQA.

Centres may get candidates to carry out as many ISAs as they wish. For each candidate however, only the one ISA that resulted in the highest mark for each subject is submitted for moderation.

The ISAs available this year were:

Set 1

B1.1 – Fieldwork	B1.2 – Reaction Times
C1.1 – Unsaturation of Oils	C1.2 – Viscosity of Oils
P1.1 – Thermal Insulation	P1.2 – Wind Turbines

Set 2

B1.3 – Microorganisms	B2.1 – Enzymes and Temperature	B3.1 – Transpiration
	B2.2 – Photosynthesis	B3.2 – Pulse Rate & Exercise
C1.3 – Testing Concrete	C2.1 – Controlling Reactions	C3.1 – Substances dissolved in water
C1.4 – Testing Emulsions	C2.2 – Electrolysis	C3.2 – Burning Fuels
P1.3 – The efficiency of light bulbs Generators		P2.1 – Resistance P3.1 –
	P2.2 – Average velocity of an object falling through air	P3.2 – Transformers

The Set 1 ISAs have now reached their expiry date, and may therefore be used for practice with candidates.

Any Set 1 ISAs that have been completed by candidates prior to May 5 2008 may still be submitted for moderation in 2009.

For SCYC, the most popular ISAs were B1.2, C1.2 and P1.1, perhaps because centres had tried them out last year and wanted to use their experience.

For ASCC, the most popular ISAs were B2.1, C2.1 and P2.1

For the separate sciences, very few centres used any of the ISAs from Unit 3, with the exception of B3.2

3.1 Teacher support for the ISA

The large majority of centres appear pleased with the scheme, with many reporting that it is less time-consuming than the previous Sc1 system.

Over the last 2 years, AQA's Teacher Support Department has run a number of different presentation meetings all over the country to explain the requirements of the new specifications. In addition to these presentation meetings, the AQA Moderation Team has also run a large number of half day standardisation meetings for teachers. More of these meetings will be

available in the autumn and spring terms of the next academic year. At these meetings, teachers are provided with standardising material and are able to ask questions about the ISAs.

3.2 Internal standardisation and the Centre Declaration Sheet

It was apparent to moderators that those centres that had sent a teacher to a standardisation meeting were far less likely to have their marks adjusted. However, 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 for the teacher who attended the meeting to use the exemplars and Microsoft PowerPoint presentations that are provided at the standardisation meeting.

In some cases, it was apparent to moderators that such internal standardisation had not taken place. This could result in all the marks of candidates at the centre being changed. This is because all the ISAs are moderated as a single subject, unlike the previous Sc1 scheme. Teachers therefore need to standardise across all the ISAs in all the different subjects. If, for example the biology and chemistry marks are judged to be in tolerance, but the physics marks are out of tolerance, this could result in all of the candidates' marks being affected as physics ISAs are included in more than one subject. Centres will receive one feedback form that covers all of the subjects entered.

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 several 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.

3.3 Provision of ISAs

The fundamental basis of the new scheme is that the CAU should be part of the teaching and learning process, and not a bolt-on extra, as Sc1 appears to have become in some cases. Teachers are provided with an outline of each ISA as early as March of the previous academic year in the publication of Teachers' Notes. This enables them to plan in advance when an ISA will fit into their teaching scheme.

The actual ISA tests and corresponding marking guidelines are issued to the Examinations Officer on a password-protected CD in September. Science departments are entitled to be given one printed copy of each ISA test and marking guidelines, which they should keep secure within the department. Other copies should be printed off as and when required for issue to candidates.

3.4 Operation of ISAs

Candidates carry out an investigation, having been provided with an outline plan by the teacher. They subsequently take the ISA test. Section 1 of the ISA asks them questions about their own investigation, the questions being based upon Section 17 of the specification, 'How Science Works'. Section 2 of the ISA describes a situation in the same related area, and asks them questions about this.

