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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Applied Science 8771/8773/8776/8779

SC03 Finding out about Substances

Report on the Examination

2007 examination - June series

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General Comments – June 2007 Series

The entry for the specification has continued to grow and centres have continued to successfully guide students to achieve well at AS level. Due credit should be given to both teachers and students in making every effort to meet the requirements of the specification, producing portfolios – in many areas - of a commendable standard of content, approach and presentation. Centre administration overall has been good. However a number of centres were very late in sending initial documentation to moderators and in sending requested samples. A number of centres failed to fully complete candidate record forms, missing candidate names and numbers makes recognition of work very difficult and leads to frustration and the potential for mis-allocation of marks.

The AS Units – SC01, SC03, SC04 and SC06

There are still a number of centres that seem to have failed to appreciate that Units 1, 3, 4 and 6 are targeted at AS level and have used assignments that are insufficiently challenging for students, sometimes below their capabilities. Activities set at a limited level of challenge can restrict access to marks from the higher mark bands because students find difficulty matching the work to the areas required in the assessment criteria. Some centres are using assignments, (some of which may be from published schemes), that may be too challenging for candidates at this level and less able candidates may find difficulty accessing the work.

AS builds on the work students are likely to have completed at GCSE level. Students will be at different levels of competence and understanding and centres should aim to build on student knowledge, capabilities, and interests. The most appropriate school and local facilities should be used to extend GCSE work to AS level. As an AS award, students need to be challenged but if the step is too great then students' learning will be made more difficult. The level of demand of an activity affects the level of response from students. It is important to match tasks with student capabilities so that they can access work and gain marks in an appropriate mark band. There is a balance to be struck between work that is sufficiently challenging to be interesting and that which is too challenging which can create barriers to progress. Many centres get this right, knowing their students well, understanding what the specification requires and providing assignments which match both.

It is very important that centres guide students on portfolio construction, leaving opportunity for student flair and individuality. Portfolios should be monitored during production to see how they are developing. Some centres continue to produce unreasonably large portfolios running to over 300 pages. These are really too large and represent an unreasonable amount of candidate effort. It also shows some lack of skill on the part of the student in selecting the most appropriate material to include; and inappropriate guidance by the centre in allowing the student to produce so much work. At the other end of the scale, some candidates submitted work that was very poorly organised making moderation difficult, and some portfolios were very short containing little of the unit requirements, thus not allowing candidates the opportunity to gain high marks.

Centres need to consider the assessment and moderation of candidates work during portfolio construction. AQA does not set out any requirements for portfolio construction: this is a matter for the centre and student to decide. However the portfolio is being produced to meet the requirements of the unit specification and those of the assessment grids. In order to award marks, it is much easier if the portfolio is structured in a way that matches the unit structure, allowing assessors and moderators to work through a portfolio and the matching assessment grid simultaneously. It is hoped that the specification will inspire individuality of content and style of approach but, eventually, all portfolios are assessed against the same assessment

criteria. Students and assessors should ensure that there are references in the portfolio to all banner requirements and all areas in the assessment grids. The more closely the work matches the assessment grid, the higher the mark. The level of response and the level of understanding, degree of autonomy and practical capability and the quality of descriptive accounts shown will allow candidates to be awarded marks from the higher mark bands. In order to substantiate marks, especially from the higher mark bands, it is very helpful if assessors add explanatory comments to the CRF, or on any other suitable document, to describe the candidates' levels of practical skills, awareness of safety procedures and degree of autonomy – especially in the areas marked # in the assessment grids.

Whilst guidance through units is important for students, too much guidance, exemplified by all students doing the same activity, obtaining the same results and doing the same calculations, suggests over prescription of activities. Allowing students to show autonomy in their working does not mean leaving them to do it alone: there is a middle way, helping students where they need help, and allowing them freedom whilst monitoring their work and providing appropriate guidance and feed-back to allow them to gain the higher marks. It is important that centre tutors ensure that unit delivery programmes cover unit specification requirements and that candidates are fully aware of what they should include in portfolios to gain marks. There are still a significant number of centres that produce portfolios with content that does not match what is required; often including too much material, or material that is outside the brief for the unit, or targeted at too low a level for AS or A2 awards.

As stressed at AQA training and standardising meetings, in communications sent to centres and in last year's Principal Moderators report, it is imperative that centres make it very clear to candidates that the incorporation of text downloaded from the internet into portfolios is plagiarism and must not be tolerated. Portfolios are intended to be candidates' original work. The assembly of a portfolio by simply downloading material and cutting and pasting it together is not acceptable. It is expected that students will use the internet but they should use it as a resource from which they construct their own portfolios by reading, understanding and re-working what they have found to suit their purpose. Students may find it helpful to download and use in their portfolios sets of data, photographs, diagrams and other similar items to support their work and this is not a problem. It is the unedited use of downloaded text in portfolios, credited as student work, which is unacceptable. If centres fail to identify this during monitoring and final assessment their entry could possibly be referred to AQA malpractice, with the result that marks are likely to be significantly reduced or even discredited altogether. Moderators are experienced teachers and read many portfolios, they know candidate capabilities, they know websites, they can recognise text content where changes in styles of writing are at variance with candidates own text, and will react by taking appropriate action. Centre assessors must work with the same vigilance. This year a number of centres were referred to the AQA malpractice unit by moderators and candidate marks were significantly reduced as a result.

