Swindon Academy Maths Curriculum Map

Intent

At Swindon Academy, we want our pupils to develop a thirst for mathematical knowledge and develop a deeper understanding of the mathematical concepts required for life outside of the Academy. It is our intention that they will master the skills required to reason and problem solve and that, by the end of Year 6, they will have the required knowledge of problem solving and reasoning through our teaching of the CPA approach.

At Swindon Academy, we have adopted the Maths No Problem scheme of learning which adopts a spiral design with carefully built up mathematical concepts and processes.
In each year group, the whole class works through the programme of study at the same pace with ample time on each topic before moving on. Ideas are revisited at higher levels as the curriculum spirals through the years. Tasks and activities are designed to be easy for pupils to enter while still containing challenging components. For advanced learners, the textbooks also contain non-routine questions for pupils to develop their higher-order thinking skills. Lessons and activities are designed to be taught using problem-solving approaches to encourage pupils' higher-level thinking. The questions and examples that we use from the MNP textbooks are carefully varied by expert authors to encourage pupils to think about the maths. Rather than provide mechanical repetition, the examples are designed to deepen pupils' understanding and reveal misconceptions.
The focus is on working with pupils' core competencies, building on what they know to develop their relational understanding, based on Richard Skemp's work. Based on Jerome Bruner's work, pupils learn new concepts initially using concrete examples, such as counters, then progress to drawing pictorial representations before finally using more abstract symbols, such as the equals sign.
(Maths No Problem)
We want every child to flourish mathematically, so at the end of each academic year, a diagnostic check will take place for Unit 1 in September. This will allow teachers to address gaps and misconceptions prior to September and start filling them before the unit begins. This testing will also take place for each unit throughout the year and will be followed up with Flash Tests. These tests will take place at the end of each week and will assess children's retention of the knowledge and skills learned during those five MNP lessons.

Implementation – Rosenshine principles of instruction

Daily Review

Daily review is an important component of instruction. It helps strengthen the connections of the material learned. Automatic recall frees working memory for problem solving and creativity.

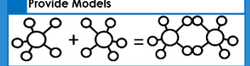
New Material in Small Steps

Our working memory is small, only handling a few bits of information at once. Avoid its overload—present new material in small steps and proceed only when first steps are mastered.

Ask Questions

The most successful teachers spend more than half the class time lecturing, demonstrating and asking questions. Questions allow the teacher to determine how well the material is learned.

Provide Models



Students need cognitive support to help them learn how to solve problems. Modelling, worked examples and teacher thinking out loud, help to clarify the specific steps involved.

Guide Student Practice

Students need additional time to rephrase, elaborate and summarise new material in order to store it in their long-term memory. More successful teachers build in more time for this.

Check Student Understanding

Less successful teachers merely ask "Are there any questions?" no questions are taken to mean no problems. False. By contrast, more successful teachers check on all students.

Obtain High Success Rate

A success rate of around 80% has been found to be optimal, showing students are learning and also being challenged. Better teachers taught in small steps followed by practice.

Scaffolds for Difficult Tasks

Scaffolds are temporary supports to assist learning. They can include modelling, teacher thinking aloud, cue cards and checklists. Scaffolds are part of cognitive apprenticeship.

Independent Practice

Independent practice produces 'overlearning" - a necessary process for new material to be recalled automatically. This ensures no overloading of students' working memory.

Weekly and Monthly Review

The effort involved in recalling recently –learned material embeds it in long-term memory. And the more this happens, the easier it is to connect new material to such prior knowledge.

Key Stage 1									
Year 1		**Term 1**	**Term 2**		**Term 3**	**Term 4**		**Term 5**	**Term 6**
MNP units		**Numbers to 10** **Addition and Subtraction**	**Position and Direction** **Numbers to 20** **Addition and Subtraction within 20**		**Shapes and patterns** **Length and Height** **Numbers to 40**	**Addition and subtraction** **Multiplication**		**Division** **Fractions** **Numbers to 100**	**Time** **Money** **Volume and Capacity** **Mass** **Space**
									
