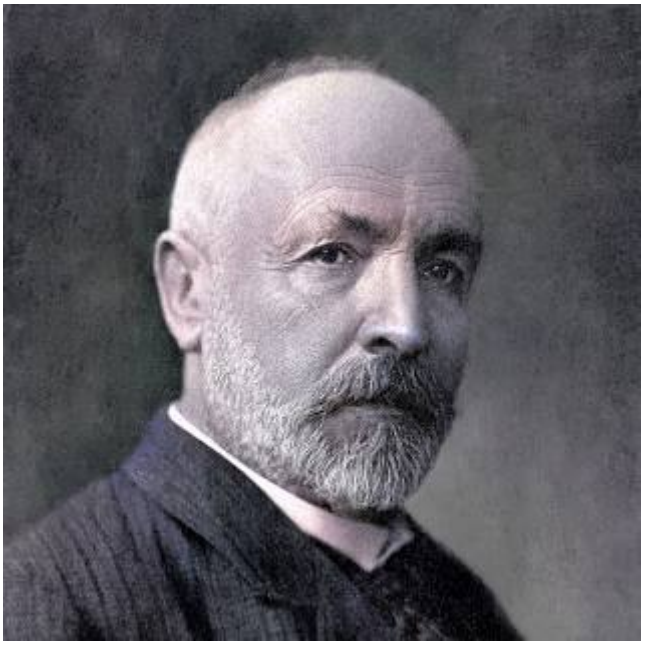
Maths

In mathematics the art of proposing a question must be held of higher value than solving it.



Georg Cantor

Subject Overview and Curriculum Intent

Intent of curriculum

Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. Our high-quality Mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of Mathematics, and a sense of enjoyment and curiosity about the subject.

We believe that students deserve a creative and ambitious Mathematics curriculum, rich in skills and knowledge, which ignites curiosity and prepares them well for everyday life and future employment. Our Mathematics curriculum will give students the opportunity to:

- ☐ become fluent in the fundamentals of Mathematics, through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately;
- ☐ reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language;
- ☐ can solve problems by applying their Mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and preserving in seeking solutions;
- ☐ can communicate, justify, argue and prove using mathematical vocabulary;
  develop their character, including resilience, confidence and independence, so that they contribute positively to the life of the school, their local community and the wider environment.
  see connections between the Mathematics that they learn in school and how it might extend to outside the classroom.

Implementation of curriculum

Mathematics is an interconnected subject in which pupils learn to be able to move fluently between representations of mathematical ideas. The programme of study for key stage 3 is sequenced into, what may appear to be, distinct domains, but pupils build on key stage 2 and connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. The teaching for sound knowledge of key concepts then enables students to access the Key Stage 4 Scheme of Work.

Our Key Stage 4 scheme of work is structured in a similar way to Key Stage 3 however students will follow one of 2 routes on their learning journey. Route 1 is studied by GCSE foundation level students and Route 2 is aimed at higher level students. Both routes build on previously mastered topics where we retrieve, affirm and build on the knowledge and understanding as we progress through the curriculum. For example, when learning about how to apply Pythagoras' theorem in year 9 we need previous teaching from Number with an understanding of square numbers and square roots, from Algebra with the application of substitution and rearranging equations and from Geometry in the knowledge of the properties of shapes and specifically triangles.

As students approach their final year at Key stage 4, they will follow a personalised scheme of learning that targets gaps in knowledge as identified by the thorough question level analysis (QLA) of each student's performance in the frequent assessments that take place. This fully prepares them for success in their GCSE examination.

Pupils in the Higher Maths set will be given the opportunity to study elements of Further Maths and if appropriate will be entered for the Level 2 Further Maths qualification, this provides a solid basis for progressing onto A Level Mathematics and Further Mathematics in KS5.

Pupils also learn to apply their mathematical knowledge in Science, Geography, Computing and other subjects.

Impact of curriculum

We are confident that through the content of the curriculum and the way in which it is delivered that pupils will;

- ☐ become fluent in the fundamentals of Mathematics
- ☐ be able to reason mathematically and solve problems by applying their mathematical knowledge to a variety of situations.
- ☐ achieve age related expectations in Mathematics each year.
- ☐ understand and appreciate the position that Mathematics holds in everyday life.
- ☐ develop progressively as they move on to a new school, not only to enable them to meet the requirements of the National Curriculum but to prepare them to become competent mathematicians in their new destination.
- ☐ will be well prepared for their next stage of learning and will have a clear understanding of what they have been taught and where their learning will take them next.
- ☐ will develop resilience through experiencing failure but realise being wrong can be part of the process to finding a solution.
- ☐ will develop a love of Mathematics and a thirst for further learning through experiencing Mathematics within a positive culture.