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

3.4.1 Stage 1

(a) The task

AQA provides teachers with a suggested approach to carrying out the investigation. However, AQA cannot provide detailed instructions, as conditions and availability of equipment will vary

greatly from one centre to another. Teachers must therefore carry out their own risk assessments of any procedure used.

Teachers may adapt or amend the suggested approach. This enables teachers to tailor the investigation to fit in with their own teaching scheme. Whether or not the suggested approach has been amended, centres must complete an ISA Explanation Sheet which gives details to the moderator of how the investigation was carried out. In some cases this year this was not done. Consequently moderators had great difficulty in confirming the award of marks in Section 1 of the ISA. One ISA Explanation Sheet is required for each different way in which an ISA has been carried out.

Teachers need to provide candidates with an outline method of carrying out the investigation. Where this is done by means of a printed worksheet, a copy of this should be provided to the moderator.

(b) The table of results

At the end of Stage 1, candidates must, on their own, produce a blank table ready for the results. This needs to be marked by the teacher before the candidates proceed to carry out the practical investigation.

The table should be able to accommodate all the data that the candidate 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 to their provision.

In some cases teachers had returned these tables to candidates after marking them. If the candidate subsequently alters the table, for example by adding units previously omitted, the teacher should annotate the table. Failure to do so made it difficult for moderators to assess whether or not the correct mark had been awarded.

Some teachers adopted the policy of either photocopying the original blank table before returning it to the candidate, or after collecting the blank table issuing the candidate 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 do so this year led to some teachers arriving at an incorrect total mark.

3.4.2 Stage 2

(a) The practical work

Candidates now carry out the practical work, working in small groups if necessary. It is important that each candidate should take part in this practical session. Any candidate who does not take an active part in this stage cannot score any marks for Section 1 of the ISA.

This year moderators found a small number of instances where all the candidates 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 candidates 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 candidate had been responsible for obtaining. This is most easily done by including the candidate's own table of results as well as that of the combined group.

(b) Drawing the graph or bar chart

At the end of Stage 2, candidates must, *on their own*, draw a suitable graph or bar chart. Some of the issues that were identified during moderation are listed below.

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- categoric variables should be displayed on a bar chart
 - continuous variables should be displayed on a line graph
 - discrete variables may be displayed on either a bar chart or a line graph
 - the maximum marks to be awarded if the candidate has used the wrong type of display is 3
 - although the convention is to plot the independent variable on the x-axis, there is no penalty for reversing the axes
 - candidates should use a scale in which the data occupies at least one third of the range shown on the axis
 - one error is allowed out of every 5 points plotted.

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 do so this year led to some teachers arriving at an incorrect total mark.

3.4.3 Stage 3

(a) Taking the ISA test

The final stage involves candidates taking the ISA test. Some centres treated this as a normal examination and used the examination hall. Other centres who felt that it was manageable carried out the tests in the normal teaching room. Either approach is acceptable.

All of the standard procedures for access arrangements that apply to written examinations are available for the ISA. These include the provision of extra time, the use of a scribe and the use of a reader.

Moderators reported that in some cases there was evidence that candidates who had difficulty in writing had not been provided with the services of a scribe. Centres are encouraged to use this provision where it is appropriate.

(b) Marking the ISA test

AQA provides teachers with marking guidelines for each ISA test. Teachers are required to use their professional judgement in marking the test, which 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, to put a tick in the body of the script for every mark awarded, and to enter a subtotal in the margin. However, many teachers adopted a different policy. If they felt that the candidate's answer was correct, they circled one mark and if they felt that it was incorrect they made no mark at all. This often left moderators wondering whether or not the teacher had actually read the answer.

(c) Annotation

The marking guidelines suggest typical answers that a candidate may provide. However, if a candidate provides an answer that, in the judgement of the teacher correctly answers the question, then the teacher should award the mark. In such cases the teacher should provide annotation, either to the ISA, the marking guidelines or both, to indicate the reasons for the judgement.

The level of annotation on the scripts varied greatly. It is a 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.

