Maths Curriculum Map

Intent:

- All students will build on their prior learning
- Key gaps and misconceptions will be identified and corrected
- All students have the ability to make progress
- All students will learn the mathematical skills needed for wider life
- All students will gain confidence in using the mathematical skills
- All students will work towards identifying where the maths will be used in later life

These themes are the ones started in primary school and those which are used in most areas in wider life. These are the building blocks for other subjects and the foundation knowledge for continuing mathematics education post-16. These are the themes which are defined in the national curriculum and offer a broad and balanced coverage of maths as a subject, allowing the scope for students to gain the important skills for life while challenging and inspiring them. Each theme is visited each year to ensure that prior learning is built upon and that their confidence in each of these areas is built upon as they mature and develop their understanding of how mathematics can be used in different fields.

We use a mastery method of teaching, ensuring that prior learning is secure before we begin to build the next layer of learning. Misconceptions are identified and addressed, gaps in prior knowledge are remedied and all the skills are regularly practiced to ensure that students can transfer these skills into secure long term memory, to be accessed with ease when it is needed. This also builds fluency with the calculations and reduces load on the working memory, allowing students to use the skills to solve problems efficiently.

Intrinsic Subject Value

- Maths is essential in life, you cannot get away from the basic skills being delivered in the maths classroom
- Wider life skills such as problem solving, analytical thinking, clear and concise communication are developed through the use of maths
- All jobs and careers will use some maths skills
- The maths in the classroom supports other subject areas, such as science, DT, Art and music to name a few.

KS2 *Maths* Curriculum

On entry to Court Fields School we will use KS2 assessment data where this is available to have a detailed profile of each students' prior mathematical capabilities. When this is not available we will assess the students' competencies in the KS2 National Curriculum to ensure that teachers are aware of entry points and know how and when to support students so every student can make progress in the classroom. We also use the KS2 (or alternative) testing data to group students in rough ability sets. This setting is reviewed regularly and students should always be in a group that builds on their secure knowledge and fully challenges them to make progress. Before teaching a topic we will assess the students to ensure that the prior learning needed or the new skills is secure. If it is not, then we will spend time ensuring that students are confident with these skills before we move on, even when these skills come from the KS2 curriculum rather than the KS3 curriculum.

Maths themes that run through the curriculum

🟨	Geometry
🟩	Number system and calculation
🟦	Algebra
🟪	Probability
🟦	Statistics

Year 7 Emerging (Red)

Geometry

Rationale:
Students will learn the skills necessary to support the work that they will be doing in other areas of school, such as measurement, converting units, and transformations and constructions. Students will already have met concepts of angles and other standard measurements. They will deepen their understanding of the vocabulary surrounding shape and spatial reasoning.

Substantive Knowledge:
Can measure line segments and angles using standard equipment
Can read measurements on standard scales
Can identify faces, edges and vertices
Can find perimeter and area of squares, rectangles and triangles
Can recognise 2D shapes
Can recognise amounts of turn
Understand clockwise and anti clockwise
Know angles rules on a line and round a point

Disciplinary Knowledge:
Solve geometric problems on a coordinate graph
Perform reflections using vertical and horizontal mirror lines
Can find missing angles on a straight line and around a point
Can interpret and construct plans and elevations
Can draw diagrams from instructions
Can use standard units of mass, measure and related concepts

Prior learning / retrieval:
Convert between units of measurement
Measure and calculate the perimeter of rectilinear shapes
Find area of rectilinear shapes
Estimate compare and calculate different measures
Read write and convert time between analogue and digital clocks
Solve problems involving converting measurements of time

Links to KS3 NC:

Disciplinary literacy:
Metric, imperial, convert, unit, area, volume, perimeter, angle, acute, obtuse, reflex, regular, irregular, polygon, capacity, clockwise, anticlockwise, isometric, plan, elevation, reflection, rotation, translation, construction, bisector, equilateral, isosceles, scale,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Number system and calculation

Rationale:
Students will build on the work that they started at KS2, deepening their understanding of the number systems and calculations. This will include positive and negative numbers, fractions, decimals and percentages as both values and operators, ratio and proportional reasoning. Calculator skills will be introduced along with consolidation and rehearsal of the formal written methods seen at KS2.

