Lionheart Maths Curriculum

It is our aim that all pupils are confident in maths; equipped with strong procedural and conceptual understanding for future education and for life

LIONHEART EDUCATIONAL TRUST

The Maths curriculum is organised into blocks, each of which contain topics and knowledge that are conceptually linked. The knowledge is broken down into small steps, which outline what each pupil should know or be able to do. This document lists the small steps within each block.

The blocks are carefully sequenced and most pupils will encounter the blocks of work as listed below, however sometimes there will be some movement of blocks between years, whilst keeping the order the same.

Year 7

- Block 1 – The Grammar of Algebra
- Block 2 – Additive Relationships
- Block 3 – Multiplicative Relationships
- Block 4 – Geometrical Reasoning
- Block 5 – Fractions

Year 8

- Block 6 – Percentages
- Block 7 – Sets and Building Numbers
- Block 8 – Describing Using Algebra
- Block 9 – 2-D Geometry One
- Block 10 – Proportional Reasoning
- Block 11 – 3-D Geometry
- Block 12 – Organising and Representing Data

Year 9

- Block 13 – Graphs and Proportion
- Block 14 – Understanding Probability
- Block 15 – Algebraic Manipulation
- Block 16 – 2-D Geometry Two
- Block 17 – Linear Equations and Inequalities
- Block 18 – Geometry of Triangles One

Block 1 – The Grammar of Algebra

Sequences:

- Understand pictorial patterns representations of growing sequences.
- Understand tabular (and graphical) representations of arithmetic sequences.
- Recognise some special number patterns
- Describe simple patterns with a term-to-term rule.
- Generate a sequence given a rule.

Algebra as a language:

- Understand terms, coefficients and expressions
- Identify like terms
- Collect like terms
- Understand letters are used to generalise in mathematical operations.
- Understand algebraic conventions:
    - multiplication/division.
    - indices.
    - brackets and other ways of grouping.
- Understand equivalence and identity
- Understand variables and unknowns

Functions:

- Understand the concept of functions and how they operate with numerical inputs.
- Use inverse operations to find an input given a function and output.
- Understand how functions operate with algebra (include inverse operations).
- Find the function given numerical input and output.
- Find the function given algebraic input and output.
- Plot graphical representation of inputs and outputs.
- **Understand mappings**

Priority of operations:

- Understand that certain operations take precedence over others.

Expressions:

- Understand how to substitute into expressions.
- Form and simplify algebraic expressions.
- **Multiply a single binomial by a factor.**
- **Factorise a single binomial.**

Block 2 – Additive Relationships

Place Value:

- Understand and write integers up to one billion in words and figures
- Recognise the place value of any digits within an integer up to one billion
- Work out intervals on a number line
- Position integers on a number line
- Compare integers including using =,≠,<,>,≤,≥
- Order a list of integers
- Understand place value for decimals
- Position decimals on a number line
- Compare and order any number
- **Write 10, 100, 1000 etc. as powers of ten**
- **Write positive integers in the form A x 10^n**
- **Investigate negative powers of ten**
- **Write decimals in the form A x 10^n**
- **Understand types and classifications of numbers**

Rounding and Estimating:

- Round numerals to the nearest power of ten
- Round numerals to decimal places
- Estimating answers as a routine part of calculation and the use of ≈
- Estimate answers to addition and subtraction problems by sensible rounding
- **Find the upper and lower bounds of a calculation to support estimating**
- **Different ways of rounding**

Addition and Subtraction of Whole Numbers and Positive Decimals:

- Explore the concepts of equality and inequality
- Understand the commutative law of addition
- Understand the associative law of addition
- Understand subtraction as the inverse of addition
- Use efficient mental strategies for adding integers
- Use efficient mental strategies for adding decimals
- Use efficient mental strategies for subtracting integers including associating signs
- Use efficient mental strategies for subtracting decimals
- Add integers using formal written methods
- Add decimals using formal written methods
- Subtract integers using formal written methods
- Subtract decimals using formal written methods
- **Count, add and subtract integers in other bases**
- **Count and add with constraints**
- **Understand and calculate using modular arithmetic**

