

CURRICULUM INTENT

THRESHOLD CONCEPTS

TC1 Mathematics begins with simple rules, which are built upon to create the different operations of arithmetic. These are set in a specific hierarchy, meaning that calculations that involve more than one different operator must be completed following the order of operations.

TC2 Every digit has a specific value according to its place in the number. We can use place value diagrams to compare and order numbers, and to convert easily between fractions, decimals and percentages.

TC3 All fractions can have different forms. We can use fractions to represent a division and vice versa and use the concept of equivalent fractions to help simplify and solve calculations.

TC4 Ratio is used to compare two or more quantities, and many mathematical problems can be modelled using ratio notation. Similar to fractions, all ratios can have different equivalent forms, allowing us to simplify and solve complex problems.

TC5 All mathematical operations have their inverse, which can be used to find the starting value when the final answer of a calculation is already known. This can also be applied in problem solving and checking of answers to calculations.

TC6 Calculations either side of the "=" symbol are equal in value.

TC7 Algebraic symbols are used in place of numbers that are either unknown or can be any value, and calculations involving these symbols follow the same rules as with number. This means that algebraic calculations can be checked by substituting numbers for each symbol at any stage.

SUPPORT AT HOME

Exploring websites such as BBC Bitesize KS3 Maths, Nrich and Numberphile

Supporting with homework on Sparx Maths

Talking about real world Maths in the adult world such as budgeting, special offers and getting a loan.

ENRICHMENT

Enrichment opportunities:

TRIPS LINKED TO MATHEMATICAL EVENTS, GUEST SPEAKERS, AFTER SCHOOL CLUBS, COMPETITIONS, WHOLE SCHOOL ACTIVITIES TO CELEBRATE PI DAY, NATIONAL NUMERACY DAY AND INTERNATIONAL DAY OF MATHEMATICS.

PERSONAL DEVELOPMENT

It is the intention of the Mathematics department to provide students with opportunities to develop themselves into mathematicians: someone who is resilient and enjoys challenges; is reflective and adaptable in their techniques; they will be able to communicate their reasoning and methods clearly, both verbally and through their written work using correct mathematical notation; they will be able to solve problems in an organized and logical manner and be confident in the accuracy of their answers.

CURRICULUM LINKS

SCIENCE: Collecting, representing and analysing data, using diagrams such as bar chart, line graphs and scatter graphs; using formulae and equations; reading scales when taking measurements; reading and plotting graphs; rounding integers and decimals.

GEOGRAPHY: Interpreting data represented as pie charts, bar charts and line graphs.

HISTORY: Understand and use a timeline.

TECHNOLOGY: Drawing 2D representations of 3D objects using plans and elevations, and isometric diagrams; taking accurate measurements of length and angles; calculating area and volume of products and linking this to costs.

ART: Ratio and proportion when ensuring composition of a piece of work is scaled correctly.

CAREERS

- Trips to universities to allow students to experience mathematics at higher and further education level, with discussions on how these qualifications lead to mathematical careers
- STEM activities allowing students to experience how mathematics links to science, technology and engineering
- Careers day where employers visit the academy and talk to students about mathematical careers and pathways that involve mathematics

THRESHOLD CONCEPTS : 1, 2, 5

WHAT

Students will:

- Perform addition, subtraction, multiplication and division with positive integers and know which are commutative.
- Express integers as prime factors and find the highest common factor (HCF) and lowest common multiple (LCM)
- Understand the correct order of operations, including calculations involving exponents, roots and brackets.
- Calculate with positive and negative integers

WHY

Number forms the foundation upon which all other topics are built upon. It is a prerequisite of all the other areas of Maths. Students need to be fluent and confident with the four operations.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; low stakes tests; bespoke Sparx Maths homework activities; end of term assessments

Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Addition, summand, sum, subtraction, subtrahend, minuend, difference, multiplication, product, multiple, factor, prime, division, quotient, divisor, vinculum, exponent, root, bracket.