	End of Year- Diagnostic check for Unit 1 takes place	Numbers to 10 • consolidate understanding of the value of numbers to 10, also including 0. • use one-to-one correspondence to count use ten frames to represent numbers, moving onto using both numerals and words. • order numbers to show value, • compare and understand all numbers to 10 • use concrete materials to show 1 more and 1 less. Addition and subtraction • make numbers up to 10 • create number stories • use the part-part-whole diagrams • make their own addition equations • subtraction by crossing out, by using number bonds and by counting back. • use manipulatives and pictorial representations • use mathematical vocabulary appropriately.	Positions • use positional language (first, second, third) • use directional language for left and right. Numbers to 20 • confidently count and write to numbers to 20 • compare and order numbers • recognise patterns within 20. Addition and Subtraction within 20 • add and subtract numbers within 20.	**PUMA Assessment Point 1**	Shapes and Patterns • talk about the properties of basic 2D shapes and some solid shapes • group shapes according to different criteria. • Recognise, describe and continue a pattern Length and Height • understand the concept of length • compare different lengths and describe whether something is taller, longer, shorter or higher. • measure two items fairly for comparison using items and body parts • measure using a ruler. Numbers to 40 • count to 40 in different ways and write numbers to 40 • compare numbers and look at number patterns	Addition and Subtraction Word Problems • count, add and subtract in a real-life context. • use pictures and other representation to help visualise problems. • Apply knowledge of number bonds and simple bar models to represent word problems. comparing by looking at how many more or how many fewer/less Multiplication • Learn equal groupings, repeated addition, arrays and doubling. • apply this knowledge to solve word problems. • use images from their previous learning such as ten frames and number tracks.	**PUMA Assessment Point 2**	Division • share small numbers into a specific number of groups • sharing equally Fractions • making halves and quarters • making the connection between fractions and division Numbers to 100 • reinforce previous learning by counting in 10s and 1s. • use number bonds to partition numbers. • compare numbers to 100 • find number patterns looking at one hundred charts. Time • tell the time to the hour and half hour, using terms such as 'next,' 'before' and 'after,' • estimate durations of time • compare time • exploring analogue clocks and telling time to the hour and half hour. • determine the order of events using specialised terminology. • estimate lengths of time compare measures of time.	Money • recognise different coins and notes • use number bonds to work out how much items cost. Volume and Capacity • compare volume and capacity, using terms such as 'more than' and 'less than' • measure volume and capacity using non-standard units • describe volume using the terms 'half' and 'quarter.' Mass • compare mass using terms such as 'heavy/heavier,' 'light/lighter.' • measure mass using non-standard units. Space • describe the position of one object relative to another • explore the concepts of 'up and down, 'forwards and backwards,' and 'inside and outside.' • learn about turns: • learn the notion of clockwise and anticlockwise.

Key Stage 1									
Year 2		**Term 1**	**Term 2**		**Term 3**	**Term 4**		**Term 5**	**Term 6**
MNP units		**Numbers to 100** **Addition and subtraction** **Multiplication of 2, 5 and 10**	**Multiplication and division of 2, 5 and 10** **Length** **Mass**		**Temperature** **Picture graphs** **Word problems** **Money**	**2D shapes** **3D shapes** **Fractions**		**Time** **Volume**	**Review and revisit**
									
	End of Year- Diagnostic check for Unit 1 takes place	Numbers to 100 • count to 100, including counting up in 10s • compare numbers using place value knowledge • use and apply number bonds • explore numbers to see patterns within 100. Addition and Subtraction • add and subtract mentally • use the standard column method Multiplication of 2, 5 and 10 • Use concrete apparatus and images to investigate multiplication by 2, 5 and 10 • look for patterns in multiplication • understand the commutative law	Multiplication and Division of 2, 5 and 10 • Use different ways of sharing, including sharing and grouping investigate links between multiplication and division and odd and even numbers Length • understand what a metre is and what centimetres • use m and cm in real-life contexts. Mass • Use mass in the context of kilograms and grams. • read scales • compare the weight of different objects • solve word problems in the context of mass	**PUMA Assessment Point 1**	Temperature • learn about Celsius • read thermometers Picture Graphs • read, interpret, analyse and construct picture graphs More Word Problems • use addition and subtraction to help solve word problems • use bar models to think about what is the same and what is the difference. Money • write and count money • represent money using £ and p. use 5s and 10s to count quickly and efficiently • show equal amounts of money and to exchange money • solve problems involving money using bar modelling	Two Dimensional Shapes • explore how to draw shapes, make patterns with shapes and turn shapes using familiar language. • identify sides of shapes and their vertices before moving on to lines of symmetry. • recreate shapes using blocks and sorting the basic shapes • draw shapes using square grids and dot grids. Three Dimensional Shapes • recognise, describe and group 3-D shapes • form structures with 3D shapes make patterns using 3-D shapes.	**PUMA Assessment Point 2**	Fractions • Understand that fractions are equal parts, focussing on halves, quarters and thirds • name fractions of the same denominations • understand how many quarters, halves and thirds make a whole • order and compare fractions • find fractions of a set of objects or part of a quantity. SATs Children will take two standardised assessment tasks (SAT) – one arithmetic paper and one reasoning paper.	Time • tell the time to the nearest 5 minutes on analogue clocks • find the duration of time, the end of a length of time, the beginning of a length of time compare lengths of time Volume • compare volumes of containers, measuring in l and ml • solve word problems associated with volume