4. Administrative matters

Last year only about 840 centres requested moderation. The reason for this was that there was no need to submit for moderation last year unless the centre required certification in 2007. This year about 3000 centres applied for moderation.

A few centres were very late in applying for moderation. Usually this was because they had not realised that applying for a subject award does not automatically mean that the Centre Assessed Unit will be moderated. A separate code needs to be submitted to request moderation.

Moderators have reported that although a few teachers were either slightly severe or rather lenient in their interpretation of the mark guidance, the majority were within tolerance. The tolerance on this component is ± 2 out of 40. Few centres exceeded tolerance compared to Sc1.

5. Submission of work to the moderator

This year, instead of being asked to submit a rank order list, centres were asked to circle the candidate with the highest score and the candidate with the lowest non-zero score, on the Centre Mark Forms. This makes it much easier for the moderator to make the selection of candidates for the sample. Many centres unfortunately failed to do this. Although it is no longer a requirement, if centres can easily provide a rank order list, this is much appreciated by the moderators.

When submitting the work to the moderator, a completed copy of the Candidate Record Form should be stapled to the front of each ISA. This form should be signed by both the teacher and the candidate. Failure to obtain the candidate's signature can severely delay the moderation process and could potentially result in that candidate receiving a mark of zero for this unit. This year rather fewer centres had to be contacted in order to obtain candidate signatures. Centres are advised to get the candidate to sign the Candidate Record Form at the same time that they complete the ISA test.

The graph/bar chart and the table(s) of results for each candidate should be **stapled to the back** of the ISA test. **Candidates' work should not be enclosed in plastic wallets or folders.**

6. Common errors

Section 1 of the ISA

This section contains questions concerning the candidate's own investigation.

Most of the ISAs start with a question that asks the candidates what they were trying to find out. Candidates should be very clear about firstly, what they were deliberately changing and secondly, what outcome they were going to measure or observe. Vague statements such as I was trying to find out something about photosynthesis will not gain any marks.

Towards the end of Section 1 on most ISAs there is a question that asks the candidates what they found out. What we are generally looking for here is a conclusion, and not simply a

restatement of the results. Again, vague statements such as I found out how viscosity changes with temperature will not gain any marks.

Tables

Blank tables, suitable for the collection of data, must be drawn and marked before the practical work begins. In some cases centres had then returned these blank tables to the candidates for them to use during the practical work. This is acceptable providing that the teacher annotates the table to say that this is what has occurred. If no such annotation exists, the moderator cannot tell whether, for example, units have been put in by the candidate before or after the table has been marked.

Graphs and charts

Generally these were done well, although in a few cases centres had allowed their candidates to use ordinary lined paper instead of graph paper.

Candidates should use a sensible scale that maximises the available space whilst still providing an easy to interpret interval. Although there are occasions when it is desirable or even essential to show the origin, in many cases it is not. Candidates should therefore not be penalised for not showing the origin if it is not essential.

If the variables are continuous, then the most appropriate method of display is a line graph. In the vast majority of cases, a line of best fit or trend line is the most appropriate line to draw. In GCSE Science AQA has always asked centres to instruct candidates to use a line of best fit rather than dot to dot lines. The new ISAs are no different.

However, the Institute of Biology expresses the view that in certain circumstances a dot-to-dot line is the most appropriate. Candidates should not be penalised if, in the professional opinion of the teacher and in that particular case, the joining of dot-to-dot is appropriate in biological experiments. If this is the case then the work should be annotated to that effect.

Section 2 of the ISA

This section contains questions on data, provided by AQA, on the same topic area as the candidates' investigation.

In this section there is always one question which contains the Quality of Written Communication (QWC) mark. There is always a statement within the rubric that alerts the candidate to this. In several centres, teachers had failed to indicate whether they had awarded this mark or not. In addition to the marks for the science within the question, teachers should indicate that they have considered the QWC mark by putting a Q✓ or a Q× somewhere within the script. In this way moderators know that the mark has been considered.

7. 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.