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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Applied Science 8771/8773/8776/8777/8779

SC12 The Actions and Development of Medicines

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.

SC12

This is a well established unit in a number of centres and some excellent portfolios demonstrating an almost complete coverage of the specification requirements were in evidence. Whilst there are some areas of study which might still be improved, even for high scoring portfolios, candidates were generally able to access most of the assessment objectives. The choice of the two medicines for each of the three required areas – action and development, chemical analysis and bioassays – remains a key decision for centres, as it is essential that these choices allow candidates easy access to (researched) materials that provide a detailed basis for study of all the required elements.

High scoring portfolios showed good coverage of the types of medicine chosen, the action of the medicines and their modes of administration and sites of action. Formulations were less well considered and many candidates, and, indeed, some centres, seem to misunderstand what is required here – i.e. what is in a tablet or medicine in other prepared formats.

The sections on development, testing and licensing were variable, with those who chose, say, Aspirin and Penicillin, sometimes struggling to include up to date scientific ideas in these respects and to relate those ideas specifically to the medicines in question. Those who selected medicines which have a more recent development phase fared better in this area of study. Similarly, those who were able to relate specifically the ideas of clinical trials, ethical issues and the roles and responsibilities of manufacturers and regulatory authorities to the two medicines in question were able to access the higher mark bands more readily.
In the practical work, there was evidence of careful, accurate and reliable analyses and bioassays by many candidates, but with a significant number whose marks were limited by poor recording of data, a lack of precision and clearly inaccurate and unreliable results.

Where portfolios had omissions or weaker areas, they most often appeared in the following areas and with the effects noted:

- Incomplete coverage of the required elements of study (e.g. formulations): limits marks in AO1.
- A lack of detail in the scientific basis for the actions of the medicines, formulations, methods of administration and roles and responsibilities: limits marks in AO1
- Research into suitable methods for the analyses and bioassays not made explicit and justifications for the methods selected weak or absent: limits marks in AO1
- A lack of detailed scientific evidence supporting the consideration of ethical issues and/or roles and responsibilities of manufacturers: restricts marks in AO2
- A poor choice of concentrations for standard solutions used in the chemical analyses leading to very small and thus inaccurate titres: restricts marks in AO3(i)
- Unsound scientific justifications and evaluations for the analytical method(s) selected (e.g. for Aspirin) when more accurate methods have been researched, are documented within portfolios, and are appropriate for school laboratories: limits marks in AO1
- Incomplete raw data, imprecise recording of data, lack of correct units: restricts marks in AO3(i)
- Non-concordant titres: limits marks available for skilful working in AO3(i)
- Unreliable bioassay results through a lack of measuring zones across several diameters and in not repeating tests for each dilution: restricts marks in AO3(i)

- Incomplete and/or inaccurate risk assessments: limits marks in AO3(ii) [NOTE: the use of potential pathogens by candidates should be carefully considered. Risk assessments should fully reflect organisms used and if there are potential risks, alternative organisms should be used. Centres are advised to consult the list of micro-organisms approved for use in schools if in doubt.]
- Evaluations that were limited and failed to consider the data obtained and explain obvious anomalies and unreliable results: this is frequently a weak area across a wide range of portfolios and is often over-marked by centres. Many evaluations seen fail to reach standards beyond MB1 or MB2!

Mark Ranges and Award of Grades

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