Substantive Knowledge:
Order positive and negative integers
Understand place value
12x12 times tables and associated division facts
Understand the difference between Sum and Product
Define percentages as number of parts per hundred
Write an amount as a ratio
Simplify ratio

Disciplinary Knowledge:
Compare fractions using pictures
Add and subtract fractions with the same denominator
Simplify fractions
Find equivalent fractions
Column method for addition of integers and decimals
Column method for subtraction of integers and decimals
Use place value in calculations

Prior learning / retrieval:
Count in multiples of 6, 7, 9, 25 and 1000
Find 1000 more or less than a given number
Count backwards through zero
Recognise place value in 4 digit numbers
Order and compare numbers beyond 1000
Identify represent and estimate numbers
Round numbers to 10, 100 and 1000
Read roman numerals to 100
Add and subtract numbers with 4 digits
Estimate and use inverse operations to check accuracy
Recall multiplication facts to 12x12
Use mental method and derived facts to multiply and divide
Recognise and use factor pairs and commutativity in mental calculations
Multiply 2 and 3 digit numbers by 1 digit numbers
Recognise and show using diagrams families of equivalent fractions
Count up and down in hundredths
Use fractions to divide quantities
Add and subtract fractions with the same denominator
Recognise decimal equivalents for ½ ¼ and ¾
Round decimals with 1 dp to the nearest whole number
Compare numbers with the same number of decimal places

Links to KS3 NC:

- Understand and use place value for decimals and integers
- Order positive and negative integers
- Use the four operations including the formal written methods

Disciplinary literacy:
Positive, negative, integer, decimal, fraction, percentage, place value, ones, tens, hundreds, thousands, ten thousands, tenths, hundredths, thousandths, estimate, round, error, simplify, equivalent, multiplication, division, addition, subtraction, numerator, denominator, ratio, parts, divide, factors, multiples, common multiple, common factor

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Algebra

Rationale:
Some students will have had a basic introduction to algebra. This will be extended as students become confident using letters to represent unknown values in calculations, manipulating expressions and substituting values into formulae. Students will also explore the links between sequences and graphs, the nth term and the functions of linear graphs.

Substantive Knowledge:
Understand the role of =
Work with coordinates in the first quadrant

Disciplinary Knowledge:
Use inverse operations to complete number sentences
Find the next two terms of a linear sequence from patterns and diagrams

Prior learning / retrieval:
No algebra prior learning expected

Links to KS3 NC:

Disciplinary literacy:
Balance, equals, inverse, operation, term, linear, sequence,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Probability

Rationale:
Students will be introduced to the idea of probability and the calculation of chance. They will explore how this effects decisions and look at how to calculate the probability of single events.

Substantive Knowledge:
Use appropriate language of probability
Use the 0 – 1 probability scale

Disciplinary Knowledge:

Prior learning / retrieval:
No statutory prior learning on probability
Add and subtract decimals
Add and subtract fractions with like denominators

Links to KS3 NC:

Disciplinary literacy:
Probability, scale, likelihood, chance, certain, impossible

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Statistics

Rationale:
Students will build on their understanding of collecting and representing data, and how to analyse this using the averages and the range. Students will analyse the benefits of different methods of representation and analysis, being critical of which method suits the data.

Substantive Knowledge:
Construct and complete frequency tables and tally charts
Construct pictograms

Disciplinary Knowledge:
Be able to read bar charts

Prior learning / retrieval:
Interpret and present discrete and continuous data using bar charts and time graphs
Solve comparative problems with data represented in bar charts, pictograms, tables and other graphs

Links to KS3 NC:

Disciplinary literacy:
Frequency, bar, tally, pictogram, discrete, continuous, table, graph, chart

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Year 7 Developing (Orange)

Geometry

Rationale:
Students are already confident working with rectangles and can categorise different types of angles. Students will deepen their understanding of shape, develop further accuracy with measuring and drawing lines and angles and be able to use their skills in real life situations such as reading maps

Substantive Knowledge:
Can recognise different types of quadrilaterals
Use standard conventions for labelling and referring to lines and angles
Can measure and draw angles
Understand line and rotational symmetry

Disciplinary Knowledge:
Can interpret measurements on maps and scale drawings
Can find the volume of a cube / cuboid
Can find area of composite rectilinear shapes
Isometric drawing
Can find missing angles in triangles and quadrilaterals
Can apply understanding to solve multi-step angle problems
Perform reflections in diagonal lines
Perform rotations about any point

Prior learning / retrieval:
Convert between different units of metric measurement
Understand and use approximate equivalence between metric and common imperial units
Measure and calculate the perimeter of compound rectilinear shapes
Calculate and compare the area of rectangles, and estimate the area of irregular shapes
Solve problems involving converting units of time
Estimate volume and capacity
Use all four operations involving measurements
Identify 3D shapes from 2D representations
Know angles are measured in degrees and be familiar with acute, obtuse and reflex angles
Draw given angles and measure them in degrees
Identify angles at a point, meeting on a straight line and other multiples of 90
Use properties of rectangles to deduce related facts and find missing angle lengths
Distinguish between regular and irregular polygons

