

Creating

Wizard

Mathematicians



At



The intent, implementation and impact for the learning of Maths

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

What are the key concepts in maths at Limeside?

Number and place value	Number facts	Addition and subtraction	Multiplication and division	Pattern
Whole numbers Positive and negative numbers Subitising	Number bonds Number families	Mental methods Estimation Inverse Formal column Compensation Part/whole	Times tables Mental methods Column methods Estimation Special numbers: primes, squares, factors, multiples Scaling	Repetition Ratio Sequence Symmetry
Fractions	Geometry	Statistics	Measures	
Fractions Decimals Percentages Sequencing Comparisons Related facts	2D and 3D shapes Angles Properties Construction Nets Symmetry Perimeter and area	Bar charts Line graphs Data tables Comparisons Scales Coordinates Pictograms Pie charts	Length Capacity Weight Temperature Money Time	

What are the key mathematical subject discipline skills?

- Develop fluency in fundamentals of mathematics recalling and applying knowledge rapidly
- Reason mathematically by following lines of enquiry
- Solve problems by breaking down into smaller steps and trying different approaches
- Creating chains of reasoning
- Interpreting and creating representations and models
- Finding patterns and sequences
- Making connections between mathematical ideas and numbers
- Developing fluency (number facts, table facts)
- Following procedures
- Using mathematical vocabulary
- Selecting efficient methods
- Trial and error
- Checking and finding errors
- Giving justifications and proof using mathematical terms

How is maths taught at Limeside?

Direct and daily	Sequencing of learning	Lessons
<p>Maths is taught daily for an hour each lesson.</p> <p>Additional time may be given for maths meetings to revise and practise key concepts.</p> <p>Lessons are predominantly discrete</p>	<p>The sequence of learning is based on the Power Maths scheme, supplemented by materials from other programmes of study.</p> <p>Lessons are organised into jigsaws of 6 key skills for each unit. And then learning is assessed at the end of each unit in a mastery task. Jigsaws are expected to take around 2 to 3 weeks to complete but some involve more complex ideas than others.</p> <p>Schemes for learning detail the must have knowledge children need to progress.</p>	<p>Each maths lessons compromises of time to consolidate core number facts for the first section before focussing on new learning.</p> <p>Children work on developing fluency, application, reasoning and problem solving.</p> <p>They move from the use of concrete representation to abstract thinking.</p> <p>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.</p> <p>Lessons use through shared and guided practice to independent work</p>

