



## **General Certificate of Education**

### **Applied Science**

**8771/8773/8776/8777/8779**

**SC01      Investigating Science at Work**

## **Report on the Examination**

*2010 examination - June series*

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## General Comments

The number of candidates entered has again increased this year *for many units* and many centres have continued to guide candidates to achieve well. The award has generated much high quality work from centres. Credit should be given to both teachers and candidates in making every effort to meet the requirements of the award, producing portfolios, many of which demonstrated a commendable standard of content, approach and presentation. The centre accreditation scheme currently numbers 94 centres at AS and 26 centres at A2 level and random sampling of these centres has again confirmed the value of the process – with centre marking being confirmed as in line with AQA standards in the vast majority of cases, but with a small number showing some “slippage” with marks going out of tolerance leading to loss of accreditation.

## Portfolio issues

Portfolio construction remains a concern for some candidates, and it is evident that better centre guidance is required in some cases. However, it is very important that centres provide the opportunity for candidates to demonstrate flair and individuality. It is easier for moderation if portfolio structure matches the structure of the unit. Centres are also advised to monitor portfolios during production to identify “cut and paste” styles of working early and to ensure approaches are appropriate. Some centres correctly down-marked candidates’ final portfolio marks due to inappropriately including cut and paste or copied work – but early identification and correction of such work could have avoided these final mark reductions. Other centres missed the inclusion of un-reworded downloads and these were dealt with appropriately by moderators, with most instances resulting in portfolio marks falling out of tolerance, a situation which unfortunately affects the entire entry for that unit. It is essential that these situations are dealt with at centre level before submission of marks in order that all candidates are treated fairly.

Some candidates continue to produce unreasonably large portfolios and it is rare for such portfolios not to include irrelevant material or be repetitive or, indeed, to have omitted some areas that would benefit from additional time and consideration.

For some units, it appears that the levels of expectation of the quality of portfolio content and/or the outcomes that candidates are allowed to produce are set too low. A number of centres are still judged to have marked candidates work too generously and where this was the case, marks were reduced and fell out of tolerance.

Some of the causes of over-generous marking included:

- Misinterpretation of the requirements of unit
- Too much work on non-essential areas and/or too little on required aspects
- Failure to fully complete fundamental aspects of the unit as required in the “Banner”
- Over-lenient interpretation of the assessment grids
- Failure to appreciate that high scores are likely to equate to “A” grade which means very good work in all areas of a unit – marks allocated to students should be matched to the track record and overall ability of students to ensure they are justified. Weak students gaining uncharacteristically high grades could indicate lenient marking.
- Lack of rigour in marking/assessment of work – incorrect science accepted, incorrect calculations marked as correct, incorrect statements accepted, praise for work which is of poor quality, marks allocated for work for which there is no evidence – or no supporting teacher comment (# in the assessment grids).

- The inclusion of materials directly down-loaded from the internet – such work should be awarded NO MARKS as original student work.
- Weak candidate skills in practical activities leading to a lack of precision and unreliability as evidenced in results, but high marks awarded.
- A lack of description by the centre assessor of each candidate's level of practical skills, their awareness of safety procedures and degree of autonomy (marked # in the assessment grids) and resulting inconsistencies between the marks awarded and the portfolio evidence.
- Many units require the use of risk assessments, and whilst many candidates include these, centre assessors are frequently over-generous in their allocation of marks in this area. The following are examples of where candidates are insufficiently accurate or specific and where marking is lenient.
  - Where solutions are used, the concentration is important and this can significantly affect the hazard and subsequent risk factors.
  - Where compounds or solutions are used, it is inappropriate simply to refer to and use the elemental form of the cation component of a compound – sodium has quite a different hazard rating to sodium chloride!
  - Common sense and an understanding of science should be applied when judging risk. Candidates should consider what are the real and sensible hazards and risks and then relate these to the actual compounds used at the concentrations involved as appropriate.

2010 was the first year for Quality of Written Communication (QWC) to feature in all portfolio units. The criteria appear in AO1 of Sc01 and AO3(ii) for all other units. Whilst appearing in particular assessment objectives, the intention is for the QWC statements to be applied across the entire portfolio. As explained at teacher standardising meetings, the intention was that QWC would consist of a cluster of criteria within each mark band and would generally be in line with other criteria at the level in question. As such there would be little change to existing standards. This has proved to be the case and only in a minority of instances did marks move up or down due to QWC alone. It was generally clear that centres had taken into consideration the QWC elements in their assessments. Unfortunately a minority of centres have continued to use the older criteria where QWC statements are not included and all centres are advised that they should be using the correct assessment grids.

