Curriculum Guide for Maths

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The de Ferrers Trust

1. Curriculum Rationale

INTENT

The Maths Faculty believe it is essential to strike a balance between supporting our students to develop their mathematical and numerical skills which allow them to achieve their potential, whilst enriching and deepening their understanding and curiosity in the subject through games, puzzles and real-life contextual problems.

Achieving a good GCSE grade in Maths opens many doors to future career choices, and increasingly more and more employers are raising their entrance requirements to include a grade 5 or above in GCSE Maths. In recent years, the Maths faculty has developed a more problem-solving approach to learning the subject as many students find it difficult to transfer simple ideas to different contexts. There is also now a renewed emphasis on basic numeracy and mental Maths.

In addition to the work done in Maths lessons, weekly activities are undertaken in tutor time to support the development of numeracy skills. This is often in the form of puzzles and quizzes and students can work individually or collaboratively in engaging and enjoyable activities but at the same time developing their numerical skills.

We promote high standards in Maths by building on the Numeracy and Mathematics elements taught at Primary through a carefully structured and thorough Scheme of Work. Using a variety of teaching styles and resources and incorporating the 'do now', 'I do / we do', 'you do' approach in lessons, and our use of small steps / multi-plenaries, provides our students with a similar approach to 'Mathematical Mastery' that they have become accustomed to during KS1 and 2.

2. How the students will learn in Maths

IMPLEMENTATION

Retrieval Practice

Each lesson should begin with a short quiz on previously covered content (5-10 minutes). The aims of this are:

- To improve students' long-term retention of key mathematical skills and knowledge to help improve fluency, transfer and reduce cognitive load.

- To help develop a culture of high expectations, exemplary behaviour and mathematical rigour within every classroom.

- The systematic approach to retrieval practice ensures key knowledge and skills are recalled at specific intervals, leveraging the 'spacing effect' and 'testing effect' to build durable learning. The systematic approach ensures that information is repeated in a distributed fashion or spaced over time, it is learned more slowly but it is repeated much longer' (Roediger & Pyc, 2012).

- To develop students who are capable of selecting required approaches from a variety of different interleaved questions, rather than providing solutions to a 'blocked' set of questions from the same topic (Rohrer, Dedrick & Burgess, 2014).

Sequencing

At Key Stage 3, there is a focus on the basics of number and algebra. The sequencing is designed to allow for interleaving of content; the placement of each unit within the scheme of work allows for knowledge to easily be transferred into the following topics allowing for links between domains to become visible. As a result, much of the Key Stage 3 scheme of work contains the following progression sequence: Number > Algebra > Geometry or Statistics.

Each section of the scheme of work references the prerequisites and dependants for that unit. This is in order to ensure that teaching builds on the knowledge and skills that students have, whilst ensuring that topics are taught in a way which best prepares them for success in future topics. Priority has been given to the topics which are heavily built upon at Key Stage 4 and 5. Some topics which are traditionally taught at Key Stage 3, such as constructions, bearings and transformations are not included in the curriculum until Key Stage 4, because they are not prerequisites for multiple other topics.

As a result of removing some topics from KS3 and reducing the time spent re-teaching, there is the opportunity to spend more time on each topic, allowing it to be studied in greater depth. This provides the opportunity for additional practice, improved links between topics and successful encoding of knowledge and skills into long term memory. As Rohrer & Taylor (2006), found: 'the retention of Mathematics is markedly improved when a given number of practice problems are distributed across multiple assignments and not massed into one'.

Each unit of the scheme of work has been broken down into carefully selected components so that new content is taught in small chunks, in order to ensure that working memory is not overloaded. When introducing new learning, methods such as Example-Problem Pairs and activities based on Variation Theory should be used to ensure students can manage the flow of new information they receive and make connections to previous learning. By minimising intrinsic load in this way, students are more likely to encode information into long term memory, in line with the principles of cognitive load theory (Kirschner et al, 2006).