Maths Sequence of Learning

Year	Exploration Autumn 1	Heritage Autumn 2	Cultures Spring 1	Growth Spring 2	PLSS Summer 1	Our world and beyond Summer 2
1	<p>Numbers to 10 1 more /less Ordering and comparing Part /whole within 10 Addition within 10 Finding and making number bonds to 10</p>	<p>Subtraction within 10 Subtraction and addition related facts Subtraction counting back and difference Numbers to 20 Tens and ones Ordering and comparing 2D and 3D shapes</p>	<p>Addition and subtraction within 20 Bonds to 20 Add by counting on/ adding ones/ making ten Subtracting 1s, 10s Crossing ten</p> <p>Numbers to 50 counting, tens and ones, ordering</p>	<p>Counting in 2s, 5s, 10s Length and Height Measuring in cm (+ - within 20 applied)</p>	<p>Multiplying and dividing by grouping and sharing Doubling and halving</p> <p>Money using different coins Fractions $\frac{1}{2}$ $\frac{1}{4}$ Position and direction describing positions and turns</p>	<p>Numbers to 100 counting and partitioning Comparing and ordering Money and shopping problems (all operations) Time Capacity L 100ml 10ml units Bar charts Everyday problems</p>
2	<p>Place value 2 digit numbers to 100 Comparing and ordering 2-digit numbers to 100 Addition and subtraction within 100 (adding tens and ones) Counting in 2s, 3s, 5s, 10s How many to next multiple of 10</p>	<p>Subtraction within 100 with practical exchanging</p> <p>Money coins and notes</p> <p>Multiplying equal groups, adding groups, arrays</p> <p>2, 5, 10 times table Word problems multiplication</p>	<p>Division: making equal groups, sharing and grouping Divide by 2, 5, 10 Odd and even Bar models Word problems division</p> <p>Data tallying, pictograms/ block charts scale 2 and comparison/total question</p> <p>Length and height measure in cm/m (including addition and subtraction)</p>	<p>Fractions Find $\frac{1}{2}$ $\frac{1}{4}$, Equivalence of $\frac{1}{2}$, $\frac{2}{4}$,. Count in halves counting in $\frac{1}{2}$ $\frac{1}{4}$ Find unit fractions and simple non-unit fractions Finding fractions of quantities Understand whole part</p> <p>Shape 2D shapes (sides, vertices, vertical line symmetry) Mathematical sequences and patterns 3D shapes (edges, vertices)</p>	<p>Position and direction ($\frac{1}{4}$ $\frac{3}{4}$ turns)</p> <p>x and divide and number families</p> <p>Mental addition and subtraction strategies Inverses and missing numbers Problem solving and efficient methods</p> <p>3d shape and venn / Carroll sorting diagrams</p>	<p>Time Tell and write time to 5 mins Find start/finish times Time comparing intervals, reading clock to 5 minutes and counting back forward in 5 minutes Capacity estimate and measure in l, ml, $\frac{1}{2}$ l, $\frac{1}{4}$l Weight estimate and measure in kg and g Measure temperature using thermometer</p>
3	<p>Place value to 1000 Addition and subtraction (3 digit and ones, 3 digit and multiples of 10 and 100, 3 digit and 2 digit, formal column addition with exchanging)</p>	<p>Column subtraction 3-digit number take away 2-digit number with exchange of 10s or 100s</p> <p>Multiplication and divide X 3 table/ x 4t table x 8 Find related facts between multiplying and dividing</p> <p>Statistics bar charts and tables (scales 2 and 10)</p>	<p>Multiplication and division Related multiplication and division statements Multiply 2-digit number by 1-digit number Divide 2-digit number by 1 digit number (grouping/sharing /partitioning) Doubles and halves within 100</p> <p>4 operation problems</p> <p>Money (addition and subtraction with £; -- counting on for change)</p>	<p>Fractions Tenths Fractions as numbers, as fractions of a set unit and non-unit</p> <p>Problems with fractions</p> <p>Length and perimeter Measure in m, cm, mm Metre/ centimetre/ mm equivalence Adding and subtracting lengths</p>	<p>Equivalent fractions Comparing fractions Adding and subtracting fractions Counting in fractions Time Months of year, hours in a day Time to 5 min/ 1 min intervals, Finding duration and start/end times Angles and shapes Horizontal, vertical, perpendicular/ parallel 2D /3D shapes including prisms Angles –turns and right angles</p>	<p>Mass – kg , g Reading scales Application of operations</p> <p>Capacity L ml Measuring, comparing , problem solving Reading scales</p> <p>Everyday problems application of all maths skills – chance to embed, revisit as needed.</p>

