

Consultation on draft AS/A level mathematics criteria

We consulted on draft criteria for AS/A levels in mathematics, further mathematics, use of mathematics and use of statistics between Friday 17 April and Friday 10 July 2009.

To address issues with the current arrangements and the mathematics requirements of other qualifications, we consulted on proposals for the following 'suite' of level 3 mathematics qualifications:

- AS/A level in mathematics
- AS/A level in further mathematics
- AS/A level in use of mathematics
- AS/A level in use of statistics
- level 3 free-standing mathematics qualifications (FSMQs).

There were five separate questionnaires for this consultation. There was a questionnaire on overarching issues for level 3 mathematics qualifications and separate questionnaires on each of the draft subject criteria. The overarching issues questionnaire dealt with the suite of qualifications and how the individual qualifications relate to each other. The four other questionnaires contained specific questions on criteria for individual subjects.

The Advisory Committee on Mathematics Education (ACME) produced a position statement on level 3 mathematics alongside this consultation.

Please note: This document contains the information that was published on our website when this consultation was launched in April 2009.

Background to the consultation

Mathematics and further mathematics

Currently, A level mathematics and further mathematics are both six-unit qualifications. Each qualification has its own pure mathematics units but they draw from a common pool of applications

units which may include units in mechanics, statistics and decision mathematics. This results in six routes to A level mathematics.

Although the current arrangements are simpler than the Curriculum 2000 model, there are some remaining issues:

- The various routes to A level mathematics, while equivalent, are not perceived as equivalent by all centres or end users.
- In order to allow candidates to take more than one type of applications unit, candidates may certificate A level mathematics with four AS and two A2 units. This makes mathematics unique among A level subjects and has resulted in different arrangements for awarding the A* grade for A level mathematics, with A* awarded on the basis of performance on the A2 pure mathematics units only, which means very good performance on an A2 applications unit will not contribute to A*.
- Arrangements for grading candidates who take both mathematics and further mathematics are uniquely complex because of the shared applications units, with these units being 'moved' between the two subjects to maximise the candidate's grade in each subject and then to maximise the UMS in A level mathematics.
- Some assessment objectives (AO4 and AO5) have very low weightings and there is limited coverage of proof and mathematical argument (in AO2).

Although there is potential choice of applications units in A level mathematics currently, evidence suggests that the choice is often made by the school or college delivering the qualification, so students themselves may not have any options. Some higher education institutions have indicated that they would prefer all students to follow the same course so that they know that all have a more comparable mathematical experience.

Use of mathematics and statistics

The current AS in use of mathematics and AS/A level in statistics both follow a similar approach, concentrating more on the applications of mathematics.

Mathematics requirements for other qualifications

There are increasing demands for different aspects of mathematics to support other qualifications. Other A levels have always required the use of certain aspects of mathematics, for example physics requires mechanics, and biology, psychology and sociology require statistics.

Many Advanced Diploma lines of learning involve the use of mathematics. The Extended Diploma is also being developed for all Diploma lines of learning for introduction in 2011. The Extended

Diploma at Advanced level will require learners to complete an additional extended core of mathematics, English or ICT and an extra component of additional and specialist learning.

Summary of consultation proposals

AS/A level mathematics

- AS and A level mathematics should be stand-alone qualifications with no units shared with further mathematics.
- A level mathematics should consist of four units (two at AS and two at A2).
- The pure mathematics content should be prescribed and remain generally as at present.
- The applications content should be prescribed, covering aspects of mechanics, statistics and decision mathematics, and building on the pure content, particularly at AS; the applications content should comprise between 33% and 40% of the AS and A level.
- There should be a greater emphasis on problem solving, modelling and mathematical communication, building on the key stage 4 programme of study and GCSEs in mathematics being introduced in 2010.
- There should no longer be a requirement for a non-calculator paper.
- There should no longer be a list of formulae to memorise.

These proposals will:

- remove the need for the complex grading arrangements for students taking both AS/A level mathematics and AS/A level further mathematics
- ensure there is a balance of AS and A2 units in A level mathematics
- enable the A* grade to be awarded in the same way as all other subjects
- meet the requirements for 'stretch and challenge'
- allow some examinations to be longer and provide better opportunity for setting less structured questions
- allow links to be made more easily between pure and applied content
- provide students with equality of opportunity and a common basis for progression.

AS/A level further mathematics

- A level further mathematics should continue to exist as six units.
- Pure mathematics content should be prescribed, comprising one-third of the AS and one-third of the A2.

- The content of AS level further mathematics should not be dependent on the content of AS level mathematics.
- Students should be able to select from a wide range of pure mathematics and applications units to meet their own needs.
- There should be a greater emphasis on problem solving, modelling and mathematical communication.

These proposals will:

- avoid disruption to the teaching of further mathematics in general and in particular to the work of the Further Mathematics Network which has achieved success in increasing uptake of this subject
- give clearer commonality between specifications
- meet the requirements for 'stretch and challenge'
- allow students to specialise by taking units which best meet their needs
- continue to allow concurrent teaching of AS further mathematics with AS mathematics as at present.

AS/A level use of mathematics, AS/A level use of statistics and FSMQs

- AS/A level use of mathematics and AS/A level use of statistics should both be comprised of six units.
- AS/A level use of mathematics and AS/A level use of statistics should both make use of the same common pool of units, namely FSMQs.
- FSMQs will be available at AS and/or A2 level in at least the following areas:
 - calculus
 - mechanics
 - finance
 - decision mathematics
 - statistics.
- AS/A level use of mathematics should have a wide choice of units. AS use of mathematics should consist of one compulsory unit in algebra, plus any two AS FSMQs. At A2, students should take the A2 calculus FSMQ, a controlled assessment unit and one other A2 FSMQ. The units may be selected to best relate to the student's programme.

- AS/A level use of statistics will not contain options. AS use of statistics should consist of one compulsory unit, which will be a controlled assessment, plus two AS statistics FSMQs, with a similar structure at A2. The controlled assessment unit will require students to carry out two tasks, one on a topic from each of the FSMQs. These tasks may be contextualised in the student's other studies and/or interests.

These proposals will:

- allow students to tailor their mathematics programme to meet their own needs and/or support their interests
- benefit students who need certain types of mathematics to support one or more of their A levels or to support a particular Advanced Diploma line of learning
- help schools and colleges to offer the full range of qualifications more easily.