Addition and Subtraction Involving Negative Numbers:

- Understand representations of directed integers
- Understand and confidently use the language and notation of directed numbers
- Compare directed integers including using =,≠,<,>,≤,≥
- Order lists of directed numbers
- Find the sum of a positive and a negative number
- Find the sum of two negative numbers
- Find the difference between a positive and a negative number
- Find the difference between two negative numbers
- Understand equality and inequality with negative numbers

- Apply the commutative and associative laws of addition to negative numbers
- Use a calculator to add and subtract directed numbers

Perimeter of Polygons:

- Find missing side lengths when given perimeters
- Find missing side lengths in polygons using relationships between side lengths
- Calculate perimeters of polygons given integer or decimal side lengths
- Reason about possible side lengths using perimeters and properties of polygons
- Explore how changes in polygons effect perimeter

Median and Range:

- Order a list of values
- Find missing numbers in a list
- Identify different values by their position in a list
- Identify the range
- Identify the size of an ordered list
- Find the middle position in a list of size n
- Identify the median
- Missing number puzzles

Block 3 – Multiplicative Relationships

Multiplication facts

- To know multiplication tables up to 12×12
- To understand that every integer can be expressed as a product of two factors (of integers).
- To understand that 1 is the multiplicative identity.
- To understand a number multiplied by its reciprocal is 1
- To understand the multiplicative property of zero.
- To understand the effect of multiplication by a negative number
- Consolidation of existing models of multiplication
- Introduction of other representations for multiplication
- Multiplication as scaling
- To use sensible estimates before calculation
- Multiplying by powers of 10

Properties of arithmetic

- To understand multiplication of decimals is related to other multiplication facts
- To use fractions to understand multiplication of decimals.
- To understand the commutative property of multiplication
- To understand the associative property of multiplication
- To understand the distributive property of multiplication

Area

- To understand area as a multiplicative relationship
- Extend to area of irregular shapes by counting squares
- To understand squaring and cubing numbers

Factors and multiples

- To be able to find LCM and HCF (by listing)

Formal Methods

- Formal methods of multiplication with integers
- Formal methods of multiplication with decimals

Priority of operations (multiplication over addition)

- To understand that multiplication takes precedence over addition and subtraction (Priority of operations)

Division facts

- To understand notation and associated language
- Understand division as the inverse of multiplication
- Using negatives in division
- Understand the effect of dividing by the multiplicative identity
- Understand the effect of dividing a dividend by itself
- Dividing by zero is undefined

Models of division

- Consolidation of existing models of division.
- Division with arrays (area model of multiplication)
- Other representations to use

Properties of division

- Dividing by powers of 10 (positive & negative)
- To understand remainders.
- To understand division by the divisor is the same as multiplying by the reciprocal
- To understand that division is not commutative
- To understand that division is not associative
- To understand that division takes precedence over addition and subtraction (Priority of operations)
- To understand that the order of a division can change in some circumstances.
- To understand that multiplying or dividing the dividend and the divisor by the same number has no effect on the quotient

Formal methods

- Formal methods of division with integers
- Formal methods of division with decimals
- Finding unit values (unitary method)

Arithmetic mean

- Equal sharing (arithmetic mean)

Block 4 – Geometrical Reasoning

Draw, measure and classify angles

- Understand and use conventions for labelling geometric figures
- Draw and measure line segments including geometric figures
- Understand angles as a measure of turn
- Understand compass bearings to give directions
- Classify angles
- Measure angles up to 180°
- Draw angles up to 180°
- Draw and measure angles between 180° and 360°
- Identify perpendicular and parallel lines

Find unknown angles (right angle, straight line, around a point, vertically opposite)

- Estimate angles including interior to geometrical figures
- Understand complementary and supplementary angles
- Understand the relationship between adjacent angles on a straight line
- Understand the relationship of angles around a point
- Be able to identify vertically opposite angles and understand their relationship

Properties of triangles and quadrilaterals

- Understand the difference between regular and irregular
- Understand congruence and similarity in relation to geometric figures
- Understand and identify types of triangle and their properties
- Find missing angles in triangles using their properties
- Understand and identify types of quadrilateral and their properties
- **Classify quadrilaterals by using their properties**
- Find missing angles in quadrilaterals using their properties
- Identify polygons up to a decagon

