KS4 Milestone Knowledge Tracker

## MATHS Year 10: Curriculum Intent

Year 10 Curriculum Intent: The Year 10 maths curriculum aims to provide students with the skills to become fluent in the fundamentals of mathematics, through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. The Year 10 curriculum builds directly on students' progress from KS3 through a mastery and problem-solving approach. Mathematical concepts are explored through small steps developed from the White Rose scheme of learning to allow students to fully understand each element and avoid cognitive overload and repetition of rote methods. Students will be given the opportunity to solve problems every lesson through both independent and group tasks. The aim of year 10 is not only to consolidate and embed all prior skills but also to link them together to enable students to access and reason with complex mathematical problems.

## Year 10 Essential Knowledge Summary

### Schemata 1: Similarity

**Composite Knowledge:**
Pupils will extend their understanding of parallel line angles rules and similar triangles. Pupils will develop their understanding of congruency by considering what information is needed to produce a unique triangle. Pupils will also gain an understanding of trigonometric functions and how these are linked to ratios.

**Component Knowledge:**
**Foundational Knowledge:**
Declarative Knowledge:
- Congruent shapes.
- Similar shapes.
- Scale factors of enlargement.
- Trigonometric ratios.
- Exact trigonometric values of key angles.

Procedural Knowledge:
- Explore the difference between congruence and similarity.
- Enlarge a shape about a given point; understand and use similarity.
- Find missing sides in similar shapes including pairs of similar triangles.
- Understand and use the conditions for a pair of congruent triangles.
- Work out missing lengths and angles in right-angled triangles.
- Use the exact values of key angles.

**Upper Hierarchical Knowledge**
- Find the area and volume of similar shapes.
- Explore formal proof of congruency of triangles.
- Enlarge a shape by a negative scale factor.
- Use trigonometry in 3D shapes.
- Derive and use the sine and cosine rules.
- Use the formula ½absinC to find the area of non-right angled triangles.

### Schemata 2: Developing Algebra

**Composite Knowledge:**
Pupils will reinforce and deepen their understanding of equations and inequalities; forming and solving equations; establishing the difference between a solution and solution set; and exploring how number lines and graphs can be used to represent the solutions to inequalities. Pupils will also learn how to solve simultaneous equations, using both algebraic and graphical methods.

**Component Knowledge:**
**Foundational Knowledge:**
Declarative Knowledge:
- Meaning of solution and solution set.
- Inequalities on a number line representation.
- Linear simultaneous equations.

Procedural Knowledge:
- Form and solve equations and inequalities in a variety of contexts, including with unknowns on both sides.
- Represent solutions to inequalities on a number line.
- Represent solutions to equations graphically.
- Form and solve a pair of linear simultaneous equations graphically.
- Form and solve a pair of linear simultaneous equations algebraically.

**Upper Hierarchical Knowledge**
- Use set notation for solutions.
- Solve inequalities in two variables, identifying regions.
- Solve quadratic equations and inequalities (by factorisation only).
- Solve simultaneous equations with one linear and one quadratic.

### Schemata 3: Geometry

**Composite Knowledge:**
Pupils will be formally introduced to bearings and develop their understanding of trigonometry and Pythagoras, by applying their skills in another context. Pupils will also develop their understanding of the formulae for arc length, sector area and surface area and volume of spheres and cones. In this block, pupils will also gain a more formal understanding of vectors by exploring vector notation, operations and journeys within shapes.

**Component Knowledge:**
**Foundational Knowledge:**
Declarative Knowledge:
- Angles rules.
- Bearings notation.
- Area and circumference of a circle.
- Parts of a circle.
- Volume of cylinders, cones and spheres.
- Vector notation.

Procedural Knowledge:
- Understand and use bearings.
- Calculate area and circumference.
- Name parts of a circle and perform related calculations.
- Find areas and volume related to circles, including cylinders, cones and spheres.
- Vector arithmetic – addition, subtraction and multiplication by a scalar.
- Explore vectors and translations.

**Upper Hierarchical Knowledge**
- Derive, use and prove the first four circle theorems (Note: the rest are covered in Y11).
- Understand and use the equation of a circle.
- Explore vector journeys in shapes.
- Explore quadrilaterals using vectors.
- Understand parallel vectors.
- Explore collinear points using vectors.
- Use vectors to construct geometric arguments and proofs.

