

KS3 Mathematics at Norbury

Overview

Mathematics has developed over time and having an understanding of basic numeracy is essential to navigating everyday life. At the heart of mathematical study is the development of problem solving, discussion, analysing, reasoning and independent thinking. The department is passionate about delivering an engaging and relevant curriculum that will develop confident individuals both in the classroom and beyond.

Year 7 Mathematics

The department follows the Mathematics Mastery approach at Key Stage 3. This approach ensures students master and acquire a solid enough understanding of the mathematics being taught to enable them to move on to more advanced material. Mastering mathematics means students acquiring a deep, long-term, secure and adaptable understanding of the subject.

UNIT 1: Place Value

The focus of the first unit is to understand and use place value for decimals, measures and integers of any size as well as order positive and negative integers. Students will also learn to round numbers and measures to an appropriate degree of accuracy. For example to decimal places or significant figures

UNIT 2: Addition and Subtraction

Students are taught to use formal methods for addition and subtraction of integers and decimals. Mastery then looks to use this to introduce other skills such as problems involving perimeter.

UNIT 3: Multiplication and Division

To begin by multiplying and dividing by 10, 100 and 100 and then to ensure students have formal written methods of multiplication and division of integers and decimals. Students are introduced other topics that use multiplication and division such as solving problems involving area of rectangles, triangles and parallelograms

UNIT 4: Fractions

Students are introduced to fractions using diagrams and on a number line going on to express one quantity as a fraction of another, identify and use equivalent fractions, simplify fractions, convert between mixed and improper fractions and order fractions. Students will also be taught to add, subtract, multiply and divide fractions and use this to solve problems in functional contexts.

UNIT 5: Statistics

This unit focuses on representing and interpreting data such as bar charts, pie charts, pictograms and two way tables. Students will also be introduced to averages such as finding the mode, medium, range and mean from real life data.

UNIT 6: Negative Numbers

This unit looks at directed numbers in the real world such as temperature and finances. Students will also be introduced to the rules of negative numbers

UNIT 7: Algebra

This is an introductory unit into algebra. Students will understand that a letter can be used to represent a variable. The focus is to understand the basics of algebra such simplifying expressions through collecting like terms, multiplication and division. Students will also be introduced to solving simple equations.

UNIT 8: Geometry – Angles

This unit introduces shapes and polygons and using the appropriate language to describe their properties. Students will be taught how to measure angles using a protractor and calculate angles using all the various angle rules such as angles on a straight line, angles at a point, vertically opposite angles and more.

All students will take a unit test following each unit taught as well as more summative assessments at the end of term.

Year 8 Mathematics

Maths in year 8 builds on the students' knowledge from year 7 and focuses on deeper understanding.

UNIT 1: Basic Numeracy

The start of the year looks to recap many of the key numeracy skills taught in year 8 that are needed to access further topics such as methods for addition, subtraction, multiplying and division as well as rounding and estimating.

UNIT 2: Fractions

Recapping the skills taught from year 7 such as using the four operations with fractions and then introducing links between fractions, decimals and percentages.

UNIT 3: Percentages

Recognising the use of percentages in the real world and linking percentages with fractions and decimals. Students will be taught to find percentages of an amount without a calculator and use this to solve problems involving percentage increase and decrease.

UNIT 4: Algebra

Using the skills taught in year 7, students will learn new skills such as expanding over a single or double bracket, factorising expressions and using algebra to model and solve problems. Students will also learn to rearrange equations.

Unit: 5 Geometry – Area and perimeter

Students will understand the difference between area and perimeter and see their use in the real world. Students will look to calculate the area of a variety of 2D shapes such as rectangles, triangles, trapeziums and circles.

Unit 6: Geometry – Ratio, Proportion and Rates of Change

Students will be introduced to ratio notation and use ratios to split quantities in amounts and then look further to solve problems that involve direct and inverse proportion.

Unit 7: Statistics

Students will recap the skills taught in year 7 and extend this by representing and interpreting data on stem and leaf diagrams and using averages to analyse data such as comparing the mode, medium or range of two sets of data.

Unit 8: Geometry and 3D Shapes

Using the ideas of area taught in year 7, students will look at surface area in a 3D shape. Students will look at 3D shapes and their properties. This will extend to understanding volume and calculating the volume of 3D prisms.

Similarly to year 7, all students will take a unit test following each unit taught as well as more summative assessments at the end of term.

Year 9 Mathematics

In Year 9, we begin to look at introducing concepts used at GCSE and specifically topics that have not been taught before in previous years. Some of these are then revisited in GCSE, helping to cement their understanding.

UNIT 1: Recap and Revise

A recap of a variety of Mathematical skills such as numeracy, algebra, fractions and percentages.

