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Staff room

New GCE AS/A−level Cores

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Trevor Easingwood, C.Math. FIMA
Honorary Treasurer, Chair of Education Committee

New cores for all subjects at AS− and A−levels are being introduced into syllabuses which will be taught from September 1998. The first output of students with A−levels which incorporate the new core requirements will be in the summer of 2000. This paper outlines the main features of the new specifications.

Introduction and Background Information

A "core" for Mathematics at GCE Advanced level was first agreed in 1983. The benefits attributed to subject cores included:

- providing a degree of commonality between A−level syllabuses;
- helping to ensure comparable standards between the various examining boards;
- enabling higher education and employers to have an idea of the scope and content of Advanced level studies.

The Advanced Supplementary (AS) level examination was subsequently introduced and examined first in 1989. The AS was designed to be at the same standard as an A−level but requiring only half the study time. This arrangement has subsequently been described as a "vertical" AS. Between 1991 and 1995 A and AS cores were developed in 19 subjects. The Mathematics core was rewritten in 1993 [1] to accommodate AS− as well as A−level. Syllabuses based on the 1993 Mathematics core were examined for the first time in the summer of 1996.

In his review of qualifications for 16−19 year olds, [2] Sir Ron Dearing acknowledged that the AS had not been as successful as had been hoped at its inception. Take−up has remained low (and indeed latterly has actually declined in Mathematics). The AS represents a sizeable part of the core of the A−level and it has generally been found to be relatively more demanding for many learners. Few schools offer more than two subjects at AS−level. It has therefore failed to achieve its main purpose of increasing breadth of study in post−16 education.

Sir Ron's review found support for a reformulated AS which will be economic to teach, which should reduce student wastage rates and which will encourage breadth of study. Instead of covering half the A−level syllabus in the same depth, the new AS (re−named the Advanced Subsidiary) will cover the syllabus content in the breadth and depth "appropriate to one year's study post−GCSE". For full−time A−level courses organised conventionally over two years, the AS will normally be the first year's work. The AS− and A−level will then be co−teachable. The A−level course must fully incorporate the AS, and the AS will be graded on an A−E scale like the A−level. The reformulated AS has been described as a "horizontal" structure.

This redefinition of AS presents a semantic problem regarding its "standard", for higher education recruiters. The new AS will clearly be at a standard between GCSE and A−level, whereas the old AS was intended to be at the same standard as A−level (albeit with only half the content). To reflect this positioning of the new AS, the modules which constitute the AS component will be weighted as only 40% of the total marks towards a full A−level. However, for UCAS points tariff purposes, Sir Ron has recommended that the new AS should count as half a full A−level.

The Secretary of State accepted Sir Ron's recommendations. Consequently the School Curriculum and Assessment Authority (SCAA) has undertaken a review of all the subject cores in order to ensure that each AS core is appropriate for its revised role. At the same time as looking at the AS, the existing A−Level core has also been reconsidered to ensure appropriate progression from the AS component to the full A−level.

Many associations have objected to this process both because of the speed with which this important task has had to be undertaken, and also on the grounds that the previous A−level core has only been examined for the first time in 1996, so that further changes will be introduced too soon. The drafting of the revised core and opportunity to comment were constrained within the period from late September to the end of November 1996, so that the 'consultation' left much to be desired. However, the new Mathematics core was agreed by the Secretary of State in February; the examining boards have to submit first drafts of revised syllabuses and specimen examination papers to SCAA by early June; teaching on the new syllabuses will be from September 1998 and the first A−level output based on these will be in summer 2000. A−levels and AS−levels in Further Mathematics will continue to be available.

The Main Features of the Revised Cores

The document [3] runs to 18 pages and anyone needing the details of the proposals should write to SCAA for a copy. The summary which follows represents the author's views of the key features and changes.

Aims

Surprisingly, the earlier versions of the cores did not contain anything specifically about the aims of AS/A courses in Mathematics. The new core lists 10 aims, which state important attributes which students should be encouraged to achieve during their studies.

Key skills

Students in all subjects are expected to develop their skills in the three areas of communication, application of number, and information technology, where these support the acquisition of subject knowledge.

Mathematical content

Content in specified in greater detail than in the 1993 core. This should be helpful to clarify to examining boards what has to be included in all syllabuses, and for higher education tutors to understand what all

students should have covered. There is also more material than previously. The AS core is expected to represent 50% of the total content for the AS and similarly the A−level core will be 50% of the A−level. Some commentators believe that the specified content may represent slightly more than 50% of what many students can satisfactorily learn in the teaching time typically available in schools and colleges.