Whilst studying the entire suite of units and considering the externally marked assignments at the awarding meeting in July, it became apparent that there appears to be a common area where candidates are showing a need for development of skills. This is the area of experimental design. Candidates appear to show signs of weakness in designing experiments to meet a particular need – for example, to find the refractive index of glass or to test the effect of different treatments on seed growth. Some candidates appear to find difficulty putting together a method that is appropriate for investigating the chosen aspect and then carrying this out in a way that will produce a sufficient number of readings at an appropriate level of accuracy to provide a meaningful set of results. Many students produce results at a low level of basic observational detail – for example simple mass losses or observation of mould or bacteriological growth in Unit 4. Some students do not collect sufficient numerical data to process and undertake critical analysis of their results. Some, when analysing or processing data, do not do this clearly, do not draw the most appropriate form of graph or may not draw appropriate conclusions from the evidence they have before them. Centres are alerted to the mark

distribution in the portfolio requirements of units on page 30 of the current specification. AO3 (Experimentation and Investigation) makes up 43.3% of the marks for the entire award. In all portfolio units, apart from Unit 1, from which AO3 is absent, AO3 can contribute up to 2/3 of the marks of the unit. Whilst the theoretical component of the portfolio is an essential part – since it provides the background knowledge and reasoning – it should be noted that the design, carrying out, concluding and evaluation of the investigatory practical work is a high scoring part of the award and should receive an appropriate amount of attention and level of treatment – commensurate with the work of AS or A2 level study.

Administratively, most centres managed to send mark sheets (or sets of portfolios if 10 candidates or fewer) in good time. However some centres were very late, making life more difficult for everybody concerned, including themselves. A number of centres forgot to include Centre Declaration Sheets and a significant minority forgot to send Candidate Record Forms signed by the candidate; some of these also had the candidate name or number missing which again makes finding work more difficult as both are needed for checking. Some centres still use plastic wallets or polypockets and these should be avoided as they are time consuming and frustrating for moderators. The best way to submit final portfolio work is to use double or single treasury tags to secure portfolio pages with the Candidate Record Form and any centre assessment documents at the front. Centres may choose to keep work-in-progress in any way they find most appropriate.

Unit 3 – Finding out about Substances

Again, as last year, most centres made good efforts with this unit. Centres are reminded of the need to tackle 5 pieces of work, the 4 analyses, and the enthalpy of combustion determination. A number of centres did not attempt all 5 activities and this automatically reduced the marks available. A number of centres guided students to carry out more than 5 activities, whilst these may be interesting and teachers may wish to include these as a part of their teaching programme, if they have time, it is not a requirement of the unit and such additional work may very well detract from student effort in the required areas of this or other units and thus reduce their marks. Centre assessors should read the unit specification and its assessment requirements carefully and guide students to study these to an appropriate depth, remembering it is an AS unit. Students stand a better chance of gaining higher marks by fully covering the unit requirements, than by going outside it with work that cannot be given credit.

Ideally, for each analysis, students should learn standard procedures and then use them for another purpose. Simply carrying out the analyses on known substances to see what the result is, is only half of the idea. Students should go on to identify unknowns as appropriate. Students should consider where different types of analysis are appropriate and where their results have limitations – such as inorganic analysis, maybe flame tests, or carbonate tests with acid, these only show what is there, not how much of it there is. They should also find out where these tests are put to use in the work-place. As pointed out in Unit 1 some centres sensibly linked aspects of these 2 units together, learning about techniques in Unit 3 and seeing them in action in Unit 1, putting the learning in the context of the working environment. Some centres approached this work through the context of a burglary where evidence had to be collected and samples identified or muddled compounds that needed identifying. An approach which researched the composition of eggs was interesting, but it leads to the use of back-titrations and which is too involved for some students to understand and successfully to analyse their results.

Some centres carried out too many chromatography analyses and others failed to make adequate conclusions from colorimetry work. Most centres carried out enthalpy of combustion investigations but some limited this to the use of practically obtained data to calculate the energy yield per gram or mole of fuel. To gain the highest marks it is expected that candidates

will calculate the theoretical energy yield using bond energy values and relate this to their own values obtained practically. This year, as last year, a number of centres misinterpreted the unit requirements by carrying out work on the enthalpy of neutralisation or displacement. This caused problems at moderation since the unit requirements had not been properly met thus limiting candidates' opportunity to gain high marks.

There are still many centres whose candidates seem insufficiently aware of the levels of precision required in this unit. Here, parity with other GCE science qualifications is expected so that burette readings, for instance, should be recorded to an accuracy +/- 0.05. Concordant titres are expected and means should not be calculated using any additional non-concordant values. Full sets of readings are expected, suitably tabulated, and this would always include initial and final burette readings. It is important that students are trained well at this level to have an appreciation of the errors associated with readings taken with different pieces of apparatus and their effect on the final calculated experimental value. This will then aid their evaluations where both qualitative and quantitative errors should be considered.
Where candidates carry out analyses or calculations it would be very helpful if assessors could indicate that the analysis findings and calculations are correct. In some cases moderators do not know what should have been identified. Equally useful, would be the inclusion of expected or target values in order that the accuracy of the candidate's practical work can be assessed.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.