

Mathematics in the OCL Primary Curriculum

Intent

The OCL Curriculum Statement of Intent has been carefully considered for each curriculum area to ensure the content designed meets this at every opportunity.

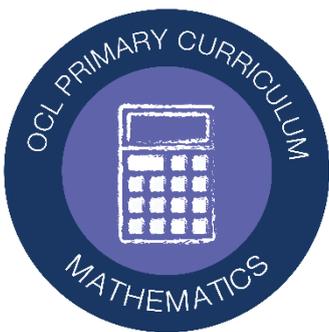
The context that our children and young people live in:

- Our children live in a world where they require the skills and qualifications, flexibility, emotional intelligence and expertise to be leaders and to thrive as human beings.
- Our children live in world where accepting themselves as individuals and celebrating who they are is key in navigating a complex and ever-changing environment.
- Our children live in a world where they need to feel a sense of ability to change things for the better and have self efficacy.
- Our children live in a world where they need a network of relationships and a network of support to thrive and excel.
- Our children live in a world where early development of vocabulary skills is the single most important factor to get right as early as possible.

We want our children and young people to:

- Be inspired to improve the world around them.
- Have the ambition, skills and expertise to thrive in a fast changing, interconnected and communication rich world, with the confidence and technical expertise to thrive.
- Have a network that supports them.
- Be comfortable in who they are and able to continuously explore who they are becoming.
- Be rich in language with a passion for learning.
- Seek to include others, be other-centred and celebrate difference.
- Have a values approach to life and a sense of what is right and wrong through the lived experience of the 9 habits.

Therefore, we focus on developing character, competence and community. The Maths curriculum specifically meets the OCL statement of intent by focussing on character, competence and community in the following areas:



Character: All children will have a positive, growth mindset towards mathematics, understanding its importance in everyday life and within our world

Competence: Children will be fluent in the core mathematical concepts, using precise mathematical vocabulary across a range of problem solving and reasoning situations and applying these to real life situations.

Community: Children will understand the interconnectedness of mathematics across subjects as well as understand its importance in everyday life, within communities and our world. They will learn about famous mathematicians and the impact they have in society today.

Implementation

To ensure our intent transfers into everyday classroom practice, we use current research in cognitive science to develop pedagogy and specific CPD to ensure subject content is expertly delivered. This is alongside individualised coaching in constantly striving to continually improve practice. Responsive feedback approaches, delivered through out highly effective one-to-one horizons approach, ensure each adult knows the relevant next steps to maximise learning opportunities.

Using research from Dan Willingham's Models of Memory, Sweller's Cognitive Load Theory, Rosenshine's Principles of Instruction and the thinking behind Ebbinghaus' Forgetting Curve, the curriculum is implemented effectively through a set of core concepts, developed for each curriculum area. This enables children to assimilate new information into growing schema as they move through the academy. By presenting new information to students as another example of these core concepts it allows them to process information in relation to previously learned knowledge and make connections.

The core concepts for Maths:

Core Concepts in Mathematics			
Number and Place Value	Number Facts	Addition and Subtraction	Multiplication and Division
Fractions	Geometry	Statistics	Measures