Symmetry and tessellation

- Understand and identify line symmetry in regular polygons
- Identify line symmetry in other geometric figures
- Understand and identify rotational symmetry in regular polygons
- Identify rotational symmetry in other geometric figures
- Understand the requirements for polygons to tessellate
- Know the 3 regular tessellations
- Understand tessellation of quadrilaterals
- **Know the 8 semi-regular (Archimedean) tessellations**

Draw simple triangles and quadrilaterals accurately

- Construct triangles given two angles and the side between them
- Construct triangles given two sides and an angle
- Construct triangles given two sides and the angle between them
- Construct quadrilaterals including parallelograms, trapezia, **rhombi, kites**

Block 5 - Fractions

Prerequisites

- *Understand that fractions are equal parts of a whole*
- *Understand and find factors of an integer and common factors of two or more integers*
- *Understand what multiples are and find common multiples of two or more integers*

Fractional thinking

- Understand representations of fractions
- Convert fractions to mixed numbers
- Convert mixed numbers to fractions

Equivalence of fractions

- Understand the equivalence of fractions including comparisons using bar models
- Find equivalent fractions by multiplying by a fraction equal to one
- Write fractions in simplest form by finding common factors of the numerator and denominator
- Compare and order fractions using equivalence
- Convert fractions to decimals
- Convert decimals to fractions
- **Compare and order mixed fractions and decimals using equivalence**

Multiplication and division of fractions

- Represent multiplication of fractions
- Multiply a fraction by an integer
- Find the product of a pair of unit fractions
- Find the product of a pair of any fractions
- Divide an integer by a fraction
- Divide a fraction by a unit fraction
- Understand and use the reciprocal
- Divide any pair of fractions

Multiply and divide improper and mixed fractions

- Fractions of amounts (fractions as operators)
- Find a fraction of a given amount
- Use a given fraction to find the whole and/or other fractions
- Find fractions of amounts larger than one (improper fractions of amounts)

Block 6 – Percentages

Converting between fractions and decimals (review)

- Understand different representations of fractions and decimals
    - Number line
    - Bar model
    - Place value counters
    - Fraction wall
- Equivalence of key fractions
- Convert between fractions and decimals
    - Tenths, hundredths, thousandths
    - Halves, quarters, eighths
    - Thirds and fifths

Developing understanding of percentages

- Understand percentages as parts of 100.
- Understand equivalence between decimals and percentages and use this to convert between them.
- Covert between fractions, decimals and percentages
- Understand fractions and decimals greater than 1 and percentages greater than 100

Percentage of a quantity

- Review multiplication as scaling/scale factor
- Review fractions as a divisor
- Review fractions of an amount
- Find a percentage of an amount.

Find the whole, given the part (fraction, decimal or percentage)

- Find the amount given a fraction
- Find the amount given a decimal
- Find the amount given a percentage
- Working interchangeably with fractions, decimals and percentages.

Block 7 – Sets and Building Numbers

Primes and Prime Factorisation

- Understand what prime numbers are and be able to identify them
- Understand that all non-prime integers are composite numbers
- Understand Index Notation (recap)
- Break composite numbers down into their prime factors
- Find Highest Common Factors and Lowest Common Multiples using listing (recap)
- Understand Co-Primes
- Find the Highest Common Factor of two or more integers using prime factors
- Find the Lowest Common Multiple of two or more integers using prime factors

Venn Diagrams and Sets

- Understand sets and subsets, including notation
- Use Venn diagrams to represent the connection between sets
- Draw Venn diagrams where the sets are categories
- Understand mutually exclusive events
- Use Set notation and regions of Venn Diagrams to describe connections between sets

Adding and Subtracting Fractions

- Understand conditions required to add/subtract fractions
- Add and subtract fractions with the same denominator
- Understand addition and subtraction of fractions in relation to whole numbers
- Find common denominators and lowest common denominator
- Add and subtract fractions with different denominators
- Add and subtract directed fractions
- Calculate with more than two fractions
- Use a calculator to add and subtract fractions
- Add and subtract improper fractions
- Add and subtract mixed numbers
- Link adding and subtracting fractions to algebra

