

Mathematics at Elemore Hall School

Rationale

We believe that every pupil can learn mathematics, given the appropriate learning experiences within and beyond the classroom. In Mathematics, we aim to enable our pupils to develop knowledge and skills to help them make sense of the world around them. Mathematics is about developing a curiosity in the world around us and offering solutions to problems. It is also functional, aiming to develop knowledge which will enable increasingly greater independence.

Mathematics provides pupils with access to important mathematical ideas and to develop the mathematical knowledge and skills that they will draw on in their personal and work lives.

While the usefulness of Mathematics for problem solving is well known, it also has a fundamental role in both enabling and sustaining cultural, social, economic and technological advances and empowering individuals to become critical citizens.

INTENT

The national curriculum states 'Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas.' Therefore, our intent for Mathematics is to teach a rich, balanced and progressive curriculum, to ensure that all pupils reason mathematically, solve problems and develop fluent conceptual understanding in each area.

Our curriculum is sequenced with reference to the *White Rose Maths* Scheme of learning. This provides us the order in which we teach to ensure that pupils have the opportunity to experience the full breadth of the curriculum - from the primary curriculum through to GCSE. We are aware that pupils will have a range of prior knowledge and, as such, our lessons allow for the development of each pupil, depending on their own place in each topic.

Alongside this curriculum model, assessment objectives have been linked to each topic area. As our pupils have a variety of starting points and gaps in their knowledge, the assessment criteria in each topic area provides context and pre-requisite knowledge. Teachers use their own expertise in order to provide an appropriate level of challenge for all pupils, whether that is to build a more solid foundation, or to extend those who are already working with fluency in a specific area.

The curriculum is arranged into broad topic areas. In each area there is clear progression. It is a sequential subject that must be constructed upon solid foundations, otherwise there is an increased chance of misconceptions. Therefore, closing any gaps discovered through assessments, is vital and a key part of the ethos of the department. The curriculum is sequenced in such a way as to ensure maximum progress, by building upon prior learning and putting in place interventions where the foundations are not yet in place or where gaps are identified. It allows all pupils to progress to their maximum potential and regardless of their start points and work pace.

Pupils are given a clear progression route through appropriate accreditation, beginning with Entry Level Functional Skills. As pupils' mathematical knowledge, ability to apply this knowledge to different contexts and problem solving and confidence builds, they can work towards GCSE. Level 1 and 2 Functional Skills qualifications run alongside this in Key Stage 4. This gives all pupils the opportunity to succeed and achieve accreditation at a higher level.

Curriculum Map (WRM)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2	
7	Algebraic Thinking <ul style="list-style-type: none">- Sequences- Understand & use algebraic notation- Equality & equivalence	Place Value & Proportion <ul style="list-style-type: none">- Place value & ordering integers and decimals- Fraction, decimal & % decimal	Applications of Number <ul style="list-style-type: none">- Solving problems with + and -- Solving problems with \times and \div- Fractions and &	Directed Number <ul style="list-style-type: none">- Operations and Equations Fractional Thinking <ul style="list-style-type: none">- + and - of fractions	Lines & Angles <ul style="list-style-type: none">- Constructing, measuring & using geometric notation- Develop geometric reasoning	Reasoning with Number <ul style="list-style-type: none">- Developing number sense- Sets & probability- Prime numbers & proof	
8	Proportional Reasoning <ul style="list-style-type: none">- Ratio & scale- Multiplicative change- \times and \div fractions	Representation <ul style="list-style-type: none">- Working in the Cartesian plane- Representing data- Tables & Probability	Algebraic Techniques <ul style="list-style-type: none">- Brackets, equations & inequalities- Sequences- Indices	Developing Number <ul style="list-style-type: none">- Fractions and %- Std. index form- Number Sense	Developing Geometry <ul style="list-style-type: none">- Angles in parallel lines & polygons- Area of trapezia & circles- Line symmetry & reflection	Reasoning with Data <ul style="list-style-type: none">- The data handling cycle- Measures of location	
9	Reasoning with Algebra <ul style="list-style-type: none">- Straight line graphs- Forming & solving equations- Testing conjectures	Constructing in 2 & 3 Dimensions <ul style="list-style-type: none">- Three-dimensional shapes- Constructions & congruency	Reasoning with Number <ul style="list-style-type: none">- Numbers- Using %- Maths & money	Reasoning with Geometry <ul style="list-style-type: none">- Deduction- Rotation & translation- Pythagoras' Theorem	Reasoning with Proportion <ul style="list-style-type: none">- Enlargement & similarity- Solving ratio & proportion problems- Rates	Representations & Revision <ul style="list-style-type: none">- Probability- Algebraic representation- Revision	
10	Similarity <ul style="list-style-type: none">- Congruence, similarity & enlargement- Trigonometry	Developing Algebra <ul style="list-style-type: none">- Representing solutions of equations & inequalities- Simultaneous equations	Geometry <ul style="list-style-type: none">- Angles & bearings- Working with circles- Vectors	Proportions & Proportional Change <ul style="list-style-type: none">- Ratios & fractions- % & Interest- Probability	Delving into Data <ul style="list-style-type: none">- Collecting, representing & interpreting data	Using Number <ul style="list-style-type: none">- Non-calculator methods- Types of number & sequences- Indices & Roots	Manipulating Expressions
11	Graphs <ul style="list-style-type: none">- Gradients & lines- Non-linear graphs- Using graphs	Algebra <ul style="list-style-type: none">- Expanding & factorising- Changing the subject- Functions	Reasoning <ul style="list-style-type: none">- Multiplicative- Geometric- Algebraic	Revision & Communication <ul style="list-style-type: none">- Transforming & constructing- Listing & describing- Show that ...	Revision	Examinations	
M	<p>Pupils follow a pathway that will lead the majority of them to taking their GCSE exam. In order to build confidence, pupils will work through Edexcel Entry Level Certificate 1, 2 and 3, with stronger pupils advancing to Functional Skills Level 1, and perhaps, 2. The group follows the order of the year 11 curriculum but support in each area means that pupils are likely to be working on building stronger foundations in the subject area, with an emphasis on Entry Level Certificate style questions.</p> <p>Pupils are entered for the appropriate Entry Level Certificate Qualification whenever they are ready. This may mean that pupils will be given different tasks within the same lesson, but the overarching topic will be the same.</p>						

