

Leeds 14 – 19 Mathematics Pathways

These pages are designed as an introduction to the *Leeds 14-19 Pathways Model* (circa June 2005). Our intention is to provide a relatively quick way into the many complex issues raised in conceiving 14-19 pathways.

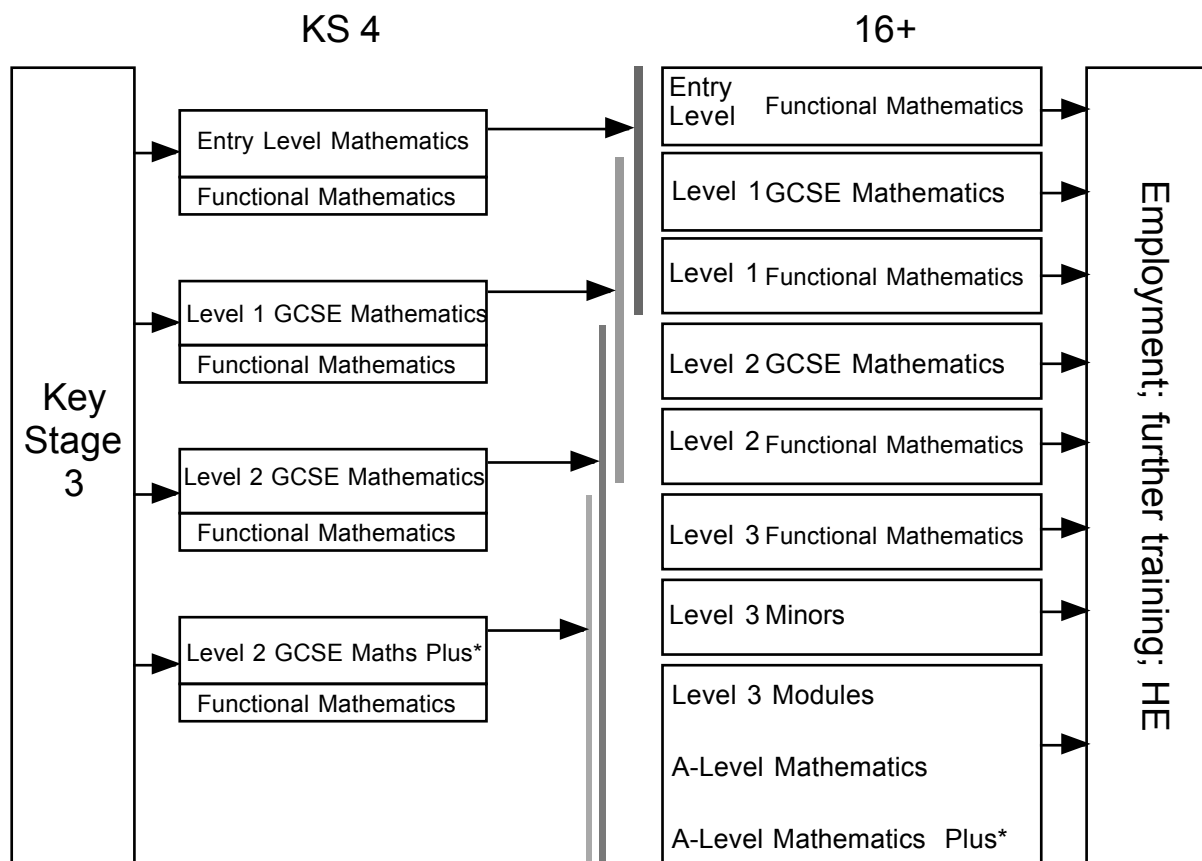
The schematic overleaf shows how we currently conceive the curriculum options in mathematics for KS4 and 16+ students. It is presumed that students at 16+ will have a number of alternatives which will be affected by their career aspirations, their interests and their achievement to date; these are indicated by the vertical bars to which each horizontal arrow points. Two features not shown on the schematic are: (i) ‘transition modules’ for pupils who are performing at the top of their level and which, if successfully completed, will enable them to move up a level; (ii) in any ‘phase’ pupils may sequentially follow more than one of the stated elements, e.g. they may complete level 1 Functional Mathematics and move on to level 2 Functional Mathematics.

The notes that follow are in three sections: Functional Mathematics; GCSE; level 3 Mathematics other than Functional Mathematics. We outline a number of decisions we have taken. The status of these ‘decisions’ varies: in some cases these decisions have been taken for us, e.g. by the *14-19 Education and Skills White Paper*; in other cases these decisions are based on issues of equity, e.g. that Functional Mathematics should be taken by all pupils at KS4; and some of these decisions are ‘working assumptions’ that could be changed, e.g. that Functional Mathematics assessment will result in a pass/fail result not grades. To keep this report of reasonable lengths we have not, in most cases, detailed the reasons behind these decisions.

The sections vary in detail due to a number of ‘imponderables’ with regard to GCSE and GCE.

What is Functional Mathematics?