UNIT 2: Algebra – Linear and Quadratic graphs

Students will learn to draw and plot linear and quadratic graphs. This will also introduce them to the algebra that revolves around linear graphs ($y = mx + c$) such as gradient and y intercept.

UNIT 3: Geometry – Transformations

Students will be introduced to the different transformations such as reflection, rotation, translation and enlargement.

UNIT 4: Geometry – Bearings and Constructions

Students will use their knowledge on angles to understand the concept of bearings and their use. This unit focuses on using mathematical equipment such as compasses and protractors accurately to construct shapes.

UNIT 5: Statistics

Students will begin to compare and analyse two sets of data using scatter diagrams and identify the correlation between them. They will also be introduced to finding averages such as the mean from frequency tables.

UNIT 6: Probability

This unit will introduce the idea of randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale. Students will learn to calculate probabilities and solve problems using sample space diagrams.

UNIT 7: Standard Form, Indices and Surds

This unit will look at the laws of powers/indices and extend this to introduce standard form and doing calculations using standard form. The idea of Surds is also introduced

UNIT 8: Pythagoras and Trigonometry

Students will be introduced to the concepts of both Pythagoras and Trigonometry. This will begin by identifying and labelling the sides of right angled triangles and using either skill to find a missing length or angle.

UNIT 9: Similar and Congruent Shapes

Students will learn to visually recognise two congruent shapes as well as learn when two shapes are similar. Students will go on to further prove congruency in different shapes.

KS4 Mathematics at Norbury

Every student at Norbury follows the EDEXCEL syllabus for GCSE Mathematics. There are two tiers of entry. Students are entered for either the Higher Tier or the Foundation Tier. Both tiers follow the Linear Course 1MA1. Here, students will undergo a final assessment at the end of the course.

The GCSE course covers the following attainment targets:

- Number
- Algebra

- Ratio Proportion and Rates of Change
- Geometry and measures
- Statistics and Probability

There are two tiers of entry which will now be assessed using the new number scale rather than grades: Higher (Scale 4-9 with a 3 being awarded in most years) and Foundation (Scale 1-5). The course starts in Year 10 and continues through to Year 11. The tier of entry is based on the student's KS3 result and her progress subsequent to that. The final decision is not made until after the mock GCSE exams have taken place in Year 11.

During the course students take Unit Exams at the end of each unit taught. These are used to set predicted grades and may lead to set changes if the student would benefit from a move to a higher or lower set.

The Linear Course is assessed through three terminal examination papers of equal weighting. Each paper is 1 hour 30 minutes and contains 80 marks each. Paper 1 is a non calculator. Calculators are allowed for paper 2 and 3.

A scientific calculator, ruler, protractor and compasses are all ESSENTIAL to the course. Homework books and GCSE practice papers are used throughout the course. Students are encouraged to purchase text books or revision books to support study at home.

The department also subscribes to two on-line software's called "MathsWatch" and "Hegarty Maths". Both contain video lessons on all GCSE topics taught throughout the course, accompanying worksheets and online tasks that are set regularly by teachers as independent study.

Year 10 GCSE Foundation Mathematics

Number

- Integers and Place value – working with four operations, rounding and estimating
- Working with decimals – four operations and ordering
- Powers and Roots – square, cube numbers and their roots
- Factors and Multiples – finding the Highest Common Factor and Lowest Common Multiple
- Fractions – four operations, fractions of an amount and comparing fractions
- Percentages – of an amount, increase and decrease, VAT, profit and loss

Algebra

- Simplifying expression – collecting like terms, multiplying and dividing

- Form expressions – area and perimeter and modelling problems with algebra
- Expanding over a single bracket
- Substitute positive and negative values into expressions and formulae
- Factorise expressions
- Solve simple formulae - Solve linear equations with unknowns on both sides
- Solve inequalities on a number line
- Rearrange simple equations
- Sequences – continue an arithmetic or geometric sequence, find the nth term of a sequence and use the nth term to generate a sequence
- Straight line graphs – plot and label linear graphs, find and interpret the gradient

Geometry and Measure

- Shape and Angles – recognise different angle rules, angles at parallel lines and angles in polygons
- Tessellations – continue the tessellation of regular shapes
- Polygons – interior and exterior angles of regular and irregular polygons
- Area and perimeter – find the area of 2D shapes by counting and formula
- Volume – of 3D shapes including cuboids and prisms

Statistics and Probability

- Representing Data – bar charts, pictograms, line graphs, frequency polygons, two way tables, stem and leaf diagrams, pie charts and scatter diagrams
- Averages – from a data set and from frequency tables (including grouped frequency tables)