Year	Exploration Autumn 1	Heritage Autumn 2	Cultures Spring 1	Growth Spring 2	PLSS Summer 1	Our world and beyond Summer 2
4	<p>Place value beyond 1000 Introduction to negative numbers Addition and subtraction of 4 digit numbers columns Embed x2,3,3,4,8 tables</p>	<p>Multiplication and division Multiply and divide by multiples of 10 and 100 Multiply and divide by 6, 9, 7 Problems Multiply 2 /3 digit number by 1-digit number using columns Relationships between $\times \div$ (factors/ partitioning/ inverses/ missing numbers Learn x 6 table Learn x 9 table Perimeter</p>	<p>Division Dividing 2/3 digit number by 1 digit-number Remainders Problem solving with division Fractions Tenths and hundredths Equivalent fractions Simplifying fractions Mixed numbers Fractions adding and subtracting fractions with same denominator Fractions of quantity Embed all 4 operations with 3 digit numbers Learn x 7 table</p>	<p>Decimals Dividing by 10, 100 Decimals 1/10s introduction to 1/100s, ordering and rounding Simple decimal equivalents $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, and 1/10s 1/100s Dividing 1 and 2 digit numbers by 10 or 100 Decimals Comparing and ordering, rounding to nearest whole number Distance m-cm/ cm - mm linked to decimals and simple fraction equivalents Area –counting squares Learn x 11/12 table</p>	<p>Money and application of all 4 operations Time 24 hour clock Calendar problems Converting units of time Negative numbers Patterns and sequences with different multiples including negative numbers Data Line graphs, charts and tables, bar charts different scales</p>	<p>Shape identifying/ comparing angles Classifying triangles and quadrilaterals, Symmetry Mass and capacity Conversion of units Application of decimals and fractions Coordinates, translations , Roman numerals 1 -100 Count in multiples of 25</p>
5	<p>Place value numbers to 1,000,000 Round numbers within 100,000 Comparing and ordering 6-digit whole numbers Addition and subtraction of numbers with more than 4-digits using columns and efficient mental models Inverse and rounding to check</p>	<p>Multiplication and division Multiples / common factors Primes/ composites Square and cube numbers Inverse operations X divide by 10, 100, 1000, Mentally using place value including decimals Multiply in columns 4 digits or more x 1 digit Introduction to 2-digit multiplication Division using bus stop 4-digit numbers rounding remainder Area and perimeter Perimeter area of squares / rectangles/ simple compound shapes Statistics 2 way tables , line graphs</p>	<p>Fractions Find and use equivalent fractions Convert between improper and mixed numbers Compare and order fractions Understand fractions as division and use to show remainders Add and subtract fractions with a denominator that is a multiple of the other, including mixed numbers Multiply proper fractions and mixed numbers by whole numbers Find a fraction of an amount/operator Properties of shape Parallel/ perpendicular Polygons Volume of cuboids by counting cubes</p>	<p>Decimals Read and write decimals upto 3 decimal places including numbers greater than 1 Round decimals to nearest whole number. Order and compare decimals to 3 decimal places Write percentages as fractions and decimals Find percentages using multiples of 10, 1, and fraction knowledge Know some fraction, decimal, percentage equivalents Measures Convert between metric units mm, m, cm, km using knowledge of decimals Convert between metric units Distance, measuring in m, cm, mm , km with accuracy Read scales marked in different intervals</p>	<p>Calculations with Decimals Add, subtract, divide, multiply with decimals Angles Measuring in degrees Turns through multiples of 90° Acute, obtuse, reflex angles Angles on straight line and round a point Time- 24 hour clock Start/ finish / duration problems Timetables Calendar problems Translations /reflections with coordinates Reflections through diagonal lines Coordinates in first quadrant</p>	<p>Time Reading timetables Capacity Mass- Estimate measure in ml, l with accuracy Read scales marked in different intervals Convert between metric units Solve problems using different units of capacity/mass Convert between metric units Number sequences forwards and backwards Negative numbers counting through Roman numerals to 1000</p>

			Identify 3d shapes form 2d representations drawings/ nets	Solve problems using different units of length		
Year	Exploration Autumn 1	Heritage Autumn 2	Cultures Spring 1	Growth Spring 2	PLSS Summer 1	Our world and beyond Summer 2
6	Place value beyond 1,000,000 Rounding Negative numbers Written methods of addition subtraction Long column multiplication by 2-digit numbers Short and long division 4 digits by 2-digit number Mental calculations	Fractions decimals percentages Simplify fractions Compare and order fractions Add and subtract fractions including mixed numbers Multiply fractions by whole numbers and fractions Divide fractions by whole number another fraction Fractions of amounts Position and direction Coordinates in 4 quadrants/ translations/ reflections/ symmetry All four operations with fractions Angles in triangles/ quadrilaterals/ on straight line, drawing triangles	Decimals Place value of decimals Multiplying and dividing by 10,100,1000 Converting decimals to fractions Multiply and divide decimals by single digits numbers Percentages Work out percentages using known fractions and decimal facts Find multiples 1% 10% Convert, order and compare fractions, decimals and percentages Metric measures Convert between metric units and some imperial units Solve problems involving metric measures	Algebra and simple equations Sequences including nth term Scale drawing and enlarging Ratio and proportion Perimeter and area including triangles, parallelograms/ compound shapes Circle radius/ diameter/ arc/ circumference Volume / surface area Shape 3d and 2d classifying / describing using mathematical vocabulary/ constructing nets Data charts conversion charts/line graphs Pie chart	Conversion charts Bodmas Factors/ multiples/ primes/ squares/ cubes mean average Problems involving metric / imperial units for measures distance/ weight / capacity (application of decimals/ fractions / capacity) Negative numbers and calculating with negative numbers	Extended problem solving Finding all possible outcomes Trial and improvement Working in different bases Chance to embed and reinforce areas that are needed to meet end of year expectations