IMPLEMENTATION

Resources will be bespoke for each class and chosen at the discretion of the teacher in order to meet the needs of pupils. These can include White Rose Maths resources, but could equally be sourced from other locations, or made specifically for an activity or class. By design, the activities in each class may look different, but the same overarching topics will be covered in the same sequence.

Classes consist of small groups and emphasis is placed on working as a team of Mathematics teachers, Learning Support Assistants and with a Numeracy intervention coordinator.

Teaching methods vary throughout the topics, with demonstrations, modelling and explanations, to pupils practising, working towards independence, fluency and ability to apply. Pupils are assessed

throughout their lessons, with verbal feedback at regular intervals throughout, by both teacher and Learning Support Assistant. Questioning is used to determine understanding and inform next steps. Pupils are also encouraged to pose questions themselves.

Teaching staff relate learning to 'real life' situations, giving real examples that help to answer the 'why am I learning this' question.

The Mathematics curriculum requires pupils to be both literate and numerate and, as such, both play a part in every lesson. Pupils are encouraged to speak the "language of maths", including learning and using mathematical terminology, as well as describing the order of operations. Polysemous vocabulary (words that have multiple meanings and that are used differently in different subjects) such as 'chord' or 'prime', are discussed and the use of stem sentences aid pupils in their use of mathematical language. Discussions about mathematics enable pupils to verbalise and converse their understanding and depth of knowledge, where pupils are encouraged to make connections, teach a peer and solve or use concepts in different ways.

Cross-curricular links are made to enable pupils to understand that mathematics is an essential part of life. It offers a creative way to develop pupils' knowledge, skills and understanding, while motivating them to learn through stimulating, interconnected topics. Lessons which cross subject boundaries allows for investigations that engage pupils' imagination and opens up opportunities for revisiting skills previously learned. Examples include: Measuring and recording, as well as using data handling, within the sciences; making Pythagorean links to musical notes and comprehension skills in English. Bush-craft practically applies mathematical skills, knowledge and understanding, from the positional language and angles required, to fire-making and shelter building. Other subjects that involve mathematical areas, such as measure, formulae and equations, are Design Technology, Food & Nutrition and Physical Education. Programming in ICT uses logical language with mathematical basis. History can be addressed with time lines and mathematical history, such as the persecution of Alan Turing,

Cultural links, links to other subjects and SMSC are abundant. Examples enabling pupils to identify patterns of information between subjects and in different contexts, that will help to enforce key knowledge are: Fibonacci numbers in nature; The Golden Ratio, the wide use of Arabic numerals; Indian mathematics; the use of zero, Katherine Johnson helping NASA during the space program; in spite of racism, other prejudices and misogyny; Statistics in newspapers and social media; "real life" applications of mathematics that have had and still have profound consequences to human development (e.g. wireless communications, GPS, flight, electronics) and the value of money/financial literacy.