Year 11 GCSE Foundation Mathematics

Number

- Multiplicative Reasoning – simple and compound interest, reverse percentages, growth and decay problems
- Ratio – simplest form, splitting a quantity in a ratio, exchange rates, recipe ratios, scale drawings and maps
- Proportion – best buy, direct and inverse proportion
- Standard Form – write numbers in and out of standard form

Algebra

- Quadratics – expand double brackets, factorise into double brackets, find the roots of an equation

- Graphs – plot quadratic graphs and estimate solutions
- Simultaneous Equations – solve both graphically and algebraically

Geometry and Measure

- Transformations – reflect, translate, rotate and enlarge shapes
- Circles – area and circumference and volume of cylinders
- Pythagoras Theorem – find the hypotenuse and short sides of a right angled triangle
- Trigonometry – label right angled triangles appropriately and use Trigonometry to find a missing length or angle
- Construction and Loci – construct triangles and use simple laws of loci using perpendicular and angle bisectors
- Similarity and Congruence – identify similar and congruent shapes
- Plans and elevations
- Vectors – column notation, add/subtract vectors, vectors from a to b

Statistics and Probability

- Probability – probability scale, list outcomes of events, sample space diagrams, two way tables and frequency trees

Year 10 GCSE Higher Mathematics

Number

- Calculations and rounding – working with four operations including decimals, rounding and estimating
- Indices and Roots – laws of indices, negative and fractions indices
- Factors and Multiples – finding the Highest Common Factor and Lowest Common Multiple
- Standard form – calculations in standard form
- Surds – simplify, expand and rationalise surds
- Fractions – four operations, fractions of an amount and comparing fractions
- Percentages – of an amount, increase and decrease, VAT, profit and loss, percentage multiplies, reverse percentages, simple and compound interest
- Recurring decimals to exact fractions
- Ration – simplest form, splitting a quantity, exchange rates, best buy problems, maps and scales
- Direct and Inverse proportion – find the constant of proportionality
- Accuracy and Bounds – upper and lower bounds

Algebra

- Expanding brackets – single, double and triple brackets
- Solve linear equations – simple and with unknowns on both sides
- Rearrange equations – make x the subject of an equation
- Factorise – into single and double brackets
- Iterations – use iterations to find solutions
- Sequences – find the n th term of a linear and quadratic sequence
- Straight line graphs – plot and label linear graphs, find and interpret the gradient, relationships between parallel and perpendicular lines

Geometry and Measure

- Shape and Angles – recognise different angle rules, angles at parallel lines and angles in polygons, interior and exterior angles of regular and irregular polygons
- Pythagoras Theorem – find the hypotenuse and short sides of a right angled triangle
- Trigonometry – label right angled triangles appropriately and use Trigonometry to find a missing length or angle, angles of elevation and depression
- Finding exact trigonometric ratios
- Area and perimeter – find the area of rectangles, triangles, parallelograms, trapeziums, area and circumference of circles, arc length and area of sectors
- Volume – of prisms, changing between units of volume, spheres, cones and frustums
- Transformations – reflect, translate, rotate and enlarge shapes and describe transformations
- Loci and Constructions – bearings, plans and elevations, bisectors and loci problems

Statistics and Probability

- Representing Data – frequency polygons, two way tables, stem and leaf diagrams, pie charts and scatter diagrams. Interpretation of graphs.
- Averages – from a data set and from frequency tables (including grouped frequency tables), pros and cons of different averages, moving averages

Year 11 GCSE Higher Mathematics

Algebra

- Quadratics – expand double brackets, factorise into double brackets, find the roots of an equation
- Graphs – recognise and draw graphs of quadratics, cubic, graphs of circles and reciprocal graphs
- Solving quadratics – by factorising, quadratic formula and completing the square
- Simultaneous equations – solve graphically, linear and quadratic simultaneous equations
- Inequalities – solve linear and quadratic inequalities (on a number line and sketch a graph)
- Algebraic fractions – simplify and use four operations on algebraic fractions
- Functions – inverse and composite functions
- Graphs of trigonometric functions – transformation of graphs

Geometry and Measure

- Similarity and congruence – prove congruence using SSS, SAS, ASA and RHS, prove two shapes are similar, similarity in lengths, areas and volume
- Further Trigonometry – sine and cosine rule, area of triangles, further trigonometry in 3D shapes
- Circle geometry – equation of tangents, gradient of the radius, perpendicular lines
- Vectors – vector notation, problems using division of vectors, prove two vectors are parallel or collinear

Statistics and Probability

- Probability – probability scale, list outcomes of events, sample space diagrams, two way tables, Venn diagrams and tree diagrams using independent and conditional probabilities
- Data – sampling, capture recapture
- Cumulative Frequency and Box plots – median and quartiles
- Histograms – drawing and interpreting