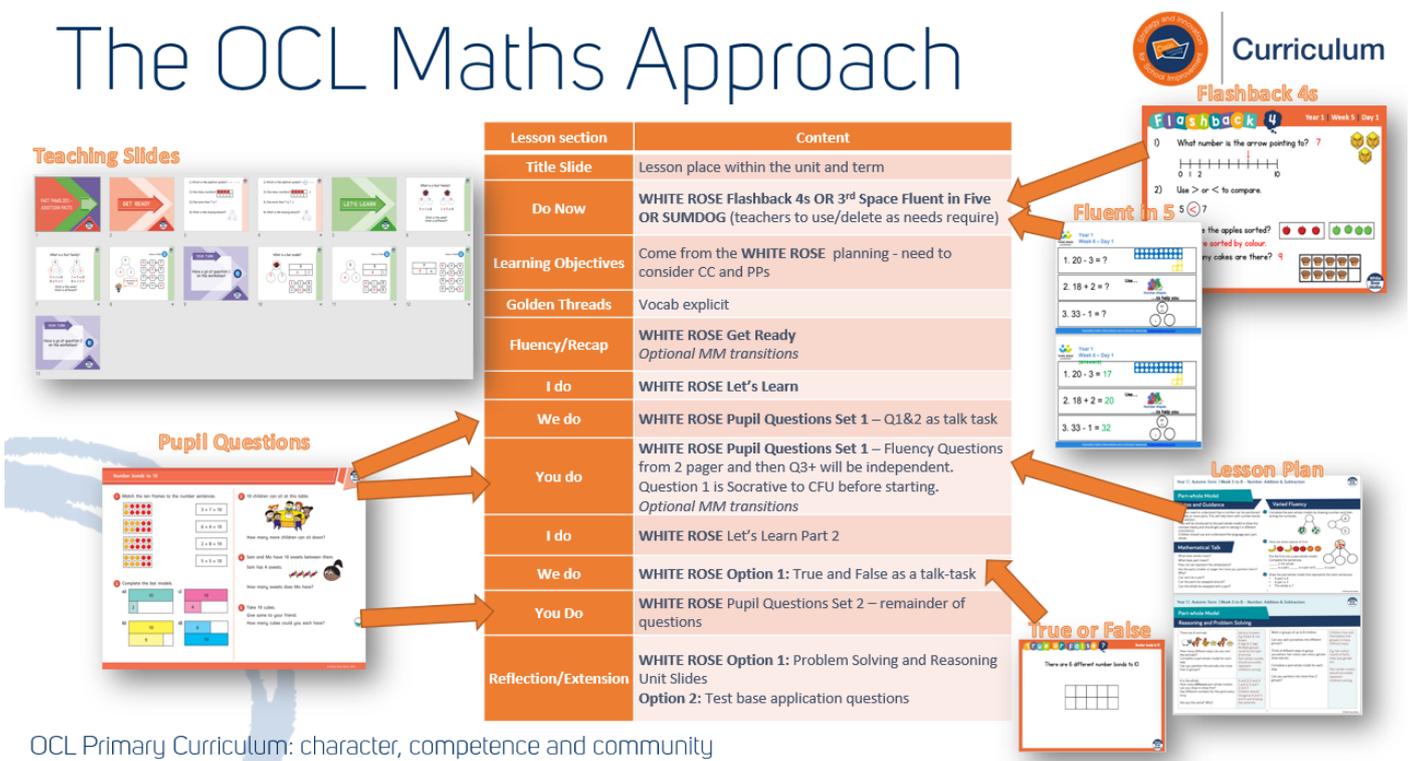
The curriculum is mapped using these core concepts. We plan for progression using the key points outlined in the impact section below. Lesson content is planned towards these progression points and follows the model of direct instruction, shared and modelled practice before culminating in independent practice and mastery. Specific knowledge is acquired through the knowledge organisers in each curriculum area and unit of study to ensure broad and balanced coverage and as a tool for children to add to, revise and structure that knowledge.

Subject Delivery

Lesson Timings	Type of delivery
Maths is taught daily (5 lesson per week) for an hour per lesson. Teaching occurs for 5 week blocks in each half term and then the sixth week enables consolidation of subjects areas identified through formative assessment as requiring more time.	The lessons are predominantly discrete to enable focus on the core concepts of maths, although vocabulary is continually developed using sentence stems and tiers universally across the subject areas. Each maths lessons compromises of time to consolidate core number facts for the first section before focussing on the new learning taking place in the subsequent section.

Maths lesson and planning follow the White Rose planning overviews and make use of White Rose materials and Third Space Learning materials within the OCL lesson structure. Lessons are supplemented by the use of Sumdog for additional practice and number fluency of key facts to minimise cognitive overload in all new learning. In EYFS and KS1 the Mastering number programme will also be used to develop understand of early number.

The diagram below demonstrates how the White Rose Resources have been used to feed into the Curriculum approach to teaching.



The diagram below shows how the lesson slides and content are produced and shared ready for localisation at an academy level.