Reading Development in Mathematics

Reading is central to our curriculum: From basics, including the language of mathematics/reading mathematically to higher problem solving and longer worded reasoning questions, give pupils the opportunity to read. Pupils will have opportunities to read questions, whether that is aloud to the class, to the teacher or LSA or independently, to understand questions. Important key vocabulary is displayed in classrooms. Polysemous vocabulary are discussed, pupils conduct guided reading tasks, are confronted with worded problems.

Additional Support & Stretch/Extend/Challenge

Our inclusive curriculum caters for all, including disaffected, low attaining and disadvantaged, as well as higher achieving, pupils. We offer:

- individual gap analysis for every pupil
- personalised lessons
- small groups
- numeracy withdrawal / 1:1 targeted intervention for targeted pupils in order to close the gaps in pupil knowledge and to assist Y7 pupils to 'catch up'
- additional LSA support for targeted pupils within lessons
- multiplication squares to support learning and to allow pupils to access certain topics
- the use of online tools, such as Flashback 4, Kahoot!, Mathsbox Skills Check
- high quality Scientific Calculators available for all pupils at Key Stage 4
- revision packs for year 11
- focused gap analysis with supporting materials provided for year 11 pupils
- extension work for pupils who need greater challenge
- ad-hoc extra sessions with teachers for pupils who work at greater depth

Enrichment

Visits possible – Durham Maths Trail, Bletchley Park, Centre for Life etc.

Links with evening activities

- Evening Bushcraft sessions to apply pupils' learning in real, practical contexts
- Other - arranged with pupils on an individual bespoke basis

Steps and Assessment

At the beginning of each academic year, all pupils complete the Wide Range Achievement Test (WRAT) which assesses their underlying abilities. In addition to this, pupils in year 7 are assessed using data from year 6 SATs papers, to analyse their strengths as well as gaps in knowledge while providing a baseline of their starting point at Elemore Hall School.

Termly, summative assessments on the whole curriculum are used to judge progress over time and ensure that prior learning is revisited. Progress is different for each pupil and is celebrated with the pupils based on their own targets. Assessments provide a framework for intervention for each pupil and inform schemes of work, which are designed to be flexible based on need and to close these gaps before moving on to the next topic. As such, there may be some planned discrepancies from this curriculum map to ensure we meet the needs of all pupils.

Assessments are easy to understand and moderated for consistency. They are also highly relevant to the learning of all pupils and link directly to the desired outcomes at the end of key stage 4.

In addition, weekly basic skills are used to help develop understanding and address gaps in learning, as well as build confidence, through competence. Individual feedback and formative assessment on weekly basic skills helps develop a deeper understanding on an individual basis.

Evidence in books/files of pupils, combined with the on-going weekly formative and termly summative assessment folders, are recorded as sources of comparison and progression, for every individual and class group.

At the end of year 8/start of year 9, teachers decide whether pupils will follow the Foundation or Higher route in years 9, 10 and 11. There are two assessment options that can be used: the year 8 End of Year test or the pre-GCSE Baseline test (Foundation or Higher).

Assessment program

	Term 1	Term 2	Term 3	Notes
KS3 & ELC	Step Assessment 1	Step Assessment 2	Step Assessment 3	Step assessment 4, 5, 6 to be used at teacher discretion for baselining or development
Year 9				
Year 10	AQA GCSE Paper 1	AQA GCSE Paper 2	AQA GCSE Paper 3	ELC 1, 2, 3 and Functional Skills 1 & 2 completed as appropriate
Year 11	Mock Exam 1 (AQA GCSE Summer of previous academic year)	Mock Exam 2 (AQA GCSE November of previous academic year)		

IMPACT

Through observations and regular assessments, effective teaching and delivery, our curriculum should show that:

- pupils make progress over time from their starting points
- pupils are able to retain, recall and apply what they have been taught, independently or with minimal support
- pupils develop transferable knowledge through sustained learning
- pupils leave with better mathematical knowledge and skills
- all pupils achieve and reach their individual potential

Our teaching should:

- develop pupils' resilience, confidence and independence
- promote pupils' learning in other subjects
- enable pupils to achieve a good qualification in Mathematics (The importance of this is stressed to pupils throughout their time at the school. Pupils are made aware of the impact that this has on their future post16 choices.)
- reduce barriers
- prepare pupils for life and work

Accreditation

- Edexcel Entry level 1-3 Functional Skills
- Edexcel Functional Skills Level 1/2
- AQA GCSE Maths