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: DECIMALS AND FRACTIONS

THRESHOLD CONCEPTS : 1, 2, 5

WHAT

Students will:

- Use place value to compare, order, add, subtract, multiply and divide by powers of 10
- Multiply decimals using equivalent calculations, inverse operations and place value
- Round integers and decimals to a given place value or significant figure
- Estimate calculations using rounding
- Use equivalent fractions to simplify, compare, order fractions, and perform the four operations with fractions

WHY

Decimals and fractions are used in many areas across mathematics. Students need to be fluent and confident working with numbers expressed as fractions and decimals.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; low stakes tests; bespoke Sparx Maths homework activities; end of term assessments

Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Decimal, fraction, vinculum, numerator, denominator, proper, improper, mixed number, inverse, reciprocal, significant, estimate, approximate, round, equivalent, simplify

READING SKILLS

THRESHOLD CONCEPTS : 1, 2, 3, 5

WHAT

Students will:

- be able to use place value and equivalent fractions to convert between fractions, decimals and percentages
- be able to calculate percentages of amounts with and without a calculator
- be able to increase and decrease an amount by a percentage, including sales discounts
- be able to apply percentages to real world contexts of bank interest and depreciation
- be able to understand the proportional connection of percentages as a multiplier

WHY

This is covered after decimals and fractions as it allows students to interchange between the three representations that a value can take, before further exploring the area of percentages.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; low stakes tests; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Decimal, fraction, vinculum, numerator, denominator, inverse, significant, estimate, approximate, round, equivalent, simplify

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: PROBABILITY, AND PROPORTION AND RATIO

WHAT

Students will:

- be able to use a probability scale for comparing the likelihood of the outcomes of events
- be able to use FDP to express the probability of outcomes occurring (or not)
- be able to use probability diagrams to systematically organise all possible outcomes of multiple events
- be able to understand ratio notation and equivalent ratios
- be able to understand real life ratio contexts (maps, scale drawings)
- be able to share amounts in a ratio, and find unknown amounts using equivalent ratios

WHY

Probability applies the concepts of equivalence of FDP, building on previous units. Ratio is covered after probability to avoid the incorrect use of expressing probabilities as a ratio.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; low stakes tests; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Ratio, proportion, similar, event, trial, outcome, certain, impossible, probability, probability scale, likelihood, equally likely,

READING SKILLS

WHAT

WHY

HOW

VOCABULARY

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

- Students will:
- understand the history of measuring and the need for the imperial and metric systems
 - be able to convert units of measurement between and within the metric and imperial systems
 - be able to estimate measurements
 - be able to use mathematical equipment to accurately draw (ruler/protractor/angle measurer) or construct (straight edge/compass) a diagram

Now that the foundations of number have been covered, this unit introduces students to the history of the measurement system, and the equipment we use to accurately construct diagrams. It builds upon their understanding of reading from scales

ASSESSMENT
How students will be assessed: GL baseline assessments; low stakes tests; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

Metric, imperial, scale, milli-, centi-, deci-, kilo-, mega-, giga-, metre, litre, gram, length, mass, volume, capacity, construct, locus, loci, path, region, parallel, perpendicular, bisect, equidistant

HALF TERM 2: ANGLES

WHAT

WHY

HOW

VOCABULARY

READING SKILLS

- Students will:
- be able to recall and apply basic angle facts and properties
 - be able to use the interior angle sum of a triangle to find the interior and external angles of all polygons
 - be able to calculate angles in parallel lines
 - be able to use angles in parallel lines with bearings

This unit continues with working with geometric diagrams, but now without the need to accurately construct them first.

ASSESSMENT
How students will be assessed: GL baseline assessments; low stakes tests; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

Acute, obtuse, reflex, full turn, right-angle, parallel, transversal, perpendicular, corresponding, vertically opposite, polygon, triangle, quadrilateral, pentagon, hexagon, heptagon, octagon, nonagon, decagon, diagonal

WHAT

Students will:

- be able to read times given in 12 and 24 hour format
- be able to calculate the length of time intervals
- be able to calculate the speed, distance or time of a journey
- be able to draw and read from a distance-time graph
- know different types of data, how this data is collected, and why sampling is used
- be able to summarise data sets through averages and range
- be able to draw conclusions from calculated averages and ranges, and compare sets of data