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 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 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 sp, end of unit mastery challenges and against the must know understanding detailed in schemes for learning

Maths Specific Impact

In maths formative assessment techniques are 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.

Frequent monitoring of pupils’ answers usi, means teachers can intervene in a timely manner to address misconceptions or move learning forward when pupils are ready.

Each term pupils from Year 2 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.

Normative, standardised tests include:

- End of term Headstart Tests
- KS1 SATs and KS2 SATs
- Year 4 Multiplication Tests

Jigsaw 1 taking away and counting how many are left		
How many are left if we take away from 10?	Subtraction within 10 by taking away and counting how many are left.	Demonstrate mastery by: <ul style="list-style-type: none"> • describing it in his or her own words; • representing it in a variety of ways (e.g. using concrete materials, pictures and symbols) • explaining it to someone else; • making up his or her own examples (and <i>nonexamples</i>) of it; • seeing connections between it and other facts or ideas; • recognising it in new situations and contexts; making use of it in various ways, including in new situations
Vocabulary	How many are left? Take away remain, in total, to begin with, subtract, taken away	
Essential prior learning	Jigsaw piece	Key knowledge
know how to count back from any number under 10 understand the different components of a part-whole model and what each represents	1 Solve subtractions by removing objects and counting how many are left?	<ul style="list-style-type: none"> • use contexts to explain their answers E.g. the cube monster eats ... cubes • differentiate between the total number to begin with, the number taken away and the number left. • There are In total. I take away There are left • when some are taken away, the number left is less than the start number. • - is a sign for take away • = means is equal to
	2 Solve subtractions by crossing out pictures of objects and counting how many are left?	
	3 Solve subtractions by drawing objects, crossing out and counting how many are left?	
	4 Solve subtraction problems using ten frames	
	5 Write subtraction sentences	
	6 Solve simple subtraction problems using involving taking away and counting how many are left	
Mastery	Solve simple subtraction problems using involving taking away and counting how many are left	
Must know	Solve subtractions by removing objects and crossing out then counting how many are left Recognise the total number to begin with, the number taken away and the number left. Apply subtraction to contexts and word contexts Write subtraction sentences using - = Use language take away, subtract	
Potential sticky knowledge	, if you remove two objects, you can count what remains or you can count back twice from the total amount	

Progression points against key concepts

Year 1

Number & Place Value	count, read and write numbers to 100 in numerals
	count in multiples of twos, fives and tens
	given a number, identify one more and one less
	identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
	read and write numbers from 1 to 20 in numerals and words.
Add and Sub	read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
	represent and use number bonds and related subtraction facts within 20 <i>memorise and reason with number bonds to 10 and 20 in different ways</i>
	add and subtract one-digit and two-digit numbers to 20, including zero
	solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = ? - 9$
Mult and Divide	solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher
Fractions	recognise, find and name a half as one of two equal parts of an object, shape or quantity
	recognise, find and name a quarter as one of four equal parts of an object, shape or quantity
MEASURES	measure and begin to record mass/weight (e.g. heavy/light, heavier than, lighter than) compare, describe and solve practical problems using non-standard units and manageable common standard units
	measure and begin to record capacity and volume (full/empty, more than, less than, quarter) compare, describe and solve practical problems using non-standard units and manageable common standard units
	measure and begin to record time (hours, minutes, seconds) (quicker, slower, earlier, later) compare, describe and solve practical problems using non-standard units and manageable common standard units
	recognise and know the value of different denominations of coins and notes
	sequence events in chronological order using language <eg>before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening</eg>
	recognise and use language relating to dates, including days of the week, weeks, months and years
	tell the time to the hour and half past the hour and draw the hands on a clock face to show these times
GEOMETRY	recognise and name common 2-D shapes <eg>rectangles (including squares), circles and triangles
	recognise and name common 3-D shapes <eg>cuboids (including cubes), pyramids and spheres
Position and directions	describe position, including: left and right, top, middle and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside
	Describe direction and movement, including whole, half, quarter and three-quarter turns