OCL Primary Curriculum Lesson Plan



Curriculum

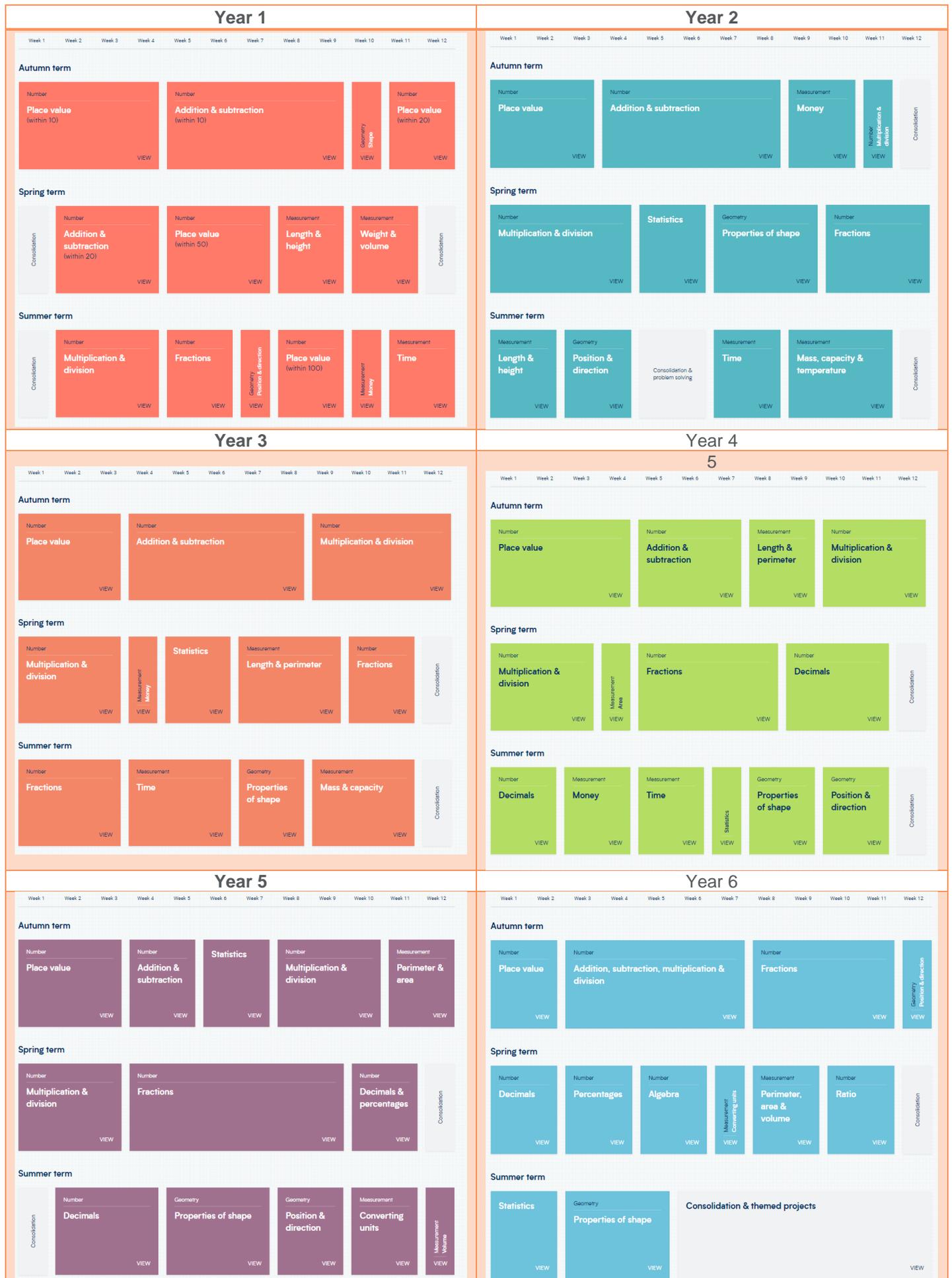
Do Now	
Learning Objectives Golden Threads Get Ready	
I do	
We do	
You do	
I do	
We do	
You do	
Reflection	

Adapting the slides

As with all OCL curriculum content this is critical to ensure the content is matched to the needs of the children in each class and academy. The lesson templates are adapted locally in the following way:

Lesson Part	Considerations
Do Now	Choose from flashback 4, fluent in 5, Sumdog or a mixture across each week using general AfL alongside summative data to know what the most pertinent content is.
Balance of I do, We do, You do content	You may decide to add in additional shared examples or models and also model the recording as agreed in your academy. The independent content may also need adapting with additional Fluency or reasoning depending on your classes needs.
Recording	Include recording details in line with your academy expectations (e.g. adding squared paper on slides or making it clear how this should be recorded in books). If you decide to create Socrative quizzes please add to the sheet on the TEAM to help others and build a bank!
Reflection summary	This can be adapted before or in the lesson and is useful to see if you need to spend a little more time on the unit in places. There is flexibility at the end of term for run over.
Learning Decks	We are producing one set of decks now with everything on so you can save two versions once adapted and decide what goes on your own pupil and teacher decks.