Problem solving

The curriculum focuses on developing the skills and knowledge required in order to think like an expert within a particular domain, rather than focusing on generic problem- solving skills.

Once these skills have been mastered, the development of problem-solving skills comes through the interleaving of previously covered content within each topic, where students are required to choose between techniques in order to solve problems.

Core and support curricula

At Key Stage 3, there are 2 tiers to the scheme of work: core and support. The support curriculum begins at a lower start point and contains a greater emphasis on concrete and pictorial representations prior to encountering abstract concepts.

3. Curriculum Maps

KS3 Autumn Support Curriculum Map

Week	HT	Date	Y7	Y8	Y9
1	Au1	3/9/2018	Place Value	Negative numbers	Sequences
2	Au1	10/9/2018	Place Value	Negative numbers	Sequences
3	Au1	17/9/2018	Place Value	Calculating	Sequences
4	Au1	24/9/2018	Calculating: addition subtraction and multiplication	Calculating	Factorisation
5	Au1	1/10/2018	Calculating: addition subtraction and multiplication	Numbers and the number system	Factorisation
6	Au1	8/10/2018	Calculating: addition subtraction and multiplication	Numbers and the number system	Factorisation
7	Au1	15/10/2018	Calculating: division	Numbers and the number system	Solving linear equations
8	Au1	22/10/2018	Calculating: division	Numbers and the number system	Solving linear equations
9	Au2	5/11/2018	Algebraic proficiency: writing expressions & substitution	Investigating properties of space	Solving linear equations
10	Au2	12/11/2018	Algebraic proficiency: writing expressions & substitution	Investigating properties of space	Assessment
11	Au2	19/11/2018	Algebraic proficiency: writing expressions & substitution	Assessment	Single event probablilty
12	Au2	26/11/2018	Assessment	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Single event probablilty
13	Au2	3/12/2018	Investigating angles	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Linear graphs
14	Au2	10/12/2018	Investigating angles	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Linear graphs
15	Au2	17/12/2018	Investigating angles	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Linear graphs

KS3 Spring Support Curriculum Map

Week	HT	Date	Y7	Y8	Y9
16	Sp1	7/1/2019	Exploring fractions (decimals and percentages)	Calculating with fractions	Rearranging formulae
17	Sp1	14/1/2019	Exploring fractions (decimals and percentages)	Calculating with fractions	Rearranging formulae
18	Sp1	21/1/2019	Exploring fractions (decimals and percentages)	Calculating with fractions	Rearranging formulae
19	Sp1	28/1/2019	Proportional reasoning	Calculating with fractions	Assessment
20	Sp1	4/2/2019	Proportional reasoning	Assessment	Laws of indices
21	Sp1	11/2/2019	Assessment	Solving linear equations by balancing	Laws of indices
22	Sp2	25/2/2019	Calculating fractions, decimals and percentages	Solving linear equations by balancing	Laws of indices
23	Sp2	4/3/2019	Calculating fractions, decimals and percentages	Solving linear equations by balancing	Speed
24	Sp2	11/3/2019	Calculating fractions, decimals and percentages	Ratio	Speed
25	Sp2	18/3/2019	Investigating angles	Ratio	Speed
26	Sp2	25/3/2019	Investigating angles	Ratio	Angles - parallel lines and polygons
27	Sp2	1/4/2019	Measuring space	Exploring fractions, decimals and percentages	Angles - parallel lines and polygons

KS3 Summer Support Curriculum Map

Week	HT	Date	Y7	Y8	Y9
28	Su1	8/4/2019	Measuring space	Exploring fractions, decimals and percentages	Angles - parallel lines and polygons
29	Su1	29/4/2019			Circles
30	Su1	6/5/2019	Solving equations	Investigating angles	
31	Su1	13/5/2019			
32	Su1	20/5/2019	Percentages		Averages (ungrouped)
33	Su2	3/6/2019		Revision & Assessment	
34	Su2	10/6/2019	Revision & Assessment	Checking, approximating and estimating	
35	Su2	17/6/2019	Checking, approximating and estimating		Revision & Assessment
36	Su2	24/6/2019		Averages	Pie charts
37	Su2	1/7/2019	Calculating space		
38	Su2	8/7/2019		Calculating space	Plans and Elevations
39	Su2	15/7/2019	Coordinates and reflection		