Impact will be measured in a number of ways;

Through rigorous, reliable and accessible assessment. On-going assessment will occur through teacher monitoring of classwork, discussions with pupils and formal assessments. Outcomes of these will be analysed and discussed within the department and interventions and extra support set up where appropriate. Assessment outcomes will be compared to targets. Specific groups such as SEN & Disadvantaged will be closely monitored.
Lesson observations and work scrutiny.
Destination data at transition points – Key Stage 3 to GCSE, GCSE to college/A levels

Programmes on offer currently include:

Functional Skills - Entry Level 1, 2, 3, Level 1, 2
GCSE Maths

AQA Further Maths Level 3

By the time pupils leave, they should be able to:
apply their mathematics to a variety of routine and non routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Other topics, also embedded within the Maths Curriculum are:

- **Online safety /internet safety – harmful sexual behaviour**

In Maths students often use chromebooks. As part of our E Safety curriculum students are expected to follow the rules for internet safety during the lessons.

- **Character education**

Pupils are reminded of the expectations all the time which boost qualities of good character. Teachers are also role models all the time.

- **Sustainable, Environmental education SEED**

Newsround is used to keep students aware of environmental issues.

- **Trauma informed practice**

Mentoring and one-to-one support is available during the lessons.

- **Literacy**

Literacy is consolidated through key words and written comments as reflection. Pupils are reminded of application of basic Grammar and Punctuation rules as we believe that Every Teacher is a Teacher of Numeracy and Literacy.

- **Healthy relationships**

In Key stage 3 students study a cross-curricular scheme of work devised for this topic to help them make better personal choices and decisions in having healthy relationships.

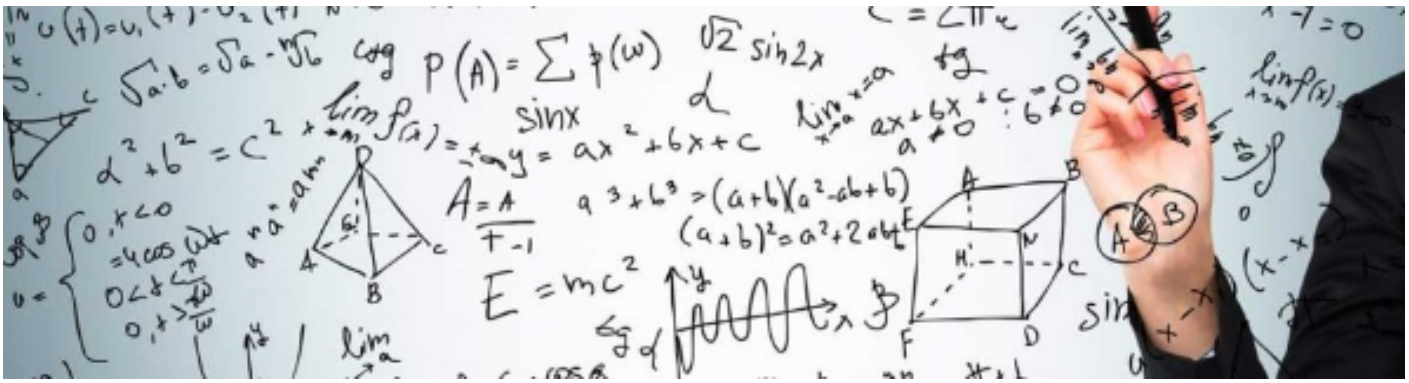
- **Equality, diversity and inclusion:** We treat every child with respect and dignity. They receive impeccable offers of bespoke interventions and extra-curricular activities regardless of their gender, sex, religion and nationality.

Remote / blended learning

Google classroom in conjunction with DrFrost Maths is used in order to provide remote learning.

- **Mental health and wellbeing**

Zones of regulation are used in lessons to help pupils manage their feelings. Pupils are also regularly referred to the strategies discussed, to minimise anxiety and stress.



Assessment and progress

Assessment is a key tool to assess progress. Pupils are assessed every half term on the content which is being taught.

Retrieval Practice is also in place. Almost every Maths lesson comprises the very first task which is based on some questions based on prior learning.

Every term pupils are also assessed on Numeracy age.

