**Maths**

**'Without maths, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers.' Shakuntala Devi**

Maths is incredibly important in all our lives. Without realising it, we use mathematical concepts, as well as the skills we learn from doing maths problems, every day. The laws of mathematics govern everything around us, and we need a good understanding of them, to fully appreciate the world around us, as well as to be able to solve problems. Science, technology and engineering all rely on maths. It is the universal language that everyone can communicate in.

At The Holt School we aim for every student to reach their full potential in maths through exciting, aspirational teaching that testifies to our love of maths, so that they can go on to achieve whatever they want to in life.

**'Mathematics knows no races or geographic boundaries, the cultural world is one country' David Hilbert**

**What is studied at KS3**

| Year 7 | Year 8 | Year 9 |
|---|---|---|
| <ul><li>Whole numbers and decimals</li><li>Measures, perimeter and area</li></ul> | <ul><li>Decimal calculations</li><li>Ratio and proportion</li><li>Probability</li></ul> | <ul><li>Pythagoras</li><li>Sequences</li><li>3D shapes</li><li>Ratio and proportion</li></ul> |

| | | |
|---|---|---|
| • Expressions and formulae<br>• Fractions, decimals and percentages<br>• Angles and 2D shapes<br>• Graphs<br>• Whole number calculations<br>• Statistics<br>• Transformations and geometry<br>• Equations<br>• Factors and multiples<br>• Constructions and 3D shapes<br>• Sequences | • Whole numbers and decimals<br>• Measures, perimeter and area<br>• Expressions and formulae<br>• Fractions, decimals and percentages<br>• Angles and 2D shapes<br>• Graphs<br>• Decimal calculations<br>• Statistics<br>• Transformations and scale<br>• Equations<br>• Powers and roots<br>• Constructions | • Probability<br><br>Students then begin the GCSE programme of study. |

## What is studied at KS4

Students study the Edexcel linear course 1MA1 at either Higher (grades 9-5) or Foundation (grades 1-5) tier.

| Higher Tier | Foundation Tier |
|---|---|
| • Number: estimation, indices, standard form, surds. | • Number: calculations, decimals, place value, factors and multiples, primes, indices. |
| • Algebra: indices, expanding bracket and factorising, equations, formulae, linear and non-linear sequences. | • Algebra: simplifying expressions, substitution, formula, expanding single brackets and factorising. |
| • Data: statistical diagrams, time series, scatter graphs and lines of best fit, averages and range. | • Graphs, tables and charts: frequency tables, two-way tables, representing data, time series, stem and leaf diagrams, pie charts, scatter graphs and lines of best fit. |
| • Fractions, ratio & percentages: Fractions, ratio and proportion, percentages. | • Fractions and percentages: calculations with fractions, changing between fractions, decimals and percentages, calculations with percentages. |
| • Angles and trigonometry: angles in triangles and quadrilaterals, interior and exterior angles of polygons, Pythagoras' theorem, trigonometry in right-angled triangles. | • Equations, inequalities and sequences: solving equations and inequalities, using formulae, linear sequences. |
| • Graphs: linear, real-life, quadratic, cubic and reciprocal. | • Angles: angles in parallel lines and triangles, interior and exterior angles. |
| • Area and volume: perimeter and area, units and accuracy, prisms, circles, sectors, cylinders, spheres, cones, pyramids. | • Averages and range: mean, median, mode and range, estimating the mean, sampling. |
| • Transformations and constructions: reflection, rotation, enlargement, translation, | |

- combinations of transformations, bearings and scale drawings, constructions, loci.
- Equations and inequalities: quadratic equations, completing the square, simultaneous equations – linear and linear & quadratic, linear inequalities.
- Probability: combined, mutually exclusive and independent events, tree diagrams, conditional probability, Venn diagrams and set notation.
- Multiplicative reasoning: growth & decay, compound measures, ratio & proportion.
- Similarity and congruence: congruence and geometric proof, similarity in 2D and 3D.
- Trigonometry: graphs of sine, cosine and tangent, sine and cosine rule, area, 3D trigonometry, transforming graphs.
- Statistics: sampling, cumulative frequency, box plots, histograms, comparing distributions.
- Equations and graphs: Solving simultaneous equations graphically,

- Perimeter, area and volume: rectangles, triangles, parallelograms, trapezia and compound shape, changing units, surface area, volume of prisms.
- Graphs: coordinates, linear graphs, gradient of linear graphs, $y = mx + c$, distance-time and velocity-time graphs.
- Transformations: translation, reflection, rotation, enlargement, combining transformations and describing.
- Ratio and proportion: writing and using ratios, proportion, proportional graphs.
- Right-angled triangles: Pythagoras' theorem, trigonometry.
- Probability: experimental probability, tree diagrams, Venn diagrams.
- Multiplicative reasoning: percentages, growth and decay, compound measures, distance, speed and time, direct and inverse proportion.

- representing inequalities graphically, graphs of quadratic and cubic equations and using them to solve equations.
- Circle theorems.
- Algebra: rearranging formulae, algebraic fractions and equations involving them, surds, functions, proof.
- Vectors and geometric proof: vector notation, parallel vectors and collinear points, solving geometric problems.
- Proportion and graphs: direct and inverse proportion, exponential functions, non-linear graphs, transforming graphs.

- Constructions, loci and bearings: 3D solids, plans and elevations, accurate and scale drawings, constructions, loci, bearings.
- Quadratic equations and graphs: expanding double brackets and factoring, plotting and using quadratic graphs, solving quadratic equations.
- Perimeter, area and volume: area and circumference of a circle, sectors, cylinders, cones, spheres and composite solids.
- Fractions, indices and standard form: multiplying/dividing fractions, indices laws, standard form.
- Congruence, similarity and vectors: similarity and enlargement, congruence, vectors.
- Algebra: cubic and reciprocal graphs, non-linear graphs, solving simultaneous equations graphically, and algebraically, rearranging formulae, proof.

# What is studied at KS5

Edexcel Maths code 9MAO papers 1-3.

Edexcel Further Maths code 9FMO paper 1, 2 and 3_d.

| Year | Maths | Further Maths |
|------|-------|---------------|
| **12** | Algebra; simultaneous equations; exponents and surds; equations of lines; quadratics; inequalities; circles; polynomials; binomial expansion; trigonometry; single variable data; radians; trigonometric graphs; scatter graphs; measures of spread; SI units; measures of location; kinematics; exponentials; large data set; functions; vectors; graph transformations; differentiation; logarithms; probability; dynamics; integration; sequences. | Complex numbers; matrices; decision algorithms/graphs; roots of polynomials; series; decision critical paths; proof; Binomial distribution; Poisson distribution; decision linear programming; discrete random variables; vectors; Geometric distribution; Chi-squared. |
| **13** | Sequences; calculus and kinematics; binomial expansion; parametric equations; binomial distribution; large data set; vertical plane motion; | Complex numbers; differential equations; probability generating function; hypothesis testing; simplex algorithm; integration; polar |

| | trigonometry; differential equations; friction; moments; integration; normal distribution; numerical methods; hypothesis testing; connected particles; vectors in mechanics; modelling; proof. | coordinates; central limit theorem; hyperbolic functions; Type I and II errors. |
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