Aston Fields Middle School
Key Performance Indicators

Pupils who are working at age related expectations at the end of the year will have a secure knowledge of these Key Performance Indicators.

Indicators for end of Key Stage 3:

Number: Structure
• Apply the four operations, including formal written methods, to positive integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative • Use and apply BODMAS, including brackets, powers, roots and reciprocals • Use the concepts and vocabulary of prime numbers, highest common factor, lowest common multiple and apply to data such as Venn diagrams, prime factorisation, including using product notation and the unique factorisation theorem. Using Venn Diagrams and mastery of Index Laws • Add and Subtract fractions with different simple denominators • Calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer. Not negative values for n • Apply systematic listing strategies (Trial and Improvement)
Number: Fraction, decimals and percentages
• Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8) • Identify and work with fractions in ratio problems • Interpret fractions and percentages as operators. Including fraction and percentage of a quantity. Not multiplier or reverse percentage)
Number: Measures and Accuracy
• Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)
Algebra: Notation, Vocabulary and Manipulation
• Use and interpret algebraic notation, including: a^2b in place of $a \times a \times b$, coefficients written as fractions rather than as decimals • Substitute numerical values into scientific formulae - including negative values • Understand and use the concepts and vocabulary of inequalities and factors - Inequality lines and integer solutions that satisfy inequality • Simplify and manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers, including the laws of indices - Only single brackets • Rearrange formulae to change the subject - 2 step equations
Algebra: Graphs
• Plot graphs of linear equations that correspond to straight-line graphs in the coordinate plane • Identify and interpret gradients and intercepts of linear functions graphically and algebraically • Recognise, sketch and interpret graphs of linear functions and quadratic functions

- Plot and interpret graphs and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration

Algebra: Solving Equations

- Solve linear equations with the unknown on both sides of the equation. Only Integer Solutions
- Find approximate solutions to linear equations using a graph

Algebra: Sequences

- Generate terms of a sequence from either a term-to-term or a position-to-term rule
- Deduce expressions to calculate the nth term of linear sequences

Ratio, Proportion and Rates of Change

- Change freely between compound units (e.g. speed, rates of pay, prices) in numerical contexts. E.g. Km/Miles and exchange rates
- Use compound units such as speed, rates of pay, unit pricing)
- Use scale factors, scale diagrams and maps
- Express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)
- Express a multiplicative relationship between two quantities as a ratio or a fraction
- Understand and use proportion as equality of ratios
- Relate ratios to fractions and to linear functions
- Compare lengths, areas and volumes using ratio notation
- Work with percentages greater than 100%
- Solve problems involving percentage change and simple interest including in financial mathematics
- Solve problems involving direct proportion, including graphical and algebraic representations

Geometry and Measures: Properties and Structures

- Understand and use alternate and corresponding angles on parallel lines
- Derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons) - Interior and Exterior Angles
- Identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement, reflection, translation and rotation
- Interpret plans and elevations of 3D shapes

Geometry and Measures: Mensuration and Calculation

- Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings
- Calculate perimeters of 2D shapes, including circles
- Calculate areas of circles and composite shapes
- Apply the given formulae to calculate volume of *all* prisms (including cylinders) and know and apply the formula for cubes and cuboids

Statistics

- use and interpret scatter graphs of bivariate data
- Recognise correlation
- Interpret, analyse and compare the distributions of data sets from distributions through appropriate graphical representation involving discrete, continuous and grouped data. (bar-charts, pie-charts, line graphs, freq.polygons and stem and leaf diagrams)
- Interpret, analyse and compare the distributions of data sets from distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)

• Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one
Probability
• Enumerate sets and combinations of sets systematically, use tables, grids and Venn diagrams. (Including two-way tables - creating and interpreting - worded questions) • Construct theoretical possibility spaces for combined experiments with equally likely outcomes and use these to calculate theoretical probabilities. - Sample space diagrams, tree-diagrams and understanding of the language of relative frequency