WHY

This needs to be covered as it is on the KS3

National Curriculum.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Second, minute, hour, day, month, year, timeline, speed, distance, compound measure, average, typical, mode, modal, median, mean, range, distribution

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: WORKING WITH AND REPRESENTING DATA

THRESHOLD CONCEPTS : 1, 2, 3, 4, 5

WHAT

Students will:

- be able to find averages from frequency tables and grouped frequency tables
- be able to represent a data set through pictograms, bar charts, pie charts and timeseries graphs
- be able to use scatter graphs to find correlation between two data sets
- be able to understand misleading data diagrams

WHY

This needs to be covered as it is on the KS3

National Curriculum.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Average, typical, mode, modal, median, mean, range, distribution, tally, pictogram, bar chart, line graph, time-series graph, pie chart, scatter graph, correlation

READING SKILLS

WHAT

Students will:

- understand basic algebraic notation and conventions of unknowns and variables
- be able to represent problems using algebra
- be able to simplify expressions by collecting terms and find the values of expressions using substitution
- be able to solve linear equations and inequalities using the balance method
- understand that algebra calculations follow the same rules as number
- be able to expand single brackets and factorise expressions into a single bracket
- understand and represent inequalities on a number line and using symbols

WHY

Having a solid foundation of number from Year 7, students now move to using numbers in a more general sense via algebra.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Unknown, variable, expression, term, identity, equation, formula, equal, not equal, inequality, factorise, expand, simplify, coefficient, solve, solution, substitution

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: SEQUENCES AND GRAPHS

WHAT

Students will:

- be able to identify and continue a sequence using diagrams and numbers, including special sequences (square, triangle, cube and Fibonacci)
- be able to find terms in a sequence, and use algebra to represent a sequence (nth term)
- be able to represent a sequence on a graph, and find the equation of a line on a graph
- understand the properties the gradient and the y-intercept of a straight line graph.

WHY

Students build upon their KS2 understanding of basic number patterns to linear and non-linear sequences, which is then linked to the visual representation of graphs

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Number pattern, sequence, term, rule, nth term, substitution, Fibonacci, squares, cubes, triangular, Pascal, x-axis, y-axis, gradient, y-intercept

READING SKILLS

THRESHOLD CONCEPTS : ALL

WHAT

Students will:

- understand and use formulae with substitution
- be able to model a problem using a formula
- be able to rearrange a formula using the balance method
- understand the definition and properties of polygons including special quadrilaterals and triangles
- be able to find the perimeter and area of 2D shapes by counting squares and using a formula
- understand the derivation of area formulae for special quadrilaterals

WHY

Formulae continues students exploration into algebra, before returning to working with geometry and 2D representations.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Formula, variable, substitution, coefficient, subject, quadrilateral, parallel, perpendicular, trapezium, parallelogram, rhombus, kite, delta, rectangle, square, regular, diagonal, bisect

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: PERIMETER & AREA, VOLUME & SURFACE AREA

WHAT

Students will:

- continue working with perimeter and area
- be able to draw 2D representations of 3D solids using plans and elevations
- be able to draw the net of simple solids
- be able to find the surface area of a solid
- be able to calculate the volume of a solid by counting cubes, proportional reasoning and by formula

WHY

Having explored 2D representations in the previous units, students move onto how we can represent and work with 3D solids.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Perimeter, distance, length, area, base, height, rectilinear, compound area, perpendicular, elevation, plan, isometric, net, face, edge, vertex, volume, surface area, solid

READING SKILLS

WHAT

Students will:

- know that a value can be represented as a fraction or decimal or percentage, and convert fluently between them
- be able to find the decimal, fraction or percentage of an amount
- be able to add, subtract, multiply and divide with decimals
- be able to add, subtract, multiply and divide with proper and improper fractions, and mixed number
- be able to use reciprocals as the inverse of multiplication

WHY

Students get to revisit the foundations of mathematics which are a prerequisite of all the other topics within this subject.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Decimal, fraction, vinculum, numerator, denominator, proper, improper, mixed number, inverse, reciprocal, inverse, equivalent, simplify