Number & Place Value	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
	recognise the place value of each digit in a two-digit number (tens, ones) <i>partition numbers in different ways</i> <i>begin to understand zero as a place holder</i>
	identify, represent and estimate numbers using different representations, including the number line
	compare and order numbers from 0 up to 100; use <, > and = signs
	read and write numbers to at least 100 in numerals and in words
	use place value and number facts to solve problems
Add and Subtract	solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures
	solve problems with addition and subtraction applying his/her increasing knowledge of mental and written methods
	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
	add and subtract numbers using concrete objects, pictorial representations, and mentally, including a two-digit number and ones
	add and subtract numbers using concrete objects, pictorial representations, and mentally, including a two-digit number and tens
	add and subtract numbers using concrete objects, pictorial representations, and mentally, including two two-digit numbers
	add and subtract numbers using concrete objects, pictorial representations, and mentally, including adding three one-digit numbers
	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot e.g. <i>adding numbers in a different order to check addition</i>
recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	
Multiply and Divide	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
	calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
	show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
	solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts <i>develop multiplicative reasoning</i> (e.g. $4 \times 5 = 20$ and $20 \div 5 = 4$).
Fractions	recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
	write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$
	<i>Pupils should count in fractions up to 10 starting from any number and using the $\frac{1}{2}$ and $\frac{2}{4}$ equivalence on the number line</i>

MEASURES	choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm), using rulers compare and order lengths and record the results using >, < and =
	choose and use appropriate standard units to estimate and measure mass (kg/g); to the nearest appropriate unit, scales, compare and order mass and record the results using >, < and =
	choose and use appropriate standard units to estimate and measure capacity (litres/ml) to the nearest appropriate unit, using measuring vessels compare and order volume/capacity and record the results using >, < and =
	choose and use appropriate standard units to estimate and measure temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using thermometers and compare and order lengths, and record the results using >, < and =
	recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value <i>recording pounds and pence separately</i>
	find different combinations of coins that equal the same amounts of money

	solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
	compare and sequence intervals of time
	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
	remember the number of minutes in an hour and the number of hours in a day
GEOMETRY	identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line <i>including: quadrilaterals polygons</i>
	identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces <i>cuboids, prisms, cones</i>
	identify 2-D shapes on the surface of 3-D shapes <eg>a circle on a cylinder and a triangle on a pyramid
	compare and sort common 2-D and 3-D shapes and everyday objects
Position and direction	order and arrange combinations of mathematical objects in patterns and sequences
	use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)
statistics	interpret and construct simple pictograms, tally charts, block diagrams and simple tables with <i>2, 5, 10 scales</i>
	ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
	ask and answer questions about totalling and comparing categorical data