Links to KS3 NC:

Disciplinary literacy:
Interpret, scale, bearing, volume, area, perimeter, geometric, isometric, plan, elevation, triangle, quadrilateral, polygon, reflection, rotation, translation,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Number system and calculation

Rationale:
Students will already have some number skills and will be working to strengthen the connections between these areas, further explore the relationship between numbers and their properties and consolidate their calculation skills. Ratio will be introduced as a way of dividing quantities.

Substantive Knowledge:
Know what is meant by factor and multiple
Use positive integer powers and real roots
Compare and convert between FDP
Understand that a ratio shows how something is divided

Disciplinary Knowledge:
Order positive and negative decimals
Recognise and use relationships between operations
Written method for long multiplication
Find factors and multiples
Find HCF and LCM by listing
Find unit fractions of amounts
Add, subtract and compare fractions with different denominators
Multiply and divide fractions
Interpret fractions and percentages as operators
Use ratio notation
Divide amount into a given ratio
Convert ratio to fractions
Write ratio in the form 1:n

Prior learning / retrieval:
Read write order and compare numbers to at least 1000000
Count forwards and backwards in steps of powers of 10
Interpret negative numbers in context
Round numbers up to 1000000 to powers of 10
Read roman numerals up to 1000 (M)
Add and subtract integers with 4 or more digits
Add and subtract mentally
Use rounding to check accuracy of calculations
Identify multiples and factors
Know and use the vocabulary of prime numbers, prime factors and composite numbers
Establish whether a number up to 100 is prime and recall prime numbers up to 19.
Use long multiplication
Multiply and divide mentally drawing on known facts
Divide numbers up to 4 digits using short division
Multiply and divide numbers by powers of 10.
Recognise and use square and cube numbers
Compare and order fractions whose denominators are all multiples of the same number
Identify name and write equivalent fractions when represented visually
Recognise and convert between improper fractions and mixed numbers
Add and subtract fractions with the same denominator or like denominators
Read and write decimal numbers as fractions
Recognise and use thousandths
Round decimals with 2 decimal places to 1 decimal place or whole numbers
Read, write order and compare numbers with up to 3 decimal places
Percentage equivalents to ½, ¼, 1/5, 2/5, 4/5 and fractions with a denominator as a multiple of 10 or 25

Links to KS3 NC:

- Understand and use place value for decimals and integers
- Order positive and negative integers and decimals
- Use prime numbers, factors, multiples, find HCF and LCM
- Use all 4 operations including formal written methods
- Interpret fractions and percentages as operators
- Work interchangeably with fractions and equivalent terminating decimals
-

Disciplinary literacy:
Positive, negative, integer, decimal, fraction, percentage, place value, ones, tens, hundreds, thousands, ten thousands, tenths, hundredths, thousandths, estimate, round, error, simplify, equivalent, multiplication, division, addition, subtraction, numerator, denominator, ratio, parts, divide, factors, multiples, common multiple, common factor

Algebra

Rationale:
Students will have little understanding of algebra, and will focus on missing number problems, further developing their number skills and the links between inverse relationships. Coordinates will be explored as an introduction to mapping and plotting graphs.

Substantive Knowledge:
Understand the inequality signs

Disciplinary Knowledge:
Work with coordinates in all 4 quadrants
Find the next 2 terms of a linear sequence

Prior learning / retrieval:
No prior learning expected

Links to KS3 NC:

Disciplinary literacy:
Inequality, equals, balance, inverse, coordinate, terms, linear,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Probability

Rationale:
Students will not have met probability before in any great depth, but will begin to formalise their ideas about chance and decisions. This will build on and consolidate their skills working with decimals and fractions

Substantive Knowledge:
Understand that the probabilities of an exhaustive set of outcomes will sum to 1
Understand the term mutually exclusive

Disciplinary Knowledge:
Find probabilities of mutually exclusive events

Prior learning / retrieval:
No statutory prior learning for probability
Add and subtract fractions
Add and subtract decimals

Links to KS3 NC:

Disciplinary literacy:
Exhaustive, mutually exclusive,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Statistics

Rationale:
Students will have seen information presented in a variety of different ways, in tables and simple graphs. This work will build on this and begin to look at how data can be analysed, compared and interpreted using averages and the range.

