Understanding the UK Mathematics Curriculum Pre-Higher Education

- a guide for academic members of staff -

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There is also a Welsh Baccalaureate qualification taken by a small number of students, see (12).

In **Scotland**, at age 16 students take Standard Grade examinations (roughly equivalent to the English GCSEs), at age 17 they take Highers (equivalent to AS Levels) and then at 18 Advanced Highers (equivalent to A Levels). It is worth noting that although many students do stay on to study Advanced Highers, students going on to study at a Scottish university can gain entrance having studied only Highers.

Grades for Standard Grades are on a scale from 1 to 7, where 7 is the lowest and awarded if the course was completed but the examination not passed. There are 3 levels of difficulty of papers: Foundation (grades 5 and 6), General (grades 3 and 4) and Credit (grades 1 and 2). Each level has two papers, one which allows a calculator and one which does not. Both papers assess knowledge, understanding, reasoning and enquiring skills.

There are also two Intermediate courses, Intermediate 1 and Intermediate 2, which can be studied instead of Standard Grades, or taken alongside Highers. The Intermediate I Course is equivalent to the knowledge and skills developed in Standard Grade Mathematics at Foundation level and the Intermediate 2 Course is designed to be equivalent to the knowledge and skills developed in Standard Grade Mathematics at General level. Their structure is similar to that of Highers (i.e. a one-year course split into units). Further detail can be seen in (13).

There is only one examining body in Scotland, the Scottish Qualifications Authority (SQA). It makes the following remarks about an Advanced Higher in Mathematics:

Advanced Higher Mathematics is designed to provide a broaden crunderstanding of algebra, geometry and calculus for those candidates as an geo develop the experience they gained through the Higher Course.

The Course will consolicate and extend the candidates existing mathematical skills, knowledge and inclustanting in a way that recognises problem solving as an essential skill and that will allow them to integrate their knowledge of different areas of the surject.

There is also an Advanced Higher in Applied Mathematics, which enables students to study mathematics in real-life contexts and create and interpret mathematical models. However, the uptake for this is relatively low, with around 300 students studying it each year, see (14).

In **Northern Ireland** there are AS and A Levels in Mathematics and Further Mathematics. In 2009 approximately 2750 students studied A Level Mathematics, up from 2300 in 2004 but, again, relatively few study A Level Further Mathematics - 150 in 2009 (up from 140 in 2004). The examinations are provided by the Council for the Curriculum, Examinations and Assessments (CCEA), which is also the regulatory body.

STATISTICS

Correlation and Regression

- ✓ Product moment correlation
- ✓ Spearman coefficient rank correlation
- ✓ Independent and dependant variables
- Least squares regression
- ✓ Scatter diagrams

The Binomial Distribution and **Probability**

- ✓ Probability based on selecting or arranging
- ✓ Probability based on binomial distribution
- ✓ Expected value of a binomial distribution
- ✓ Expected frequencies from a series of trials

Data Presentation

- ✓ Bar charts, pie charts
- \checkmark Vertical line graphs, histograms
- ✓ Cumulative frequency

Discrete Random Variables

- Expectation and variance of discrete random variables
- ✓ Formulae extensions E(aX+b)

Probability

- ✓ Measuring, estimating and expectation
- ✓ Combined probability
- ✓ Two trials
- ✓ Conditional probability
- ✓ Simple applications of laws

Exploring Data

- ✓ Types of data
- ✓ Stem and Leaf diagrams
- ✓ Measures of central tendencor
- and of spread Linear coding
- keyn ss and outli

Normal Distribution

- ✓ Properties (including use of tables)
- ✓ Mean and variance
- ✓ Cumulative distribution function
- ✓ Continuous random variables (probability density function and mean/variance)
- ✓ As an approximation to binomial or Poisson distributions
- ✓ t-distribution

Chi-squared

- ✓ Introduction
- ✓ Conditions

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CO.U Hypothesis Testing

E Collishing the null and alternate h pothesis Conductil g the test and it preting the results

- Use of the binomial or normal distribution
- Type 1 and type 2 errors

Poisson Distribution

- ✓ Properties (including use of tables)
- ✓ Mean and variance
- ✓ Use as an approximation to binomial distribution

Sampling/Estimation

- ✓ Randomness in choosing
- ✓ Sample means and standard errors
- ✓ Unbiased estimates of population means
- ✓ Use of central limit theorem
- ✓ Confidence intervals

Understanding the UK Mathematics Curriculum Pre-Higher Education

Year	Up to 16	16-19	
1999	National Numeracy Strategy (primary schools)	New common cores at AS and A Level, now known as subject cores	
2000		First teaching of new syllabuses to conform with Curriculum 2000	
2000		Work starts on an MEI pilot programme to foster Further Mathematics	
2001	Key Stage 3 National Strategy Framework for teaching mathematics to Years 7, 8 and 9	Very poor results at AS Level Marked drop in retention rate for full A Level	
	Introduction of data handling coursework at GCSE		
2002		Large reduction in numbers taking A Level mathematics	
2003		New subject cores for AS and A Level Mathematics	
2004	The Smith Report: Making Mathematics Count		
2004	104 The Tomlinson Report on 14-19 Curriculum and Qualifications Reform (mostly re		
2004		First teaching of new mathematics syllabuses, now known as specifications, introduced to overcome the problems caused by Jurn wann 2000	
2005	No	Df S ons U one MEI Further Mathematics Programme as the Further Mathematics Network (still r n v MEI)	
2006	First teaching of GUSE syllabuses that meeds the syllabuses that meeds the syllabuse syllabuses that meeds the syllabuse syllabuses that meeds are syllabused as a synthesized synthesynth	br ce starts to rise under the new specifications	
prev	First teaching dir CS2 lawe hatics with no coursework		
2009	Key Stage 3 National Curriculum tests discontinued	Uptake is the highest since 1989	
2009		The Further Mathematics Network is replaced by the Further Mathematics Support Programme (still run by MEI)	
2010	New GCSE syllabuses to start		
2010	Pilot of twin GCSEs to start		