At present Functional Mathematics is just a term used, in the Tomlinson and Smith reports and the *14-19 Education and Skills White Paper*, to locate an area of study which will allow pupils to *function* in the world (work, leisure, home and applied further education). The White Paper states clearly that all KS4 pupils will study/be assessed on Functional Mathematics and that it should be available as study modules beyond compulsory schooling. It is the hope of the government that Functional Mathematics will incorporate and replace Key Skills and Basic Skills, e.g. Adult Numeracy and Application of Number. The nature of Functional Mathematics is not yet determined and it is part of the Leeds team’s brief to come up with a model for Functional Mathematics. Various parties hold differing positions about how to approach this, such as: (i) to specify content that, when mastered, would enable pupils to function in the world; (ii) to focus on the processes of mathematics along the lines of *Using and Applying*; (iii) to emphasise the contexts / applications of mathematics. We are currently considering all of these.



Functional Mathematics

Decisions taken

General features:

- Functional Mathematics will be taken by all KS4 pupils as part of their mathematics courses.
- At 16+ all pupils will be able to take Functional Mathematics as a stand-alone course and qualification.
- Functional Mathematics will be offered at Entry level and levels 1, 2, 3 and possibly 4.
- Functional Mathematics at any given level will be the same for all pupils.
- Functional Mathematics at any given level will be the same at 16+ as it is at KS4.
- Mathematics teachers should teach Functional Mathematics.

Content:

- The content of Functional Mathematics at any given level will be simpler than the content of GCSE Mathematics at that level.
- Level 1 Functional Mathematics will include, among other things, applying the four number rules (+, −, x, ÷) in everyday, work and leisure contexts.
- Levels 2 and 3 Functional Mathematics will include, among other things, ‘modelling with numbers’ and ‘modelling with relationships’ respectively.
- Functional Mathematics will include a Financial Capability aspect.
- Functional Mathematics at any level will not be tailored to fit different Vocational Pathways, i.e. it will be generic to all courses.

Assessment:

- Functional Mathematics will be pass/fail, i.e. no grades.
- Functional Mathematics, the examination and the accreditation, will be completely separate from GCSE, even though a pass at level 2 will be a pre-requisite for the award of GCSE at grade C or above.
- Pupils will be able to take the examination when they are ready.
- Assessments are likely eventually to include e-assessment and examinations with ‘prior data sheets’ (descriptions of contexts and information – but not the questions - circulated in advance of the exam), but at first may be in the form of more ‘traditional’ examinations.
- Forms of assessments unlikely to be involved include teacher assessment and coursework.
- Functional Mathematics assessment will test ‘mastery’ of content in that the passing threshold will be high (60-70%).

Issues to be resolved with focus groups, individuals and organisations

- The extent to which level 1 Functional Mathematics should go beyond applying the four number rules in contexts and embrace extended tasks that involve some form of mathematical modelling.
- The nature of Entry level Functional Mathematics

GCSE (level 1 and level 2 mathematics)

Decisions taken

- GCSE content will be largely retained.
- GCSE assessment will include 'traditional' examinations and externally assessed coursework and is unlikely to include e-assessment or teacher assessment.

Matters to be resolved in consultation with government bodies

- 2 tier or 3 tier system?
- The place of statistics within GCSE Mathematics.
- The role of ICT within GCSE Mathematics.
- Double award.

Matters for ongoing discussion (with focus groups, individuals and organisations)

- GCSE at 16+
 - ◊ The specific problems for FE institutions.
 - ◊ Methods to improve the 're-sit problem' - that many re-sit students do not improve their KS4 grades.
- The nature of level 2 GCSE Mathematics for higher attaining KS4 pupils. We have written 'Mathematics Plus*' in our schematic. This concerns GCSE Mathematics for higher attaining pupils, in particular, the extent to which challenging the higher attaining 25% of pupils should be addressed by acceleration or by extension (or both – with each institution deciding for themselves). As part of this we propose a level 2 Extension Award (similar to AEA at level 3) to be graded in the same way as GCSE.
- Whether there should be additional provision at levels 1 and 2 in the form of smaller modules (akin to Free Standing Mathematics Qualifications) that may include specific mathematics related to different vocational routes.
- The affordances and constraints of our model in terms of pupil motivation and engagement with mathematics.

Level 3 Mathematics (other than Functional Mathematics)

Decisions taken

- AS/A2 content will be largely retained.
- AS/A2 assessment will include 'traditional' examinations and externally assessed coursework and is unlikely to include e-assessment or teacher assessment.

Matters to be resolved in the third stage of our work (from October 2005)

- Exactly how AS/A2 mathematics relates to level 2 GCSE mathematics.
- Addressing the 'university problem' - that university Admission Tutors for subjects which require specific mathematical competences find it difficult to cope with the variety of AS/A2 modules pupils have taken.

Matters for ongoing discussion (with focus groups, individuals and organisations)

Level 3 Minors

This will be academic mathematics for academic stream pupils who wish to study mathematics beyond level 2 GCSE but who do not intend to pursue work or university courses which require AS/A2 level mathematics.

AS/A2 (A-level) Mathematics 'Mathematic Plus*'

- Should high attaining pupils, especially those intending to take degree courses in mathematics or 'hard sciences', follow an accelerated or an extension curriculum? (Again, perhaps not an either-or matter.)
- Should level A-level Mathematics be split into two (or more) qualifications, for pupils with career intentions in mathematics, physics and engineering, and for pupils with career intentions in the arts and humanities?