Block 8 – Describing Using Algebra

Review: Negative numbers and inequality statements

- Review equality and inequality with negative numbers
- Review find sums and differences of positive and negative numbers
- Review multiplying and dividing positive and negative numbers
- Review comparing directed integers including using =,≠,<,>,≤,≥

Formulate and evaluate expressions

NB Unknowns are being used as variables in these small steps

- Understand the priority of operations when given in algebraic form **including indices and roots**
- Write an algebraic expression given in words
- Derive expressions from real world situations
- Evaluate expressions by substituting given unknown
- Understand that the value of an expression can have many solutions depending on the value(s) substituted
- Be able to produce a list of ordered pairs from a simple linear expression in one unknown

Linear equations

NB Unknowns are being used as 'specific unknowns' in (most of) these small steps

- Understand that the equals sign means equality (and not 'here is the answer')
- Understand that two equal expressions can be expressed as an equation.
- Understand that solving an equation is finding a specific unknown (i.e. what would I have to substitute into this equation to make the given number)
- Understand that linear equations in one unknown have a unique solution
- Solve one step linear equations
- Solve two step linear equations (including with brackets)
- Solve linear equations with unknowns on both sides (including with brackets)
- Form and solve linear equations
- Form and solve linear formulae from real world situations

- Understand that linear equations in two unknowns have an infinite number of solutions
- Produce (non-unique) solutions for equations in two (or more) unknowns

Linear sequences

- Review term to term sequences (from year 7 block 1)
    - Generate a sequence given a rule
    - Find a rule given a sequence
- Generate a sequence given a linear expression (building on small steps in 'Formulate and evaluate expressions' above)
- Understand a sequence derived from a linear expression is 'position-to-term'
- Understand a sequence derived from a linear expression has a constant difference (and hence is called an arithmetic sequence)
- Understand graphical representations of sequences
- Find the nth term given the linear sequence (use language of functions as well as nth term)

Block 9 – 2-D Geometry One

Construct Triangles and Quadrilaterals

- **Understand the ambiguous case for constructing triangles using two sides and the non-included angle**
- Draw a circle with a pair of compasses
- Construct accurate triangles with a pair of compasses (SSS)
- Construct accurate quadrilaterals with a pair of compasses

Find Unknown Angles

- Identify and find alternate angles
- Identify and find corresponding angles
- Identify and find co-interior angles

Conversion of Units

- Convert between metric length units
- Convert approximately between metric and imperial units
- Convert between metric area units

Area and Perimeter of Composite Figures

- Calculate the perimeter of any composite figure made from polygons
- Find the area of composite figures made from rectangles, parallelograms and triangles

Area of Trapezia

- Calculate the area of a trapezium
- Find missing lengths of trapezia using the area formula

Area of Other Shapes

- **Calculate area of composite shapes including trapezia**
- **Calculate area of kites as a composite shape**
- **Calculate area of regular polygons as composite shapes**

Block 10 – Proportional Reasoning

Convert between percentages, vulgar fractions, and decimals

- *Review 'developing understanding of percentages' (from year 8 block 1)*
- Convert vulgar fractions to decimals and vice versa
    - *Review use of division to convert a fraction to a decimal*
    - *Review representing any decimal as a fraction over base 10*

Percentage increase and decrease

- *Review percentage of a quantity (from year 8 block 1)*
- Use bar modelling to represent percentage increase and decrease
- Represent percentage increase and decrease as multiplication
- **Finding the original quantity after a percentage increase and decrease**

Finding the whole given the part and the percentage

- *Review 'Find the whole, given the part (fraction, decimal or percentage)' (from year 8 block 1)*
- Find the total quantity given a percentage of the total (less than 100%)
- **Find the total quantity given a percentage of the total greater than 100**
- Find one amount as a percentage of another