KS3 Autumn Core Curriculum Map

Week	HT	Date	Y7	Y8	Y9
1	Au1	2/9/2019	Negative numbers	Sequences	Standard Form
2	Au1	9/9/2019	Negative numbers	Sequences	Standard Form
3	Au1	16/9/2019	Calculating	Factorisation	Upper and lower bounds
4	Au1	23/9/2019	Calculating	Factorisation	Upper and lower bounds
5	Au1	30/9/2019	Calculating	Factorisation	Upper and lower bounds
6	Au1	7/10/2019	Numbers and the number system	Solving linear equations	Pythagoras' Theorem
7	Au1	14/10/2019	Numbers and the number system	Solving linear equations	Pythagoras' Theorem
8	Au1	21/10/2019	Numbers and the number system	Solving linear equations	Pythagoras' Theorem
9	Au2	4/11/2019	Properties of shapes	Assessment	Assessment
10	Au2	11/11/2019	Assessment	Solving linear equations	Pythagoras' Theorem (cont'd)
11	Au2	18/11/2019	Properties of shapes (cont'd)	Solving linear equations	Coordinate geometry
12	Au2	25/11/2019	Properties of shapes (cont'd)	Single event probability	Coordinate geometry
13	Au2	2/12/2019	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Single event probability	Coordinate geometry
14	Au2	9/12/2019	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Linear graphs	Percentage multipliers
15	Au2	16/12/2019	Algebraic proficiency: simplifying, expanding, substituting and forming equations	Linear graphs	Percentage multipliers

KS3 Spring Core Curriculum Map

Week	HT	Date	Y7	Y8	Y9
17	Sp1	13/1/2020	Calculating with fractions	Rearranging formulae	Inequalities
18	Sp1	20/1/2020	Calculating with fractions	Rearranging formulae	Inequalities
19	Sp1	27/1/2020	Calculating with fractions	Rearranging formulae	Assessment
20	Sp1	3/2/2020	Calculating with fractions	Assessment	Expanding and factorising
21	Sp1	10/2/2020	Assessment	Laws of indices	Expanding and factorising
22	Sp2	24/2/2020	Solving linear equations by balancing	Laws of indices	Expanding and factorising
23	Sp2	2/3/2020	Solving linear equations by balancing	Laws of indices	Similarity and trigonometry
24	Sp2	9/3/2020	Solving linear equations by balancing	Speed	Similarity and trigonometry
25	Sp2	16/3/2020	Ratio	Speed	Similarity and trigonometry
26	Sp2	23/3/2020	Ratio	Angles in parallel lines	Graphs of functions
27	Sp2	30/3/2020	Ratio	Angles in parallel lines	Graphs of functions

KS3 Summer Core Curriculum Map

Week	HT	Date	Y7	Y8	Y9
28	Su1	20/4/2020	Exploring fractions, decimals and percentages	Angles in parallel lines	Graphs of functions
29	Su1	27/4/2020	Exploring fractions, decimals and percentages	Circles	Simultaneous equations
30	Su1	4/5/2020	Investigating angles	Circles	Simultaneous equations
31	Su1	11/5/2020	Investigating angles	Circles	Bearings
32	Su1	18/5/2020	Investigating angles	Circles	Bearings
33	Su2	1/6/2020	Investigating angles	Revision & Assessment	Scatter graphs
34	Su2	8/6/2020	Revision & Assessment	Averages (ungrouped)	Scatter graphs
35	Su2	15/6/2020	Checking, approximating and estimating	Averages (ungrouped)	Revision & Assessment
36	Su2	22/6/2020	Averages	Pie charts	Multiple Event Probability
37	Su2	29/6/2020	Averages	Pie charts	Multiple Event Probability
38	Su2	6/7/2020	Calculating space	Plans & Elevations	Averages (grouped)
39	Su2	13/7/2020	Calculating space	Plans & Elevations	Averages (grouped)