Substantive Knowledge:
Understand the terms mean, median, mode and range.

Disciplinary Knowledge:
Calculate mean, median, mode and range from a list of numbers
Be able to read and interpret data presented in tables
Be able to read and draw dual bar charts
Plot points on a scatter graph

Prior learning / retrieval:
Solve problems with data presented as a line graph
Complete read and interpret information presented as tables including timetables.

Links to KS3 NC:

Disciplinary literacy:

Mean, median, mode, range, average, frequency, interpret, represent, plot, scattergraph, correlation, relationship

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Year 7 Mastering (Yellow)

Geometry

Rationale:
Students will have a good basic understanding of 2D and 3D shapes, they will be confident measuring lines and angles and be familiar with some facts about angle relationships. This work will deepen their understanding and provide further connections with other areas of the curriculum. Students will gain confidence with equipment such as compasses and protractors to perform standard constructions.

Substantive Knowledge:
Understand what congruence and similarity mean
Can use basic congruence criteria for triangles
Know the formula for the area of a trapezium
Understand what is meant by a scale factor

Disciplinary Knowledge:
Can change freely between related metric standard units
Can use scale factors
Can find area and perimeter of trapezia
Can find area and circumference of a circle
Can find area and perimeter of compound non-rectilinear shapes
Can derive and apply properties and definitions of special quadrilaterals
Can identify congruent and similar shapes
Can find interior and exterior angles in polygons
Can perform standard constructions
Perform and describe reflections in named lines
Perform and describe translations using column vectors
Draw nets accurately

Prior learning / retrieval:
Draw 2D shapes using dimensions and angles
Recognise, describe and build simple 3D models including making nets
Compare and classify geometric shapes based on their properties
Illustrate and name radius, circumference and diameter
Find missing angles round a point, on a line and vertically opposite.
Describe positions in a full coordinate grid
Translate shapes and reflect them in the axes

Links to KS3 NC:
- Geometry pages 46-47
- Number pages 43-44

Disciplinary literacy:
Metric, scale factors, multiple, trapezia, quadrilateral, formula, properties, diagonals, opposite, adjacent, congruent, similar, interior, exterior, construction, bisector, arc, intersections, translations

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Number system and calculation

Rationale:
Students have a good understanding of the 4 operations and will be confident performing these in a written manner and mentally. They will gain confidence with using brackets for grouping operations and changing the order of operations. Students will deepen their understanding of fractions, decimals and percentages as both operators and values.

Substantive Knowledge:
Understand the Order of operations including brackets
Know the prime numbers

Disciplinary Knowledge:
Can find decimal closest in value to another decimal
Can order positive and negative fractions
Written methods to solve division problems
Prime factor decomposition
Find HCF and LCM using Venn diagrams
Round to decimal places
Calculations with negative numbers
Convert between mixed numbers and improper fractions
Convert between FDP
Express one quantity as a fraction of another
Find fractions of amounts
Find percentages of amounts
Best Buy problems
Proportional reasoning in worded questions

Prior learning / retrieval:

Read write order and compare numbers
Round whole numbers to the required degree of accuracy
Use negative numbers in context and calculate across zero
Multiply multi-digit numbers
Divide 4 digit numbers by 2 digit numbers
Long division and short division
Perform mental calculations
Identify common factors, common multiples and prime numbers
Order of operations with 4 operations
Use estimations to check calculations
Use common factors to simplify fractions
Use common multiples to express fractions in the same denominator
Compare and order fractions
Add and subtract fractions

Links to KS3 NC:

- Number Pages 43-44
- Ratio pages 45 – 46

Disciplinary literacy:
Prime factor, Positive, negative, integer, decimal, fraction, percentage, place value, ones, tens, hundreds, thousands, ten thousands, tenths, hundredths, thousandths, estimate, round, error, simplify, equivalent, multiplication, division, addition, subtraction, numerator, denominator, ratio, parts, divide, factors, multiples, common multiple, common factor
Decomposition, proportional, inverse proportion, direct proportion, express, mixed numbers, improper fractions, HCF, LCM,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Algebra

Rationale:
Students have had a very basic introduction to the idea of algebra, mostly through missing number problems. This is the opportunity to really develop a good basis for all future algebraic learning and reasoning. Links will be made to number skills and how these apply to algebra and the inverse operations will be strengthened. Function machines will be introduced to facilitate later learning on functions and function notation. Graphing will be developed as a way of representing solutions to equations and inequalities.