Ratio (equivalent, of a quantity) and rate

- *Review 'multiplicative relationships' (from year 7 block 3)*
- Representation and use of ratio
- Convert ratios to fractions
- Convert fractions to ratios
- Manipulate and simplify ratios
- Convert ratios into the form of 1:n and n:1 (unitary method)
- Apply ratios to finance to solve 'best buy' problems.
- Share into a ratio (including using bar modelling)
- Share into a ratio where one part or the difference is known but the total or the ratio is unknown
- Represent directly proportional relationships as an equation *(building on linear equations from year 8 block 3)*
- Setup and solve direct proportion problems

Speed, distance, time

- Analyse the multiplicative relationship between distance and time as a ratio.
- Calculate the speed, distance covered or time taken pertaining to an event.
- *Review graphs within linear equations (from year 8 block 3)*
- Construct and work with distance-time graphs.
- **Convert between units of speed**

Area scale factors

- Understand the relationship between linear scale factor and area scale factor
- Explore the effects of a scale factor on rectangles and other 2-D shapes
- Work with non-linear direct proportion

Block 11 – 3-D Geometry

Rounding, Significant Figures and Estimation

- Round to a given number of significant figures

Calculator Skills

- Use S↔D button
- Use π button
- Use x^2 , x^3 and x^n buttons (including use of arrow buttons)
- Use $\sqrt{\ }$ button
- Use $\sqrt[3]{\ }$ button

Circumference and Area of a Circle

- Identify parts of a circle
- Understand that π is an irrational number that represents the ratio of the circumference of a circle to its diameter
- Calculate the circumference of a circle
- Calculate the perimeter of semi-circles, quadrants and three-quarter circles
- Calculate the perimeter of composite shapes
- Apply knowledge of the circumference of a circle to solve real life context problems
- Appreciate that the formula for the area of a circle can be derived from prior knowledge
- Calculate the area of a circle
- Calculate the area of semicircles, quadrants and three-quarter circles
- Calculate the area of composite shapes
- Apply knowledge of the area of a circle to solve real life context problems

Visualise and Identify 3D shapes and their Nets

- Identify and name 3D shapes
- Know/understand the properties of 3D shapes (faces, vertices, edges)
- Identify 3D shapes from their nets
- Accurately draw nets of simple 3D shapes (cube, cuboid, triangular prism, tetrahedron, square-based pyramid)
- **Accurately draw nets of cylinders and hexagonal prisms**
- Use spatial awareness to identify the images on opposite/adjacent faces of a cube
- Calculate the surface area of 3D shapes (cube, cuboid, triangular prism, tetrahedron, square-based pyramid, trapezoidal prism, parallelepiped)

Volume of Cuboid, Prism, Cylinder, Composite Solids

- Understand volume as the number of cubes of a given unit that fit into a shape
- Understand the difference between volume and capacity
- Calculate the volume of cubes and cuboids
- Calculate the volume of other prisms
- Calculate the volume of a cylinder
- Calculate the volume of simple composite solids
- **Calculate the volume of complex composite solids**

Volume Scale Factors

- Convert between metric volume units

Block 12 – Organising and Representing Data

Construct and interpret statistical diagrams including pie charts

- Understand and use:
  - Frequency diagrams
  - Pictograms
  - Frequency tables
  - Bar charts
  - Line charts
- Understand and use pie charts
  - Find proportions of a pie chart
  - Represent proportions in a pie chart.

Collect and organise data

- Set up a statistical investigation using the data handling cycle
- Design and criticise questionnaires
- Understand different types of data:
  - Quantitative
  - Qualitative/categorical
  - Discrete
  - Continuous
  - Primary
  - Secondary
- *Organise data into tally charts and frequency tables*
- **Write data into grouped frequency tables (discrete and continuous)**

Critique and compare statistical representations

- *Understand, draw and use Frequency diagrams, Pictograms, Bar charts, Line charts, Pie charts*
- Understand, draw and use time series graphs
- Choose which graph to use
- Make comparisons between multiple charts of pictograms, bar charts, line charts and pie charts

Mean, median and mode averages

- *Calculate mean and median from a list of data:*
- Find the mode from a list of data
- Understand what an average is
- Decide which average is appropriate to use
- Find the mean, median and mode from a frequency table
- Find the mode from bar charts, line charts, pie charts and pictograms
- **Find the mean and median from bar charts, line charts and pictograms**
- **Find the mean, median and modal group from a grouped frequency table (and understand that the mean and median are estimates)**