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: PERCENTAGES 2 AND TYPES OF NUMBERS

WHAT

Students will:

- be able to increase or decrease an amount by a percentage
- be able to calculate repeated percentage change, compound interest and depreciation
- be able to solve reverse percentage problems
- understand the need and history of the different number systems
- be able work with numbers expressed using index and standard index form

WHY

Students revisit basic percentages before extending to areas that are applicable to areas such as loans and finance, before studying the history of the number systems and exploring the various formats that numbers can take.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Percentage, fraction, decimal, multiplier, inverse, compound interest, simple interest, depreciation, standard form, index, exponent, power, root, integer, rational, quotient, irrational, surd, real

READING SKILLS

THRESHOLD CONCEPTS : ALL

WHAT

Students will:

- be able to simplify expressions by collecting like terms
- be able to expand and factorise expressions to a single bracket and double brackets
- be able to plot a linear and quadratic function on a coordinate grid
- be able to use a graph to solve a linear equation, a quadratic equation, and twolinear simultaneous equations

WHY

Students revisit basic algebraic manipulation and linear functions before building upon this and covering quadratic functions.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Unknown, variable, expression, term, identity, equation, formula, equal, not equal, inequality, factorise, expand, simplify, coefficient, solve, solution, substitution, linear, quadratic, function, parabola, turning point, simultaneous, intersection

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: OTHER FUNCTIONS, PYTHAGORAS AND TRIGANOMETRY

WHAT

Students will:

- be able to plot non-linear graphs including cubic, reciprocal and exponential functions
- be able to find approximate solutions to non-linear equations using a graph
- be able to recall and apply Pythagoras' Theorem to find missing sides in right-angled triangles
- be able to apply trigonometry to find missing sides and angles in right-angled triangles

WHY

Studying Pythagoras' Theorem and trigonometry allows students to fill the gap of finding the perimeter of shapes that are rectilinear.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Non-linear, cubic, reciprocal, exponential, solve, intersection, Pythagoras, hypotenuse, square, root, trigonometry, sine, cosine, tangent, arcsine, arccosine, arctangent, theta, alpha

READING SKILLS

WHAT

Students will:

- be able to plot and read Cartesian coordinates in all four quadrants
- be able to find the midpoint and the distance between two coordinates
- be able to find the line of symmetry and order of rotational symmetry of a 2D shape
- be able to describe and complete a translation, reflection and rotation of a 2D shape on a coordinate grid
- understand the criteria of congruent triangles, and what properties are preserved
- be able to describe and complete an enlargement of a 2D shape on a coordinate grid, and know what properties are preserved between similar shapes

WHY

Continuing with geometry and working with 2D shapes, students revisit and extend their understanding of coordinates before exploring how we can mathematically transform a shape, knowing which properties are conserved each time.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Coordinate, midpoint, congruent, transformation, translation, vector, reflection, rotation, centre, enlargement, similar, scale factor

READING SKILLS

Students will be introduced to keywords and concepts in lessons, which will be copied into their class books. They will be able to develop their reading skills when answering Maths problems set in real life contexts, that require students to extract the relevant information from a text.

HALF TERM 2: DIRECT & INDIRECT PROPORTION, PROOF

WHAT

Students will:

- be able to use proportional reasoning to solve problems
- be able to represent a directly proportional relationship as a graph
- be able to solve problems involving inverse proportion
- be able to argue mathematically and prove whether a statement is true or false
- Clearly communicate the method and reasoning used to solve a mathematical problem

WHY

Ratio and proportion have lots of applications across the curriculum, and students are able to explore and further their understanding of proportional relationships. Students are also introduced to the concepts of simple proof and how the rules and theorems of mathematics have arisen across the centuries, as well as learning how to communicate mathematically.

HOW

ASSESSMENT

How students will be assessed: GL baseline assessments; bespoke Sparx Maths homework activities; end of term assessments
Students will also be assessed through: questioning, whole class feedback; live marking; spelling tests for key words.

VOCABULARY

Direct, inverse, proportional, proportionality, linear, non-linear, proof.

READING SKILLS