Progression of knowledge and skills

KS3 Year 1 SOW

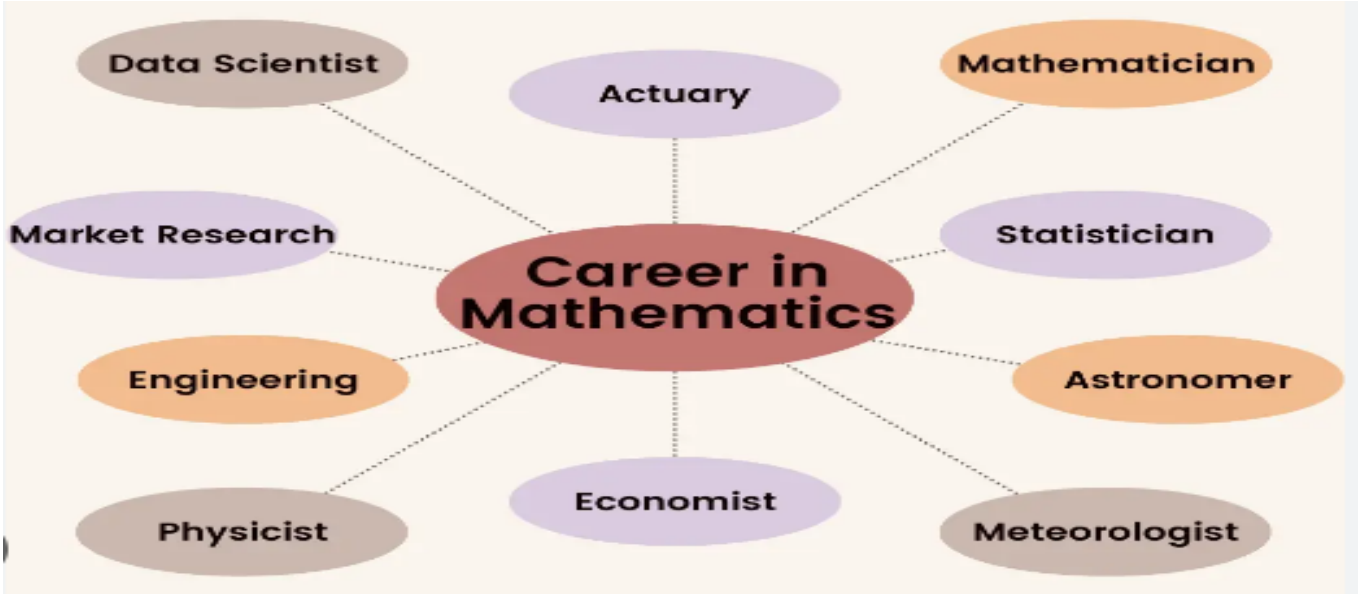
KS3 Year 2 SOW

Year 10 SOW

Year 11 SOW

Career link

This website is used in sharing and linking maths topics with different careers. Not only this resource helps them to understand and view a link between maths and real life, but also engages them in interesting conversations around career choices.



Trauma informed

It is very common to see pupils with anxiety and trauma related to maths. We have seen that the root cause of this is fear of making mistakes and teachers' marking in a different colour pen. Hence It is of paramount importance that the team is equipped with strategies to deal with such situations successfully.

We talk about sensemaking in maths. For example inverse relationship between division and multiplication, or adding 5, ten times is the same as 5 x 10.

Pupils are encouraged to mark their own work.

Different card games such as snakes and Ladders are incorporated in teaching.

BBC programmes such as Dragon's Den are very popular among pupils which helps them see the real application of maths.

'Find the mistake' resources also help pupils lower anxiety

Literacy in Maths

Key words, writing a title, writing comments about learning and making a note of next steps help pupils underpin not only basic SPAG but also subject vocabulary and key spellings. The steps above help pupils to also build up understanding of subject specific synonyms like, add and sum, multiply and times.

Numeracy in Maths

Scaffolding and differentiation of lessons helps consolidation of numeracy in lessons. As a small number of pupils in lessons highlights the importance of differentiation, it also dictates how to start their learning journey from basic numeracy skills.

ICT in Maths

Homework on DrFrost Maths is set weekly which helps them consolidate ICT and maths skills.

Equality Diversity and Inclusion in maths
FBV (Fundamental British Values) SMSC (social moral spiritual and culture)

EDI

We believe every pupil should have the same opportunity to achieve their full potential and to be successful in education, and in later life - whatever their background, ability or identity.

FBV

British values are underpinned through real life maths problems and other resources such as mathematical programmes such as Dragon's Den.