The range and outliers

- *Calculate the range from a list of data*
- Calculate the range from statistical graphs
- Understand what the range is
- Find the range from frequency tables
- **Find the range from grouped frequency tables**
- Spot obvious outliers in a data set

Block 13 – Graphs and Proportion

The Cartesian Plane and straight-line graphs

- Review: Work with coordinates in all four quadrants
- Review: Using tables of values
- Review: Identify and draw lines that are parallel to the axes
- Recognise and use the line $y = x$
- Plot graphs of slope-intercept form ($y = mx + c$)
- Explore graphs with negative gradient ($y = -kx, y = a - x, x + y = a$)
- **Plot graphs of general form ($\boldsymbol{Ax + By = C}$)**
- Find the midpoint of a line segment
- Compare gradients
- Compare intercepts
- Find the equation of a line from a graph in slope-intercept form
- **Plot graphs of point-slope form ($\boldsymbol{y - y_1 = m(x - x_1)}$)**
- **Find the equation of line from a graph in point-slope form ($\boldsymbol{y - y_1 = m(x - x_1)}$)**

Direct and Inverse Proportion

- Understand direct proportion
- Recognise and use proportion graphs ($y = kx$)
- Understand inverse proportion
- **Recognise and use graphs of inverse relationships**

Standard Index Form

- Investigate positive powers of ten
- Work with large numbers in standard form $A \times 10^n$
- Investigate negative powers of ten
- Work with small numbers in standard form $A \times 10^{-n}$
- Compare and order numbers in standard form
- Mentally calculate with numbers in standard form
- Add and subtract numbers in standard form
- Multiply and divide numbers in standard form
- Use a calculator to work with numbers in standard form

Block 14 – Understanding Probability

What is probability (including representations)

- Review: 10.1 Convert between vulgar fractions, decimals and percentages
- Understanding the concept of uncertainty:
    - Explore randomness
    - Explore fairness/equality
    - Explore unequally likely outcomes
- Single event probability
- Use the 0-1 probability scale (including appropriate language)
- Know and apply the fact that all possible mutually exclusive outcomes sum to 1

Basic probability

- Understand mutually exclusive and non-mutually exclusive events
- Understand dependent and independent events
- Calculating probabilities for combined independent events by generating sample space diagrams.

Theoretical and experimental probability

- Understand the difference between theoretical and experimental probabilities
- Calculate using relative frequency
- Understand that an increased sample size will allow better estimates to be made

Probability diagrams

- *Review: Block 7 Venn diagrams and sets*
    - Understand sets and subsets, including notation
    - Draw Venn diagrams where the sets are categories
    - Use Set notation and regions of Venn Diagrams to describe connections between sets
    - Read from a Venn Diagram
- Understand the distinction between “and” and “or” (including in regard to regions of a Venn diagram)
- Use a Venn diagram as a method for calculating conditional probabilities
- Use a tree diagram as a method for calculating probabilities for independent events
- Use a tree diagram as a method for calculating probabilities for dependent events

Block 15 – Algebraic Manipulation

Sequences (Arithmetic and Geometric)

- Review: Sequences from the Grammar of Algebra 1.1
    - Understand pictorial, tabular and graphical representations of sequences
    - Describe sequences and generate sequences from written descriptions
- Review: Linear Sequences 8.4
    - Generate a sequence given a linear expression
    - Understand graphical representations of sequences
- Recognise, describe and continue geometric sequences
- Understand the connection between arithmetic sequences and their respective times table
- Find the position-to-term rule for any arithmetic sequence
- Understand that any term in an arithmetic sequence can be expressed in terms of its position in the sequence (position-to-term rule).