Substantive Knowledge:
Understand expression, equation, formulae, inequalities, terms
Understand the terms parallel and perpendicular lines

Disciplinary Knowledge:
Use and interpret algebraic notation
Simplify and manipulate algebraic expressions
Expand single brackets
Factorise linear expressions
Solve linear equations using function machines
Solve linear equations Solve linear inequalities
Plot graphs of linear equations
Plot graphs of linear inequalities
Plot x=a and y=b graphs
Solve equations graphically
Represent solutions to inequalities on a graph

Prior learning / retrieval:
Use simple formulae
Generate and describe linear number sequences
Express missing number problems algebraically
Find pairs of numbers that satisfy an equation with two unknowns
Enumerate possibilities of combinations of two variables

Links to KS3 NC:

- Algebra pages 44 – 45
- Number pages 43-44

Disciplinary literacy:
Inequality, equals, balance, inverse, coordinate, terms, linear, notation, expression, equation, function, formulae, parallel, perpendicular, manipulate, simplify, expand, factorise,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Probability

Rationale:
Students have little prior experience of probability and the ideas of chance. This work will allow students to explore these concepts and link to the work that has been done on fraction and decimal calculations.

Substantive Knowledge:
The AND and OR rule for probability

Disciplinary Knowledge:
Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments
Construct theoretical probability diagrams
Find the probability of something not happening
Combine probabilities of more than one event

Prior learning / retrieval:
No statutory prior learning for probability
Add, subtract, multiply fractions and decimals
Convert between FDP

Links to KS3 NC:

- Probability page 47

Disciplinary literacy:
Exhaustive, mutually exclusive, random, fair, bias, outcome, event, theoretical, experimental,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Statistics

Rationale:
Students will continue to develop their understanding of the different kinds of data and how different graphs should be used in different situations. Averages will be studied in more detail, again linking to the different types of data and when different averages will be more appropriate. Scattergraphs will be introduced at this stage and this will be linked to learning about coordinates already done.

Substantive Knowledge:
Understand and use the terms primary data, secondary data, discrete and continuous
Recognise correlation

Disciplinary Knowledge:
Complete 2 way tables
Find mode and range from bar charts
Construct stem and leaf diagrams
Use and interpret scattergraphs
Draw estimated lines of best fit

Prior learning / retrieval:
Interpret and construct pie charts and line graphs
Calculate and interpret the mean as an average

Links to KS3 NC:

- Statistics page 47

Disciplinary literacy:
Mean, median, mode, range, average, frequency, interpret, represent, plot, scattergraph, correlation, relationship, stem and leaf, distribution, line of best fit, trend,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Year 8 Mastering (Green)

Geometry

Rationale:
Students will have a good understanding of calculations of area and perimeter of many different shapes. This will be supplemented with the introduction of Pythagoras' Theorem. Students will further develop their understanding of angle relationships, looking at parallel lines and the relationship that this has to bearings and reverse bearings. Students will begin to formalise their descriptions of transformations and use the correct notation and vocabulary for this.

Substantive Knowledge:
Know Pythagoras' Theorem
Understand circle definitions including chord, tangents
Know the rules for angles on parallel lines
Know the perpendicular distance from a point is the shortest distance to the line
Understand column vectors

Disciplinary Knowledge:
Can change freely between metric units of area and volume
Can calculate using compound units
Can read and interpret distance time graphs, conversion graphs and other real life graphs
Can use Pythagoras' theorem to find a missing length
Work in terms of π when calculating circles
Calculate lengths in similar shapes
Apply concepts of congruence and similarity
Can reason with angles on parallel lines
Can solve problems with bearings
Describe transformations, positive scale factors for enlargement
Construct line and angle bisectors

Prior learning / retrieval:
Can change freely between related metric standard units
Can use scale factors
Can find area and perimeter of trapezia
Can find area and circumference of a circle
Can find area and perimeter of compound non-rectilinear shapes
Can derive and apply properties and definitions of special quadrilaterals
Can identify congruent and similar shapes
Can use basic congruence criteria for triangles
Can find interior and exterior angles in polygons
Can perform standard constructions
Perform and describe reflections in named lines
Perform and describe translations using column vectors
Draw nets accurately

Links to KS3 NC:

- Geometry pages 46-47

Disciplinary literacy:
Metric, scale factors, multiple, trapezia, quadrilateral, formula, properties, diagonals, opposite, adjacent, congruent, similar, interior, exterior, construction, bisector, arc, intersections, translations, compound, enlargement, exact values, chord, tangent, radius, arc, sector, segment,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Number system and calculation

Rationale:
Students deepen their understanding of maths through the exploration of the order of operations with brackets and indices. Students will develop confidence when calculating with decimals and percentages. Students will be able to change freely between fractions, decimals and percentages and use approximations and inverse operations to check the suitability of an answer. Students will continue to work on deepening their understanding of ratio and proportional reasoning.