Lower Key Stage 2									
Year 3		**Term 1**	**Term 2**		**Term 3**	**Term 4**		**Term 5**	**Term 6**
MNP units		**Numbers to 1000** **Addition and subtraction**	**Multiplication and division** **Further multiplication and division**		**Length** **Mass** **Volume**	**Money** **Time**		**Picture and bar graphs** **Fractions**	**Angles** **Lines and shapes** **Perimeter of figures**
					 				
	End of Year- Diagnostic check for Unit 1 takes place	Numbers to 1000 • learn numbers to 1000 and focus on the value of each digit • compose and decompose numbers, compare, order and look for patterns Addition and Subtraction • use formal methods of addition and subtraction where regrouping is required. • solve problems using addition and subtraction, using the bar model as a visual aid.	Multiplication and Division • multiply and divide by 3, 4 and 8 • solve word problems Further Multiplication and Division • multiply and divide using both informal and formal methods • solve problems including missing number problems and scaling problems.	**PUMA Assessment Point 1**	Length • measure length in metres and centimetres before moving on to kilometres • convert different units of measurement • compare different lengths • use mental and procedural skills to solve problems with the aid of the bar model. Mass • use scales to measure mass in g and kg • read scales that have different values for each marking • solve word problems using the bar model Volume • measure volume using millilitres and litres • solve problems involving volume and capacity	Money • recognise different denominations (both notes and coins) • use simple addition and subtraction of money • solve word problems using bar modelling Time • tell the time using 'am' and 'pm' tell the time to the minute • use analogue and digital time use the 24-hour clock and clocks using roman numerals • measure and compare time in seconds, hours and minutes. • convert units of time	**PUMA Assessment Point 2**	Picture Graphs and Bar Graphs • create and interpret picture graphs and bar graphs • read and interpret information from bar graphs Fractions • Count using fractions and make number pairs • add and subtract fractions • explore equivalent fractions simplify fractions • compare fractions with different denominators • find fractions of whole numbers as part of set and looking at sharing 1 and more than 1	Lines and Shapes • identify perpendicular and parallel lines, followed by horizontal and vertical lines • describe 2-dimensional shapes make 3-dimensional shapes using nets Perimeter of Figures • Measure and calculate the perimeter of a shape • Solve problems using perimeter

Lower Key Stage 2										
Year 4		**Term 1**	**Term 2**		**Term 3**	**Term 4**		**Term 5**	**Term 6**
MNP units		**Numbers to 10000** **Addition and subtraction within 10000**	**Multiplication and division** **Further multiplication and division**		**Further multiplication and division** **Graphs** **Fractions**	**Time** **Decimals**		**Money** **Mass, volume and length** **Area of figures**	**Geometry** **Position and movement** **Roman numerals**
					 			  	
	End of Year- Diagnostic check for Unit 1 takes place	Numbers to 10 000 • compare and order 4 digit numbers • create and interpret number patterns • round numbers to the nearest 10, 100 and 1000 • estimate numbers Addition and Subtraction within 10 000 • add and subtract with numbers up to 10 000 • use mental methods and column methods for addition and subtraction • solve word problems: visualising the problems using the bar model.	Multiplication and Division • multiply and divide by 6, 7, 9, 11 and 12 • understand 'quotient' in relation to division • calculate multiplication equations using known multiplication facts • understand the difference between sharing and grouping understand the commutative law in multiplication • solve problems involving multiplication and division Further Multiplication and Division • divide and multiply by 1 and 0 and understand the law of commutativity • multiply three numbers together multiply multiples of ten • multiply 2- digit numbers using short multiplication • multiply multiples of 100 • multiply 3-digit numbers using short multiplication	**PUMA Assessment Point 1**	Completion of Further Multiplication and Division • divide 2-digit numbers using chunking and short division, including remainders • solve multiplication and division problems Graphs • interpret picture graphs and bar graphs • interpret line graphs and use information collated in a table to draw a line graph. • make predictions based on trends identified in data Fractions • convert between mixed numbers and improper fractions • add and subtract fractions • solve addition and subtraction word problems.	Time • convert between the 12 and 24 hour clocks • convert between units of time (minutes and seconds, and hours and minutes) • solve time problems involving conversions and calculating durations of time Decimals • count, order and record decimals in different ways • understand the equivalence between tenths and hundredths compare and order numbers • create number sequences using decimals • round decimals to the nearest whole number • explore the link between tenths and hundredths and dividing by 10 and 100	**PUMA Assessment Point 2**	Money • count and record in pounds and pence • compare amounts of money by converting amounts from pounds to pence and vice versa • round money to the nearest pound • find totals and calculate change • use bar models to visualise money problems Mass, Volume and Length • estimate and measure mass, volume and length • convert units of measure from larger to smaller and vice versa. measure perimeter using cm and mm • solve problems involving mass, volume and length Area of Figures • counting squares before measuring area by using multiplication • find areas of figures that have squares and rectangles by counting and visualising	Geometry • name and compare angles and explore symmetry and symmetrical figures • draw lines of symmetry on shapes and figures • sort a variety of 2-D shapes Position and Movement • describe the positions of objects and figures • describe positions on grids using coordinates • translate shapes using the language of 'left', 'right', 'upwards' and 'downwards' • use coordinates to describe a figure following a translation Roman Numerals • write the Roman numerals to 100 • explore the patterns involved exploring other concepts of number

