



General Certificate of Education

Applied Science

8771/8773/8776/8777/8779

**SC16 Ecology, Conservation and
Recycling**

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.

SC16

This continues to be a popular unit. Candidates need to make considerable efforts to gain high marks since they are required to learn and apply knowledge in a wide area and use a variety of techniques and approaches. Many centres made use of field work led by a study centre and others preferred to use work led by the class teacher. Some outstanding work was seen in the ecological survey where highly achieving candidates had visited an appropriate environment, maybe a sea-shore or stream, and had used random quadrats or a line transect in or across a suitable area together with other suitable survey techniques – which were clearly explained - to sample the populations of organisms. Physical (abiotic) features of the environment were measured, light/wind/speed/temperatures/water depth/speed of flow etc. All this data was tabulated and displayed so that comparisons of distributions could be made and possible links established.

Some candidates demonstrated problems in their portfolios, the most significant being:

- Where the ecology section is lead by a field study centre, there is a need for some discussion with the field study centre leaders in order that the work is more clearly targeted towards specification requirements.
- The production of produced ecological surveys from too many different habitats and subsequently had too much data which was not analysed effectively – one habitat, done well, is sufficient. The important aspect is to relate the distribution of organisms to the abiotic and biotic features of the habitat studied. There is no need to study woodland and fresh water environments for example. Better to study – perhaps shaded and exposed areas of woodland or grassland; or sheltered and exposed shorelines; i.e. A habitat where it is possible to investigate or link distributions of organisms to environmental conditions or features. This work allowing access to marks in AO1 and AO3.
- An infrequent use of capture/recapture techniques, whilst the technique can be learned using coloured beads or Smarties this does not constitute applying the technique to estimate the population of an organism in a particular habitat. This technique applied correctly and/or the use of other methods for estimations of population size, for instance using data collected by random quadrat techniques, would allow access to marks in mark band 3 or 4 in AO3 (i).
- In the use of exemplar food chains and webs where there was a range of skills shown. Some candidates worked out a very large number of food chains making up a large part of the portfolio, which is un-necessary, and some included inappropriate organisms, which is incorrect. The idea is to construct food chains using the organisms found in the environment as a basis: it may be necessary to supplement current survey data with appropriate data from secondary sources to complete a “picture”. (In this section some very good work was seen where candidates counted and weighed organisms and then used this data to construct not only food chains and webs but pyramids of biomass too). This was followed by correct explanations of principles of energy flow in the environment. This could allow access to marks in AO1 from mark bands 3 and 4 and AO3(ii)
- Having collected a significant amount of data on an environment, some candidates did very little with the results. The key idea behind the ecological survey is to find out what the habitat is like using physical measurements, find out what lives there and where it lives in the habitat, then try to relate the distribution of organisms to the physical measurements, allowing access to mark bands 3 and 4 in AO3(i)

- The production of large numbers of charts or diagrams displaying results, with different scales, some were un-necessary and because it was difficult to compare this displayed data visually it was of little use. In the display of ecological data it is usual to make use of “kite-diagrams” or bar charts showing distributions of several organisms simultaneously – often linked to physical features of the environment. A useful technique is to use transparent overlays which allows visual match of data on charts or graphs which use the same scales. The collection and display of data will give access to marks in AO3(i) and (ii) and the analysis, discussion and explanation of findings draws marks from AO3(ii). Some candidates produced display material on huge sellotaped pieces of paper or “fan-fold” diagrams of many pages. These are very time consuming to produce and difficult to manage subsequently. Centres are advised to consider very carefully the best ways to display findings to secure maximum benefit in use and that require only appropriate time and energy for production.
- Requiring study of the ecology section in late November, January or February. Pictures of candidates undertaking freshwater ecology surrounded by snow shows some lack of appreciation of life-styles of organisms and some lack of consideration for candidates – ecology is best undertaken in the late Spring, Summer or early Autumn terms when weather is likely to be more motivating for students to work, be more enjoyable and more importantly, organisms are around to see.

Many candidates made good choices of areas to study for the conservation activity such as sand dune erosion by site visitors, conservation of river quality by re-instating natural banks or recovery of meadows by organic farming. Some candidates chose “global warming” as a result of humans “burning fossil fuels”, or the destruction of rain forests as a result of a human “agricultural production system” or “mining”. Whilst these topics clearly fit the specification some approaches were very general. The aim of this section of the unit is to encourage candidates to learn the principle issues behind human impact on the environment through different activities and then go on to look at what this activity is doing to named organisms in a named habitat. This aspect and references to the underlying science behind this impact should also be included – this is where many candidates have areas of evidence missing. This should be followed by steps or measures being taken to limit or rectify the damage that has been caused and, if possible, describe any evidence of improvement of action taken so far. Candidates addressing these areas well should be able to access marks in AO2 in mark bands 3 or 4.

Candidates overall made good efforts with the study of the recycling of a **particular** material, giving general details for all refuse for their local authority. This was often linked to government targets, followed by research into the recycling of a chosen material (sometimes glass, paper or aluminium). As in previous years, few candidates seemed to choose oil. Many candidates gave some ideas of the scale of the recycling undertaken and some background to the processing. Not many candidates gave much detail about the science behind the recycling process of the chosen material. As this is a requirement for the award of marks in mark bands 3 or 4 in AO2 it is an area to target in future. As with the conservation section the idea is to, “think global – act local”, to know the overriding principles and then look in detail at some specific area – to know what actually happens to cans, bottles, compost or oil. Some excellent work on the recycling of aluminium was seen where candidates provided pictorial evidence of the entire route followed by an aluminium can supported by the scientific basis of processing recycled aluminium and the environmental and economic impacts of the process. Some work on the recycling of paper was occasionally limited to little more than cartoon style diagrams cut and pasted from web-sites. This is insufficient to demonstrate knowledge and understanding of the recycling of paper and so could limit the award of marks in AO2 for this aspect to mark bands 1 or 2.

Mark Ranges and Award of Grades

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