Substantive Knowledge:
Order of operations with brackets, powers, roots and reciprocals
Understand and use proportion as equality of ratios
Understand what is meant by significant figures

Disciplinary Knowledge:
Estimate answers to calculations
Multiplication and division with decimals
Rounding with significant figures
Work interchangeably with fractions and their terminating decimals
Solve simple interest problems
Work with percentages greater than 100%
Solve problems with percentage change
Identify and work with fractions in ratio problems
Relate ratios to linear functions
Interpret gradient as rate of change

Prior learning / retrieval:
Can find decimal closest in value to another decimal
Can order positive and negative fractions
Order of operations including brackets
Written methods to solve division problems
Prime factor decomposition
Find HCF and LCM using Venn diagrams
Round to decimal places
Calculations with negative numbers
Convert between mixed numbers and improper fractions
Convert between FDP
Express one quantity as a fraction of another
Find fractions of amounts
Find percentages of amounts
Best Buy problems
Proportional reasoning in worded questions

Links to KS3 NC:

- Number Pages 43-44

Disciplinary literacy:
Prime factor, Positive, negative, integer, decimal, fraction, percentage, place value, ones, tens, hundreds, thousands, ten thousands, tenths, hundredths, thousandths, estimate, round, error, simplify, equivalent, multiplication, division, addition, subtraction, numerator, denominator, ratio, parts, divide, factors, multiples, common multiple, common factor
Decomposition, proportional, inverse proportion, direct proportion, express, mixed numbers, improper fractions, HCF, LCM, significant figures, terminating, recurring, simple interest, gradient,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Algebra

Rationale:
Students will build confidence with manipulating algebraic equations and expressions, they will confidently be able to set up and solve equations with one or two variables and feel confident using algebra as a tool to help in other areas of maths. They will be able to plot linear functions accurately enough to be able to use them to solve equations.

Substantive Knowledge:
Understand the difference between an equation and an identity

Disciplinary Knowledge:
Rearrange formulae
Substitute values into formulae
Simplify and manipulate algebraic expressions
Expand and factorise linear expressions
Simplify expressions
Solve linear equations and inequalities with unknowns on both sides
Represent solutions to inequalities on a number line
Solve equations and inequalities with brackets
Solve simultaneous equations with 2 variables
Find the equation of a linear graph
Identify and interpret gradients and intercepts
Sketch quadratic functions
Find approximate solutions to linear and quadratic functions graphically

Prior learning / retrieval:
Use and interpret algebraic notation
Understand expression, equation, formulae, inequalities, terms
Simplify and manipulate algebraic expressions
Expand single brackets
Factorise linear expressions
Solve linear equations using function machines
Solve linear equations Solve linear inequalities
Plot graphs of linear equations
Plot graphs of linear inequalities
Plot x=a and y=b graphs
Recognise parallel and perpendicular lines
Solve equations graphically
Represent solutions to inequalities on a graph

Links to KS3 NC:

- Algebra page 44-45

Disciplinary literacy:
Inequality, equals, balance, inverse, coordinate, terms, linear, notation, expression, equation, function, formulae, parallel, perpendicular, manipulate, simplify, expand, factorise, rearrange, transpose, change the subject, substitute, simultaneous equations, intercepts, quadratic,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Probability

Rationale:
Students will begin to formalise their understanding of Set notation and use of Venn diagrams. They will extend their knowledge of probability to include multiple events and combining probabilities confidently

Substantive Knowledge:
Understand set notation

Disciplinary Knowledge:
Listing outcomes
Construct Venn diagrams to calculate probabilities from Venn diagrams
Find probabilities from 2 way tables

Prior learning / retrieval:
Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments
Construct theoretical probability diagrams
Find the probability of something not happening
The AND and OR rule for probability
Compare FDP
Multiply, add and subtract fractions and decimals
Express one quantity as a fraction of another quantity

Links to KS3 NC:

- Probability page 47

Disciplinary literacy:
Exhaustive, mutually exclusive, random, fair, bias, outcome, event, theoretical, experimental, Venn Diagrams, Set notation,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Statistics

Rationale:
Students will be able to confidently analyse data presented in lists and tables. They will be able to use a variety of different graphical representations of the data to ensure that their meaning is conveyed clearly.