Algebraic Manipulation

- Review: Formulate and evaluate expressions 8.2
- Understanding the conventions and vocabulary of algebra
- Form and interpret algebraic expressions and equations
- Simplifying expressions by collecting like terms
- Multiplying and dividing algebraic terms
- Manipulate algebraic expressions using the distributive law to maintain equivalence
    - Expanding single brackets
    - Factorising linear expressions

Changing the Subject of a Formula

- Distinguish between additive and multiplicative structures
- Write equations in the form $y = mx + c$
- Change the subject of a formula
- **Change the subject of a formula when the subject appears twice**

Block 16 – 2-D Geometry Two

Triangles and Quadrilaterals

- Review: properties of triangles and quadrilaterals
- Review: Understand and use conventions for labelling geometric figures
- Classify quadrilaterals using their properties
- Review: finding missing angles in triangles and quadrilaterals
- Find missing angles by combining angle facts

Angles in Polygons

- Calculate the sum of interior angles in any polygon
- Find the interior angle of a regular polygon
- Find a missing interior angle in any polygon
- Find the exterior angle of a regular polygon
- Find a missing exterior angle in any polygon
- Know that the sum of an interior and exterior angle at a given vertex is 180°
- Work backwards from interior and exterior angle formulae to find the number of sides to a polygon
- Combine together angle facts to solve missing angle problems
- Understand why some shapes tesselate using angle facts

Construction and Loci

- Construct and interpret scale drawings including map scales
- Review: constructing triangles and quadrilaterals
- Understand and construct the locus from a point
- Understand and construct the locus from a straight line (including straight edges of a 2-D shape)
- Understand and construct the locus equidistant from two points
- Understand and construct a perpendicular bisector
- Understand and construct a perpendicular line to a point
- Understand and construct a perpendicular line from a point
- Understand and construct the locus equidistant from two line segments
- Understand and construct an angle bisector
- Construct common angles – 60°, 30°, 90°, 45°
- Apply loci constructions to practical problems
- **Apply knowledge to further interesting constructions**

Congruency and Similarity

- Review: understand the meaning of congruence and similarity
- Understand and use triangle congruency rules
- Use triangle congruency rules to solve problems
- Find missing sides in similar shapes
- **Explore similarity in more complex similar triangles**

Block 17 – Linear Equations and Inequalities

Construct and Solve Linear Equations and Inequalities

- *Review: block 8.2 Formulate and evaluate expressions*
- Forming and representing inequalities
- Solve one-step inequalities
- Solving inequalities with a negative coefficient
- *Review: 8.3 Linear equations*
- Solve linear equations and inequalities with one variable

Graphical Solutions to Simultaneous Linear Equations

- *Review: block 13.1 – The Cartesian Plane and straight-line graphs*
    - *Review 13.1.3: Identify and draw lines that are parallel to the axes*
    - *Review 13.1.4: Plot graphs of slope-intercept form (y=mx+c)*
    - *Review 13.1.5: Explore Graphs with Negative Gradient (y=-kx , y=a-x , x+y=a)*
- Represent inequalities on a graph
- **Represent multiple inequalities on a graph**
- Understand that the intersect of two equations is a solution to both
- Plotting simultaneous linear equations
- **Plotting simultaneous linear equations that are not given in slope-intercept form**

Block 18 – Geometry of Triangles One

Pythagoras' Theorem

- Review: squaring and square rooting numbers with and without a calculator
- Locate the hypotenuse on a right-angled triangle
- Understand demonstrations of how Pythagoras' theorem works
- Calculate the length of the hypotenuse given two shorter sides
- Calculate the length of shorter sides given the hypotenuse and the other shorter side
- Determine whether or not a triangle is right-angled using Pythagoras' theorem
- Explore Pythagorean triples
- Apply Pythagoras' theorem to solving problems
- Use Pythagoras' theorem to find the length of a line segment
- **Explore proofs of Pythagoras' theorem**

Trigonometry

- Review: similar triangles
- Locate the hypotenuse, opposite and adjacent on a right-angled triangle
- Explore right-angled triangles with a hypotenuse of 1
- Explore side lengths in 30-60-90 triangles
- Explore similar right-angled triangles by adjusting the hypotenuse from 1
- Calculate missing angles in right-angled triangles using Trigonometry
- Apply trigonometry to solving problems

The Unit Circle

- **Explore the unit circle**
- **Discover and explore the sine, cosine and tangent graphs**