Centres are reminded that many issues and points of guidance made in the 2008 and 2009 examination reports are still valid and these remain valuable sources of information.

## SC01

Some centres continue to allow candidates to include inappropriate organisations in the summary. The aim should be to include organisations that manufacture or process scientific products for sale and or provide a scientific service. Some centres also allow candidates to study inappropriate single organisations where there are no scientifically qualified staff, and few, if any, scientific processes used. In such cases, candidates inevitably find it difficult to access the higher mark bands. To include an organisation in the summary or as the chosen organisation to study because it uses cleaning products – the justification being that it uses chemicals which are “scientific” – is not appropriate. The appropriate choice would be the organisation which makes the cleaning products.

A significant number of candidates rely on a single source of information for their in depth study, again falling short of both the depth and breadth of evidence required to reach the higher mark bands.

### The Survey and Summary

The high scoring portfolios addressed the required areas of the assessment grids well.

Portfolio evidence should include:

- A good range of research methods made explicit and actually used to locate information about scientific organisations.
- Well processed and well used information which has been sourced from internet research and other sources.
- An appropriate number of organisations in the summary – around 20 have been advised but the exact number is not a requirement.
- Appropriate local science based organisations only are included in the summary. Inappropriate organisations such as hairdressers, petrol forecourts, plumbers and retail outlets do not feature.
- Summaries that provide sufficient information including the name and location of the organisation, the product or service it supplies, the size of the organisation, the science used by the employed scientists. Any other small amount of essential information that is judged to be important may be included. (A local area map may be included to show the distribution of science based organisations in the locality.) Global, international or non-local companies do not feature. Local science based branches which employ scientists are appropriate, but head offices are generally not since they are unlikely to undertake the scientific work of service or production.

### The in-depth study of a single organisation

Centres should note that the requirement is to study ONE organisation in depth. Published sources advising the study of 4 or 5 organisations in more detail than the summary are incorrect for this unit. This unit also does not require practical laboratory work; to include such work will gain no further marks and uses valuable candidate time and effort on non-essential work.

High scoring portfolios generally followed the following pattern:

- The selection of an appropriate organisation (here, appropriate means that it offers opportunities to address all the required assessment criteria to a high level – and therefore will require the choice of a clearly science based organisation, which employs a number of scientifically qualified staff.)
- Comprehensive research using a combination of methods.

- Comprehensive research into the nature of the work and scientific processes used. Examples of organisations that have proved particularly successful this year included opticians, vets, dentists, hospital departments (e.g. radiology), breweries, water companies (especially if including analytical services), zoos, power stations, although there are many other options. Choice of huge organisations such as the NHS, Glaxo-Smith Klein (globally) are too large for students to manage.
- Descriptions of the skills and qualifications of scientifically qualified staff – linked to the scientific processes, roles and responsibilities within the company.
- An account of how ICT is used – again linked to the scientific products, processes, services and skills of the employees. [Good portfolios seen often had an excellent section on computer monitoring, feedback and control with good pictorial or diagrammatic information to substantiate explanations. For analytical work, the use of computer or robotic control, electronic data analysis, etc can also be discussed]
- How health and safety is applied, including specific links to the scientific processes and examples of risk assessments used. Photographic evidence from a visit of specific instances where health and safety is applied has been used to good effect. The work on health and safety follows directly from a complete consideration of the guidelines (legislation) relevant to the company, applied consistently and used to illustrate the constraints they place on the work of the organisation.
- Commercial and legal constraints under which the company operates were considered in detail. A consideration of funding, investment, competition, quality assurance, responsibilities to comply with Government Agency requirements, FSA, OfWAT, NICE, ISO, Government targets, Customs and Excise, etc, etc as appropriate.
- A full consideration of impacts on the community using the guidelines set out in the Specification.

In addition candidate autonomy and the structure and clarity of the portfolio must be included in assessments since Quality of Written Communication (QWC) is a part of the AO1 assessment criteria.

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

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