Upper Key Stage 2									
Year 5		**Term 1**	**Term 2**		**Term 3**	**Term 4**		**Term 5**	**Term 6**
MNP units		**Numbers to 1000000** **Addition and subtraction**	**Multiplication and division** **Word problems**		**Graphs** **Fractions**	**Decimals** **Percentages**		**Geometry** **Position and movement** **Measurements**	**Area and Perimeter** **Volume** **Roman numerals**
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	End of Year- Diagnostic check for Unit 1 takes place	Numbers to 1 000 000 • read and write numbers to 100 000, quickly moving onto numbers to 1 000 000. • use concrete materials to represent numbers to 1 000 000, including number discs and place-value charts. • compare numbers to 1 000 000 • explore number patterns • round numbers to the nearest 10, 1000, 10 000 and 100 000. Whole Numbers: Addition and Subtraction • use simple strategies to add and subtract, such as counting on and counting back. • adding within 1 000 000 and subtracting within 1 000 000. • use a range of methods, such as the column method and number bonds to add and subtract numbers. • use concrete materials to improve visualisation and mental skills.	Whole Numbers: Multiplication and Division • finding and defining multiples, factors and common factors. • work with prime numbers and determine what makes a number prime or composite. • understand square and cube numbers • multiplying and dividing by 10, 100 and 1000. • Use a variety of methods, including: number bonds, column methods and the grid method. Whole Numbers: Word Problems • apply learning of all four operation to solve multiple step word problems. • use the bar model and other visual representations to help visualise word problems.	**PUMA Assessment Point 1**	Graphs • read and interpret information in tables and in line graphs. • Deepen understanding of time, reading increasingly complex timetables. • compare line graphs and bar graphs. Fractions • use more diverse problems involving fractions, including dividing and multiplying fractions by whole numbers. • use concrete apparatus and diagrams to help visualise fractions. • add and subtract fractions with different denominators and fractions represented with mixed numbers and improper fractions. • multiply fractions by whole numbers and multiply mixed numbers by whole numbers. • solve problems involving fractions using the bar model.	Decimals • read and write decimals to thousandths, using concrete apparatus • order decimals using understanding of place value. • explore the link between hundredths and thousandths written as fractions and decimals. • apply understanding of addition and subtraction to add and subtract decimals. Percentages • link hundredths to other equivalent fractions. • understand how other fractions can be shown as ‘out of 100’ and write this as both a decimal and percentage. • calculate percentages.	**PUMA Assessment Point 2**	Geometry • measure angles in degrees using a protractor. • explore the angles that make 180° or straight line and those that make a full turn. • practice drawing lines and angles accurately and use this to create accurate drawings of 2D shapes. • apply understanding of angles to solve problems involving angles. • learn what a polygon is be able to name regular polygons. Position and Movement • embed understanding of writing co- ordinates of points. • understand how to translate and reflect shapes on a grid. • solve problems involving translations and reflections of shapes. Measurement • embed understanding of how to convert between different units of length, mass and time. • use negative numbers when reading scales, such as thermometers. • solve problems involving measurements	Area and Perimeter • embed understanding of how to calculate area and perimeter of shapes. • use scale diagrams to find the area and perimeter of figures. • estimate area and know when this might be useful. Volume • find the volume of solid shapes. • compare the capacity of cuboids. • convert between units of measurement for volume, estimate volume and solve word problems involving volume. Roman Numerals • read and write Roman numerals up to 1000 and write years in this way.