Sections on Proof (for AS and A) and Vectors (for A only) are included. However, the existing section on the "Mathematics of Uncertainty" has been removed. This was a controversial section in 1993. It fits uneasily within an otherwise "Pure" set of topics, and it overlaps with material contained in Statistics modules.

Technology−free component of assessment

At least 25% of the assessment at both AS− and A−levels will have to be undertaken without the use of any technological aids. This is intended to counter concerns that many candidates are over−reliant on calculators. However, in practice, it is possible that this will distort the way in which topics are distributed between different modules and/or result in less satisfactory examination questions in topics such as trigonometry and numerical methods.

Restricted formulae lists

Certain "basic" formulae, which students should commit to memory, have been listed and these will be debarred from formulae booklets provided by the examining boards for examinations. This is a response to complaints that some students are too dependant on having to look up simple formulae which they really ought to know and which they should be able to recall. Additionally the examining boards are collaborating over the production of a "national" set of formulae and statistical tables which candidates will have available in the examinations. This is to standardise the different types of formulae booklets in current usage.

Background knowledge

Students embarking on the AS/A−level in Mathematics will usually be expected to have achieved a minimum of a grade C at GCSE. Those who obtain such a grade via the Intermediate tier of the GCSE frequently have severe shortcomings, especially with basic algebra. In order to clarify what students with this type of entry level are expected to know, a list of "background knowledge" is specified. It is likely that many students will need to acquire or consolidate their knowledge of some of these topics during their AS/A−level course. The intention is that the material which is listed will not have to be tested by questions focused directly on it. However, it may be tested coincidentally within more advanced work.

Applications

Most examining boards provide AS/A−level syllabuses in subjects such as "Pure Mathematics" and "Statistics". However, to be called "Mathematics", the syllabus must contain at least one "application" area, usually Mechanics and/or Statistics. This principle remains, although the revised requirement is that the application must occupy at least 25% of the total teaching time. This is to give boards some flexibility with syllabus design, given that the core will now occupy a full 50% of the total programme. In practice, it is expected that most syllabuses will continue to require between a third and a half of study time to be devoted to applications.

Assessment Objectives

The 1993 core contained five "skills and assessment objectives" which had to be recognised in all AS/A−level courses. Only the first three were compulsory; assessment objectives 4 and 5 were to be "strongly encouraged". The five objectives remain in the new core, subject to fairly minor word changes. However,

each of the objectives now has a range of relative weightings, to which all syllabuses must conform. This will put greater pressure on the examining boards to include the previously optional assessment components. These are to be "read critically and comprehend a mathematical argument..." (though its weighting must be in the range from 0−8% of the total!) and to "appreciate how to use appropriate technology,..." with assessment weighting in the 3−8% range. These weightings apply to the whole syllabus and not to individual modules.

Examination Changes

A criticism of modular A−level examination has been that candidates may resit modules on too many occasions in order to improve their overall grades. Under the new arrangements only one resit is to be allowed of those modules which do not comprise "terminal" modules. At least 30% of the total marks for the A−level must be allocated to wholly externally assessed terminal modules. These cannot be retaken and candidates will receive an award (which cannot be declined, as at present), based on their single performance in the terminal modules and the best result from the other modules. Additionally the terminal modules must include some synoptic assessment (worth at least 15% of the total A−level marks) which tests the candidates' understanding of the connections between different elements of mathematics.

Conclusion

Despite earlier assurances that school curricula would have a period of stability, yet further changes are being introduced with great haste. Schools and further education colleges have seen their AS/A−level students complete examinations, based on the 1993 core, for the first time in summer 1996. Now teachers must respond to further syllabus revisions from September 1998 and, no doubt in many cases, have to manage with text books only recently published, based on the last round of syllabuses.

Higher education admissions tutors and syllabus writers will need to be aware of the latest changes when students with AS/A−levels enter from the 2000 intake onwards.

References

[1] GCE Advanced and Advanced Supplementary Examinations Subject Core for Mathematics; SCAA; July 1993. School Curriculum and Assessment Authority, Newcombe House, 45 Notting Hill Gate, London, W11 3JB.
[2] Review of Qualifications for 16−19 Year Olds; Sir Ron Dearing; SCAA Publications; March 1996.
[3] GCE Advanced and Advanced Subsidiary Examinations Subject Cores for Mathematics: SCAA; February 1997.