SMSC

All pupils have the opportunity to delve into maths problems and to make connections with real life. Pupils are provided with opportunities to take the challenge of solving exam questions in lessons, overturn their fears and maximise their potential.

Spiritual:

- In our maths classroom, pupils are encouraged to think logically which helps them grow spiritually
- Topics such as symmetry, sequences and patterns are all in nature
- We promote a sense of awe by giving pupils a stretch to infinity

Moral:

- We promote logical reasoning skills rather than guessing or jumping on conclusions
- We encourage pupils to listen others with respect
- Good behaviour is praised by good news slips and a follow up call home

Social:

- In our maths classroom, pupils are encouraged to share their reasoning skills either verbally, or on the main whiteboard
- Pupils are encouraged to make posters of their work which is used as display
- Pupils are encouraged to work as pairs - it creates positive competition and consolidates the learnt skills

Cultural Capital:

- We share the appreciation with the pupils that mathematics, its language and symbols have developed from many different cultures around the world: e.g. Egyptian, Indian, Islamic, Greek and Russian roots.
- We look to make explicit reference to Mathematicians contribution to progression of the subject as we teach topics throughout our Schemes of Work.
- We investigate and research cross-cultural patterns – tessellation, islamic tiling.
- We demonstrate and encourage diverse techniques e.g. for multiplication that have derived from different ancient civilisations. – Russian / Chinese multiplication, Napier's Bones etc.

Curriculum Map

<table>
<tr><th>Year</th><th>Autumn 1</th><th>Autumn 2</th><th>Spring 1</th><th>Spring 2</th><th>Summer 1</th><th>Summer 2</th></tr>
<tr><td rowspan="3">1</td><td rowspan="2">Number and Number System</td><td>Constructions Fractions</td><td>Algebraic Proficiency</td><td>Decimals</td><td rowspan="2">Percentages

FDP</td><td rowspan="2">Accuracy of Measures</td></tr>
<tr><td>Powers, roots and estimation</td><td>Factors, multiples and primes</td><td>Angles</td></tr>
<tr><td>Area, Perimeter Volume</td><td>Probability</td><td>Fractions</td><td>Proportional reasoning</td><td>Solving Equations</td><td>Presenting Data / Reading Data</td></tr>
<tr><td rowspan="3">2</td><td>Probability</td><td>Rearranging formula</td><td>Right Angle Triangles</td><td>3D Shapes</td><td>Functional Maths</td><td>Standard Form</td></tr>
<tr><td>Ratio</td><td>Graphs</td><td>Simultaneous Equations</td><td rowspan="2">Compound Measures</td><td>Expanding Binomials</td><td rowspan="2">Bounds</td></tr>
<tr><td>Angles</td><td>Proportional reasoning</td><td>Similarity and Congruence</td><td>Statistics</td></tr>
</table>

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10	Number System FDP FS Prep - Week6	Averages and range Area, Volume and Perimeter Shape and Space, Estimation and Decimals FS Prep - week 6	Ratio and proportion Bearings Plan and Elevations, Percentages FS Exam preparation	Number System Graphs and Tables FDP Past exam papers	Averages and range Area, volume and perimeter Shape and Space, Estimation and Decimals	Loci and bearings Multiplicative reasoning)
Year 11(F, H)	Number system Averages and graphs Angles Index laws Algebra Systematic Listing Box plots, parallel and perpendicular lines, equation and gradient of a line, similar shapes Cumulative Frequency, expanding triple brackets, product rule for counting	Percentages, estimation, truncating, Algebra Probability Shapes and Transformations Recurring decimals, Spheres and cones, Fractional indices Repeated percentage change, Probability equations	Prime factorisation and interest, pythagoras Compound measures, Equations and Inequalities Enlarging with negative sf, exact values,Circle theorem simultaneous equations, quadratic equations	Vectors, Trigonometry Graphs and Number Past Exam papers	Exams	Exams

Further Information

In The Maths department, we provide extra opportunities to pupils to boost their success by attending extra classes.

Maths Clinic

Year 11s have the opportunity to attend maths clinics in order to boost their understanding since the start of the year. There are two maths clinics: Foundation and Higher.

Bespoke Extra Maths Lessons

As we upheld Trauma Informed Practice, it is of high importance that every pupil receives the equal opportunity to excel. Hence we also provide bespoke sessions to meet pupils' needs during other days of the week.

Home work

Homework is set on DrFrost Maths on weekly basis. Following are the steps pupils take in order to get access to DFM platform:

- Pupils are registered on DFM platform
- As a result they receive an email in order to activate their account
- They reset their password, and they are set to go.