Annual Organisation per year group



Impact

The ultimate test of the impact of the curriculum is in whether the students know what you want them to know, and what you think they should know. This has been carefully mapped against the core concepts for mathematics in the tables on the following pages.

To determine this, we check and monitor children's learning, providing teachers and students with information about progress and analysis of deliberate retrieval practice. We need to be able to fluidly use 'checking for understanding' techniques in the moment as well as being able to know what has been learnt and retained over time and the depth of that learning:

- We use checking for understanding techniques through Socratic quizzes and hinge questions to ensure we are aware of all students learning during the lesson and adapt the pace as necessary.
- Retrieval practice is built in where most impactful to interrupt the forgetting curve and secure constructs in long term memory.
- Depth of knowledge is then assessed through spaced quizzing, end of unit assessment quizzes and Student Portfolios in Showbie.

Maths Specific Impact Measures

In maths quizzing is used frequently as a method of assessing pupils understanding in the shared and modelled practice of the lesson and then in independent practice, where questions move through fluency, reasoning and problem-solving phases to check on an deepen understanding. Live access to pupils' answers using Socratic, means teachers can intervene in a timely manner to address misconception or move learning forward when pupils are ready.

Each term pupils also complete a nationally standardised test in maths and results are examined at an individual academy level and trust level. This further supports staff in identifying any children in need of additional support. Question-level analysis from these assessments can then guide pupil practice focus in the following term.

- Normative, standardised tests include:
 - End of term White Rose Tests
 - KS1 SATs and KS2 SATs
 - Year 4 Multiplication Tests

Progression Points against the Core Concepts

Core Concepts	Y1	Y2	Y3	Y4	Y5	Y6
Number and Place Value	<ul style="list-style-type: none"> Count within 100, forwards and backwards, starting with any number. Reason about the location of numbers to 20 within the linear number system, including comparing using $<$ $>$ and $=$ 	<ul style="list-style-type: none"> Recognise the place value of each digit in two-digit numbers, and compose and decompose two-digit numbers using standard and nonstandard partitioning. Reason about the location of any two-digit number in the linear number system, including identifying the previous and next multiple of 10. 	<ul style="list-style-type: none"> Know that 10 tens are equivalent to 1 hundred, and that 100 is 10 times the size of 10; apply this to identify and work out how many 10s there are in other three digit multiples of 10. Recognise the place value of each digit in three-digit numbers, and compose and decompose three-digit numbers using standard and non-standard partitioning. Reason about the location of any three-digit number in the linear number system, including identifying the previous and next multiple of 100 and 10. Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts. 	<ul style="list-style-type: none"> Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100. Recognise the place value of each digit in four-digit numbers, and compose and decompose four-digit numbers using standard and nonstandard partitioning. Reason about the location of any four digit number in the linear number system, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each. Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts. 	<ul style="list-style-type: none"> Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01. Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and nonstandard partitioning. Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each. Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts. Convert between units of measure, including using common decimals and fractions. 	<ul style="list-style-type: none"> Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000). Recognise the place value of each digit in numbers up to 10 million, including decimal fractions, and compose and decompose numbers up to 10 million using standard and nonstandard partitioning. Reason about the location of any number up to 10 million, including decimal fractions, in the linear number system, and round numbers, as appropriate, including in contexts. Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.
Number Facts	<ul style="list-style-type: none"> Develop fluency in addition and subtraction facts within 10. Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers. 	<ul style="list-style-type: none"> Secure fluency in addition and subtraction facts within 10, through continued practice. 	<ul style="list-style-type: none"> Secure fluency in addition and subtraction facts that bridge 10, through continued practice Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number. Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10). 	<ul style="list-style-type: none"> Recall multiplication and division facts up to 12×12, and recognise products in multiplication tables as multiples of the corresponding number. Solve division problems, with two-digit dividends and one-digit divisors that involve remainders, and interpret remainders appropriately according to the context. Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100) 	<ul style="list-style-type: none"> Secure fluency in multiplication table facts, and corresponding division facts, through continued practice. Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth). 	