### Schemata 4: Proportions and Proportional Change

**Composite Knowledge:**
Pupils will develop their knowledge of ratio and fractions, by exploring their differences and similarities and linking these concepts to other areas of mathematics, including both geometry and algebra. Pupils will also reinforce and enhance their understanding of percentages by working with repeated percentage change and growth and decay problems. Pupils will explore problems in financial contexts to maintain familiarity with key vocabulary.
In this block, pupils will also develop their understanding of probability tables, Venn diagrams and tree diagrams.

**Component Knowledge:**
**Foundational Knowledge:**
Declarative Knowledge:
- Ratio and fractional form.
- Currencies.
- Compound interest formula.

Procedural Knowledge:
- Use ratios, including with mixed units.

### Schemata 5: Delving into Data

**Composite Knowledge:**
Pupils will build on their knowledge of the collection, representation and use of summary statistics to describe data, through the interpretation of results and by evaluating and critiquing statistical methods and diagrams.

**Component Knowledge:**
**Foundational Knowledge:**
Declarative Knowledge:
- Sampling and its limitations.
- Line graphs and time series data.
- Group data.
- Lines of best fit and correlation.
- Extrapolation.

Procedural Knowledge:
- Construct and interpret tables and line graphs for time series data.
- Understand and represent with grouped data.
- Understand and identify correlation.
- Use lines of best fit, understanding the impact of extrapolation.
- Construct and interpret frequency polygons.

### Schemata 6: Using Number

**Composite Knowledge:**
Pupils reinforce and develop their understanding of the calculation of key number concepts, including all four operations with integers, decimals and fractions, through problem solving questions, in particular multi-step problems. The limits of accuracy of truncation will also be explored and compared to rounding.
Pupils will also cement and extend their understanding of prime factorisation, HCF, LCM and sequences.
In this block, pupils will also develop their understanding of powers generally and in standard form, and explore negative and fractional indices in detail.

**Component Knowledge:**
**Foundational Knowledge:**
Declarative Knowledge:
- Area and volume of shapes.
- Factors, multiples and primes.
- Arithmetic and geometric sequences.
- Rules of indices.
- Standard index form.

Procedural Knowledge:

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| • Explore fractions in ratios.<br>• Explore fractions from ratios.<br>• Combining ratios.<br>• Calculate unit prices (‘best buys’).<br>• Convert currencies.<br>• Convert fractions, decimals and percentages.<br>• Find percentages and percentage changes.<br>• Find one number as a percentage of another.<br>• Calculate simple and compound interest.<br>• Evaluate exponential change e.g. depreciation.<br>• Find original values.<br>• Review single event probability – comparing theoretical and experimental.<br>• Understand and work with mutually exclusive and independent events.<br>• Construct and interpret tree diagrams.<br>• Find probabilities from frequency trees, tables and Venn diagrams.<br><br>**Upper Hierarchical Knowledge**<br>• Revise area and volume ratios.<br>• Use iterative methods.<br>• Calculate and interpret conditional probabilities. | • Evaluate measures of location and dispersion.<br>• Use statistical diagrams and measures to compare distributions.<br><br>**Upper Hierarchical Knowledge**<br>• Construct and interpret cumulative frequency diagrams, box plots and histograms.<br>• Understand quartiles; use and interpret the interquartile range. | • Use four operations with integers (positive and negative), decimals and fractions, with and without context.<br>• Work out the exact answers e.g. area and volume.<br>• Evaluate calculations involving percentages.<br>• Use factors, multiples, primes and prime factorisation.<br>• Recognise and use arithmetic and geometric sequences.<br>• Recognise and use other sequences.<br>• Work out powers and roots.<br>• Use the rules of indices.<br>• Calculate with numbers in standard index form.<br><br>**Upper Hierarchical Knowledge**<br>• Calculate with surds.<br>• Find the rule for the nth term of a quadratic sequence.<br>• Understand and use fractional indices.<br>• Work with rational and irrational numbers, including recurring decimals.<br>• Work with limits of accuracy, including upper and lower bounds. |
| **Year 10 Final Composite Knowledge End Point** | | |
| By the end of year 10, the maths department aims to ensure students have an understanding of similarity and congruent proofs, have begun to use trigonometric functions, are able to solve and form different equations and inequalities. Students will also start to be introduced to GCSE exam style questions and problems. | | |