4. Assessment Plan

Assessment

There are 3 **summative** assessments per year. These assessments will test all of the knowledge and skills that the students have developed up to that point. The third Year 9 assessment will therefore assess all of the knowledge that has been taught at KS3, with no bias in favour of recently taught topics.

Since 'learning is a change in long term memory' (Kirschner et al, 2006), the aim of these assessments is to provide a proxy for the extent to which all of the content which has been taught has been mastered, rather than assessing performance. Each assessment therefore aims to cover questions from a range of difficulties, ensuring that students at different attainment levels can be distinguished between.

Formative assessment, during which students are given advice on how to improve, should be a regular feature of each lesson as part of responsive teaching. Exit tickets and topic reviews should be used as formative assessment strategies. The intent here is to use these strategies to assess performance rather than learning. Success within a lesson sequence does not provide an indication of learning, but failure to demonstrate competence is unlikely to lead to learning.

5. Cultural Capital

	Experiences that students experience in your subject that enrich their learning?
Year 7	Nrich Maths Resources – to support specific topic content STEM activities – including Curriculum Collapse Day experiences UKMT Junior Maths Challenge Tutor Time Maths Puzzles Calendar specific topics such as Pi day
Year 8	Nrich Maths Resources – to support specific topic content STEM activities – including Curriculum Collapse Day experiences UKMT Junior Maths Challenge UKMT Team Maths Challenge Tutor Time Maths Puzzles Calendar specific topics such as Pi day
Year 9	Nrich Maths Resources – to support specific topic content STEM activities – including Curriculum Collapse Day experiences UKMT Intermediate Maths Challenge UKMT Team Maths Challenge Tutor Time Maths Puzzles Calendar specific topics such as Pi day
Year 10	Nrich Maths Resources – to support specific topic content STEM activities – including Curriculum Collapse Day experiences UKMT Intermediate Maths Challenge Tutor Time Maths Puzzles Calendar specific topics such as Pi day University visits
Year 11	Nrich Maths Resources – to support specific topic content STEM activities – including Curriculum Collapse Day experiences UKMT Intermediate Maths Challenge Tutor Time Maths Puzzles Calendar specific topics such as Pi day University visits

6. Homework and Independent Learning

The Maths faculty uses a platform called HegartyMaths (www.hegartyMaths.com) for student homework. This platform has proved to be incredibly successful with other schools within the Trust, through supporting independent student led learning.

This year, each student in Year 7 to 9 will be set two HegartyMaths tasks for homework each week; whilst in Years 10 and 11 students will be set three tasks each week. Every student has also been given a new homework book in which they are to complete their HegartyMaths homework, showing all of their working out for each question.

The homework that is set using HegartyMaths will be practice of previously learnt material. The aim for every student is to achieve 100% on each task that is set. In the event that a student does not achieve 100%, we ask that students watch the accompanying video and then reattempt only the questions that they have got incorrect. It may also be useful to complete the building block tasks in order to help achieve 100%. If help is still required, comments can be left on HegartyMaths for the class teacher to act on.

If any student still requires additional help with any HegartyMaths homework, or access to a computer, a member of the Maths faculty will also be available to support using the student's homework book to provide guidance and lunchtime access to PC's in T8 and the Library when internet / computer access is an issue.

In addition to using HegartyMaths for homework, many students have also found that it can also be used throughout the year as a valuable revision tool. There is a quiz and accompanying video that can be searched for covering nearly every topic in the GCSE Maths syllabus.