Core Concepts	Y1	Y2	Y3	Y4	Y5	Y6
Addition and Subtraction	<ul style="list-style-type: none"> Compose numbers to 10 from 2 parts, and partition numbers to 10 into parts, including recognising odd and even numbers. Read, write and interpret equations containing addition (+), subtraction (-) and equals (=) symbols, and relate additive expressions and equations to real-life contexts. 	<ul style="list-style-type: none"> Add and subtract across 10. Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more...?". Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number. Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2 two-digit numbers. 	<ul style="list-style-type: none"> Calculate complements to 100. Add and subtract up to three-digit numbers using columnar methods. Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part-part-whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction. 	<ul style="list-style-type: none"> Consolidate prior learning Calculate complements to 1000. Add and subtract up to four-digit numbers using columnar methods. Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part-part-whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction 	<ul style="list-style-type: none"> Consolidate prior learning Calculate complements to 1. Add and subtract up to four-digit numbers using columnar methods including to one decimal place. Manipulate the additive relationship: Understand the inverse relationship between addition and subtraction, and how both relate to the part-part-whole structure. Understand and use the commutative property of addition, and understand the related property for subtraction 	<ul style="list-style-type: none"> Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding. Solve problems involving ratio relationships. Solve problems with 2 unknowns.
Multiplication and Division	<ul style="list-style-type: none"> Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers. 	<ul style="list-style-type: none"> Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables. Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotitive division). 	<ul style="list-style-type: none"> Apply known multiplication and division facts to solve contextual problems with different structures, including quotitive and partitive division. 	<ul style="list-style-type: none"> Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size. Manipulate multiplication and division equations, and understand and apply the commutative property of multiplication. Understand and apply the distributive property of multiplication. 	<ul style="list-style-type: none"> Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the size, or 1 tenth or 1 hundredth times the size. Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors. Multiply any whole number with up to 4 digits by any one-digit number using a formal written method. Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context. 	<ul style="list-style-type: none"> Use a given additive or multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding. Solve problems involving ratio relationships. Solve problems with 2 unknowns.

Core Concepts	Y1	Y2	Y3	Y4	Y5	Y6
Fractions	<p>The below skills are taught within measures</p> <ul style="list-style-type: none"> Understand parts in a fraction need to be equal; compare situations where the parts are equal and those where they are not use precise language to describe a unit fraction ($1/2$; $1/4$) of a shape/area use precise language to describe a unit fraction ($1/2$; $1/4$) of a measure (for example, a length of ribbon or a beaker of water) 	<p>The below skills are taught within measures</p> <ul style="list-style-type: none"> recognise, find, name and write fractions $1/3$, $1/4$, $2/4$ and $3/4$ of a length, shape, set of objects or quantity recognise, find, name and write fractions $1/3$, $1/4$, $2/4$ and $3/4$ of a length, shape, set of objects or quantity write simple fractions, for example $1/2$ of $6 = 3$ and (recognise the equivalence of $2/4$ and $1/2$) write simple fractions, for example $1/2$ of $6 = 3$ and (recognise the equivalence of $2/4$ and $1/2$) write, interpret and use precise language to describe a unit fraction ($1/2$; $1/4$) of a shape/area write, interpret and use precise language to describe a unit fraction ($1/2$; $1/4$) of a measure (for example, a length of ribbon or a beaker of water) 	<ul style="list-style-type: none"> Interpret and write proper fractions to represent 1 or several parts of a whole that is divided into equal parts. Find unit fractions of quantities using known division facts (multiplication tables fluency). Reason about the location of any fraction within 1 in the linear number system. Add and subtract fractions with the same denominator, within 1. 	<ul style="list-style-type: none"> Reason about the location of mixed numbers in the linear number system. Convert mixed numbers to improper fractions and vice versa. Add and subtract improper and mixed fractions with the same denominator, including bridging whole numbers. 	<ul style="list-style-type: none"> Find non-unit fractions of quantities. Find equivalent fractions and understand that they have the same value and the same position in the linear number system. Recall decimal fraction equivalents for $1/2$, $1/4$, $1/5$, and $1/10$, and for multiples of these proper fractions. 	<ul style="list-style-type: none"> Recognise when fractions can be simplified, and use common factors to simplify fractions. Express fractions in a common denominator and use this to compare fractions that are similar in value. Compare fractions with different denominators, including fractions greater than 1, using reasoning, and choose between reasoning and common denominator as a comparison strategy.
Geometry	<ul style="list-style-type: none"> Recognise common 2D and 3D shapes presented in different orientations, and know that rectangles, triangles, cuboids and pyramids are not always similar to one another. Compose 2D and 3D shapes from smaller shapes to match an example, including manipulating shapes to place them in particular orientations. 	<ul style="list-style-type: none"> Use precise language to describe the properties of 2D and 3D shapes, and compare shapes by reasoning about similarities and differences in properties. 	<ul style="list-style-type: none"> Recognise right angles as a property of shape or a description of a turn, and identify right angles in 2D shapes presented in different orientations. Draw polygons by joining marked points, and identify parallel and perpendicular sides. 	<ul style="list-style-type: none"> Draw polygons, specified by coordinates in the first quadrant, and translate within the first quadrant. Identify regular polygons, including equilateral triangles and squares, as those in which the side-lengths are equal and the angles are equal. Find the perimeter of regular and irregular polygons. Identify line symmetry in 2D shapes presented in different orientations. Reflect shapes in a line of symmetry and complete a symmetric figure or pattern with respect to a specified line of symmetry. 	<ul style="list-style-type: none"> Compare angles, estimate and measure angles in degrees ($^{\circ}$) and draw angles of a given size. Compare areas and calculate the area of rectangles (including squares) using standard units. 	<ul style="list-style-type: none"> Draw, compose, and decompose shapes according to given properties, including dimensions, angles and area, and solve related problems.