Substantive Knowledge:
Understand which is the most suitable average to use

Disciplinary Knowledge:
Calculate mean, median, mode and range from data presented as tables
Construct pie charts
Construct back to back stem and leaf diagrams
Find averages from stem and leaf diagrams
Find probability from stem and leaf tables
Make predictions using line of best fit

Prior learning / retrieval:
Understand and use the terms primary data, secondary data, discrete and continuous
Recognise correlation
Complete 2 way tables
Find mode and range from bar charts
Construct stem and leaf diagrams
Use and interpret scattergraphs
Draw estimated lines of best fit

Links to KS3 NC:

- Statistics page 47

Disciplinary literacy:
Mean, median, mode, range, average, frequency, interpret, represent, plot, scattergraph, correlation, relationship, stem and leaf, distribution, line of best fit, trend, primary data, secondary data, pie chart, predictions, interpolation, extrapolation

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Year 9 Mastering (Blue)

Geometry

Rationale:
Students will be able to use their knowledge of ratio to build on the work with right angled triangles. They will be able to perform calculations for circles and part circles, using π where appropriate. Students will develop their confidence in all areas of geometry that have been studied so far.

Substantive Knowledge:
Can recall trigonometric ratios
Can identify and apply circle definitions including tangent, arc, sector, segment
Simple proofs of geometric facts

Disciplinary Knowledge:
Can change freely between related compound units
Can use compound units in algebraic contexts
Find speed from distance time graphs, and extrapolate from conversion graphs
Work rate problems
Can use SOH CAH TOA to find lengths and angles in right angled triangles
Can find volume and surface area of cylinders and prisms
Can calculate arc length and area of sectors
Can compare length area and volume using ratio notation
Apply angle facts and other prior learning to solve complex angle problems
Perform and describe enlargements with fractional scale factors
Addition and subtraction of column vectors
Solve Loci problems

Prior learning / retrieval:
Can change freely between metric units of area and volume
Can calculate using compound units
Can read and interpret distance time graphs, conversion graphs and other real life graphs
Can use Pythagoras' theorem to find a missing length
Work in terms of π when calculating circles
Calculate lengths in similar shapes
Apply concepts of congruence and similarity
Can apply circle definitions including chord, tangents
Can reason with angles on parallel lines
Can solve problems with bearings
Describe transformations, positive scale factors for enlargement
Construct line and angle bisectors
Know the perpendicular distance from a point is the shortest distance to the line
Simplify ratio
Proportional reasoning
Solving equations
Rearranging equations

Links to KS3 NC:

- Geometry pages 46-47

Disciplinary literacy:
Metric, scale factors, multiple, trapezia, quadrilateral, formula, properties, diagonals, opposite, adjacent, congruent, similar, interior, exterior, construction, bisector, arc, intersections, translations, compound, enlargement, exact values, chord, tangent, radius, arc, sector, segment, trigonometry, loci, column vectors, prism,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Number system and calculation

Rationale:
Students will start to think about the accuracy of their calculations, and how this will be influenced by error intervals and rounding. Students will learn to use standard form when calculating with very large and small numbers, and further their knowledge of percentage change by looking at exponential growth and decay.

Substantive Knowledge:
Understand what is shown by an error interval
Direct and inverse proportion
Recognise and interpret graphs that illustrate direct and inverse proportionality

Disciplinary Knowledge:
Calculate and interpret standard form
Calculate with roots and integer indices
Apply and interpret limits of accuracy
Specify simple error intervals
Use multipliers for percentage problems
Reverse percentage problems
Reverse fraction problems
Set up solve and interpret the answers in growth and decay problems, including compound interest
Express and multiplicative relationship between two quantities as a ratio or a fraction
Set up equations for direct and inverse proportion
Find the constant of proportionality

Prior learning / retrieval:
Estimate answers to calculations
Multiplication and division with decimals
Order of operations with brackets, powers, roots and reciprocals
Rounding with significant figures
Work interchangeably with fractions and their terminating decimals
Solve simple interest problems
Work with percentages greater than 100%
Solve problems with percentage change
Identify and work with fractions in ratio problems
Understand and use proportion as equality of ratios
Relate ratios to linear functions
Interpret gradient as rate of change

Links to KS3 NC:

- Number pages 43 – 44
- Ratio and proportion pages 45 – 46

Disciplinary literacy:
Prime factor, Positive, negative, integer, decimal, fraction, percentage, place value, ones, tens, hundreds, thousands, ten thousands, tenths, hundredths, thousandths, estimate, round, error, simplify, equivalent, multiplication, division, addition, subtraction, numerator, denominator, ratio, parts, divide, factors, multiples, common multiple, common factor
Decomposition, proportional, inverse proportion, direct proportion, express, mixed numbers, improper fractions, HCF, LCM, significant figures, terminating, recurring, simple interest, gradient, compound interest, growth, decay, exponential, reverse, standard form, error interval,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Algebra

Rationale:
Students will confidently start to work with quadratics, manipulating them and solving them. Students will be able to plot graphs from calculated points, or sketch the graphs from derived roots, turning points and intercepts. Students will also be introduced to different types of algebraic graph.

Substantive Knowledge:
Know that the equation of parallel lines will have the same coefficient of x.
Negative and fractional laws of indices
Recognise the symmetrical property of a quadratic graph.
Recognise and use sequences including geometric

Disciplinary Knowledge:
Expand double brackets
Factorise into double brackets with no coefficient of x²
Solve quadratics by factorising
Translate simple situations into algebraic expressions
Deduce roots of linear and quadratic graphs algebraically
Use the equation of lines to identify parallel lines
Identify and interpret gradients and intercepts of linear functions algebraically
Recognise, sketch and interpret simple cubic functions
Identify and use the roots, turning points and intercept
Solve 2 linear simultaneous equations graphically
Determine if a number is in a linear sequence

Prior learning / retrieval:
Rearrange formulae
Understand the difference between an equation and an identity
Substitute values into formulae
Simplify and manipulate algebraic expressions
Expand and factorise linear expressions
Simplify expressions
Solve linear equations and inequalities with unknowns on both sides
Represent solutions to inequalities on a number line
Solve equations and inequalities with brackets
Solve simultaneous equations with 2 variables
Find the equation of a linear graph
Identify and interpret gradients and intercepts
Sketch quadratic functions
Find approximate solutions to linear and quadratic functions graphically

Links to KS3 NC:

- Algebra pages 44 – 45

Disciplinary literacy:
Inequality, equals, balance, inverse, coordinate, terms, linear, notation, expression, equation, function, formulae, parallel, perpendicular, manipulate, simplify, expand, factorise, rearrange, transpose, change the subject, substitute, simultaneous equations, intercepts, quadratic, cubic, roots, turning points, coefficient

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Probability

Rationale:
Students learn how to use probability trees effectively to calculate the probability of a combination of event happening. They develop their understanding of Venn Diagrams and set notation, and how this applies to probability.

Substantive Knowledge:
Understand that empirical unbiased samples tend towards theoretical probability with increased sample size

Disciplinary Knowledge:
Draw probability trees to find probability of multiple events

Prior learning / retrieval:
Listing outcomes
Construct Venn diagrams to calculate probabilities from Venn diagrams
Understand set notation
Find probabilities from 2 way tables
Add, subtract, multiply decimals and fractions

Links to KS3 NC:

- Probability pages 47

Disciplinary literacy:
Exhaustive, mutually exclusive, random, fair, bias, outcome, event, theoretical, experimental, Venn Diagrams, Set notation, empirical, samples,

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)

Statistics

Rationale:
Students begin to look at the detail behind sampling and how this can be done in such a way as to be representative of a population. Students will start to look at the limitations of data analysis and how the type of data gathered will influence this.

Substantive Knowledge:
Understand the limitations of sampling
Understand that when data is grouped an exact figure for the mean and median cannot be found

Disciplinary Knowledge:
Infer properties of populations or distributions from a sample
Calculate the estimated mean, median, modal class and range from grouped data in a table
Interpolate and extrapolate apparent trends whilst knowing the dangers of doing so

Prior learning / retrieval:
Understand which is the most suitable average to use
Calculate mean, median, mode and range from data presented as tables
Construct pie charts
Construct back to back stem and leaf diagrams
Find averages from stem and leaf diagrams
Find probability from stem and leaf tables
Make predictions using line of best fit

Links to KS3 NC:

- Statistics page 47

Disciplinary literacy:
Mean, median, mode, range, average, frequency, interpret, represent, plot, scattergraph, correlation, relationship, stem and leaf, distribution, line of best fit, trend, primary data, secondary data, pie chart, predictions, interpolation, extrapolation, infer, populations, estimated mean, modal group

Assessment:
- Mini component knowledge quizzes and assessments (Component)
- End of topic tests (Component)
- End of half term assessments (Composite)