Core Concepts	Y1	Y2	Y3	Y4	Y5	Y6
Statistics		<ul style="list-style-type: none"> Make tally carts Draw and interpret pictograms and block diagrams 	<ul style="list-style-type: none"> Draw and interpret pictograms, bar charts and tables. 	<ul style="list-style-type: none"> Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs. 	<ul style="list-style-type: none"> Read, interpret and draw line graphs, tables and timetables Use line graphs to solve problems. 	<ul style="list-style-type: none"> Read, draw and interpret line graphs and pie charts
Measures	<ul style="list-style-type: none"> Compare lengths and heights Measure length, mass and capacity Recognise coins and notes Count in coins Before and after Dates Time to the hour and half hour Compare time 	<ul style="list-style-type: none"> Measure, compare and order lengths in cm and m Calculate with measures Compare and measure mass, volume and temperature Recognise coins and notes Count money Make a given amount Compare money Find the total, difference and change Solve 2 step problems involving money Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times. Know the number of minutes in an hour and the number of hours in a day. Compare and sequence intervals of time. 	<ul style="list-style-type: none"> Measure length in m Find equivalent lengths - m and cm, mm and cm Compare lengths Add and subtract lengths Measure and calculate perimeter Measure mass and capacity Compare mass and capacity Add/ subtract mass and capacity Convert pounds and pence Add/ subtract money Give change Tell and write the time from an analogue clock, including using Roman numerals from I to XII and 12-hour and 24-hour clocks. Estimate and read time with increasing accuracy to the nearest minute. Record and compare time in terms of seconds, minutes and hours. Use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight. Know the number of seconds in a minute and the number of days in each month, year and leap year. Compare durations of events [for example to calculate the time taken by particular events or tasks]. 	<ul style="list-style-type: none"> Kilometres Measure perimeter of a rectangle; perimeter of rectilinear shapes Measure and compare area of shapes Estimate, compare and calculate money in pounds and pence. Solve simple measure and money problems involving fractions and decimals to two decimal places Read, write and convert time between analogue and digital 12- and 24-hour clocks. Solve problems involving converting from hours to minutes; minutes to months; weeks to days. 	<ul style="list-style-type: none"> Measure and calculate perimeter Measure and calculate the area of rectangles, compound shapes and irregular shapes. Estimate volume and capacity Solve problems involving volume and capacity Convert between different units of metric measure [for example, km and m; cm and m; cm and mm; g and kg; l and ml] Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. Solve problems involving converting between units of time. 	<ul style="list-style-type: none"> Find the area of triangles and parallelograms Find the volume of a cuboid Convert and calculate metric and imperial measures