Number & Place Value	count from 0 in multiples of 4, 8, 50 and 100;
	find 10 or 100 more or less than a given number
	recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
	compare and order numbers up to 1000
	identify, represent and estimate numbers using different representations <i>including those related to measure,</i>
	read and write numbers up to 1000 in numerals and in words
	solve number problems and practical problems involving these ideas <i>using varied and increasingly complex problems, building on work in year 2 (e.g. $146 = 100$ and 40 and 6, $146 = 130$ and 16).</i>
Add and Subtract	add and subtract numbers mentally, <i>2 two digit numbers when answers could exceed 100.</i>
	add and subtract numbers mentally, including a three-digit number and ones
	add and subtract numbers mentally, including a three-digit number and tens
	add and subtract numbers mentally, including a three-digit number and hundreds
	add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction fluently
	estimate the answer to a calculation and use inverse operations to check answers
	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction
Multiply and Divide	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (2,5, 10 in yr 2)
	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
	solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects <i>e.g. 3 hats and 4 coats, how many different outfits</i>
	solve problems in contexts, deciding which of the four operations to use and why,,
Fractions	count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
	recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators <i>in the context of parts of a whole, numbers, measurements, a shape,</i>
	recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators <i>begin to understand unit and non-unit fractions as numbers on the number line</i>
	recognise and show, using diagrams, equivalent fractions with small denominators
	add and subtract fractions with the same denominator within one whole <i>e.g. $5/7 + 1/7 = 6/7$</i>
	compare and order unit fractions, and fractions with the same denominators
	solve fraction problems <i>using all of the above.</i>
MEASURES	measure, compare, add and subtract: lengths (m/cm/mm) <i>including comparing and using mixed units (e.g. 1 m and 20cm) and simple equivalents of mixed units (e.g. 5m = 500cm).</i>
	measure, compare, add and subtract: mass (kg/g) <i>including comparing and using mixed units (e.g. 1 kg and 200g) and simple equivalents of mixed units (e.g. 5kg = 5000g).</i>
	measure, compare, add and subtract: volume/capacity (l/ml) <i>including comparing and using mixed units (e.g. 1 l and 200ml) and simple equivalents of mixed units (e.g. 5l = 5000ml).</i>
	Use <i>simple scaling by integers (e.g. a given quantity or measure is twice as long or five times as high</i>
	measure the perimeter of simple 2-D shapes
	add and subtract amounts of money to give change, using both £ and p in practical contexts <i>including mixed units</i>

	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 <eg>to calculate the time taken by particular events or tasks
GEOMETRY	draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them <i>symmetrical and non-symmetrical polygons and polyhedra.</i>
	Describe 2-D and 3-D shapes <i>using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle</i>
	recognise angles as a property of shape or a description of a turn
	identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
	identify horizontal and vertical lines and pairs of perpendicular and parallel lines
Position and	From Yr 2 continue to use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)
statistics	interpret and present data using bar charts, pictograms and tables <i>understand and use simple scales (e.g. 2, 5, 10 units per cm</i>
	solve one-step and two-step questions <eg>"How many more?" and "How many fewer?"</eg> using information presented in scaled bar charts and pictograms and tables

Number & Place Value	count in multiples of 6, 7, 9, 25 and 1000
	find 1000 more or less than a given number, <i>including measures, pupils become fluent in the order and place value of numbers beyond 1000, including counting in Ts and Hs</i>
	count backwards through zero to include negative numbers
	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
	order and compare numbers beyond 1000
	identify, represent and estimate numbers using different representations including measures <i>connect estimation and rounding numbers to the use of measuring instruments</i>
	round any number to the nearest 10, 100 or 1000
	solve number and practical problems that involve all of the above and with increasingly large positive numbers
	read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.
Add and Subtract	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate <i>with increasingly large numbers to aid fluency</i>
	estimate and use inverse operations to check answers to a calculation
	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why
Multiply and Divide	recall multiplication and division facts for multiplication tables up to 12×12
	use place value, known and derived facts to multiply and divide mentally <i>for example $200 \times 3 = 600$ into $600 \div 3 = 200$</i> , including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
	recognise and use factor pairs and commutativity in mental calculations
	multiply two-digit and three-digit numbers by a one-digit number using formal written layout
	<i>fluent in the formal written method of short division with exact answers when dividing by a one-digit number</i>
	solve problems <i>solve two-step problems in contexts</i> involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects <i>questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.</i>
Fractions	recognise and show, using diagrams, families of common equivalent fractions
	count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
	solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
	add and subtract fractions with the same denominator <i>beyond one whole.</i>
	<i>count using simple fractions and decimal fractions, both forwards and backwards.</i>
	recognise and write decimal equivalents of any number of tenths or hundredths <i>This includes relating the decimal notation to division of whole number by 10 and later 100. They should be able to represent numbers with one or two decimal places in several ways, such as on number lines</i>
	recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$
Fractions	find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
	round decimals with one decimal place to the nearest whole number
	compare numbers with the same number of decimal places up to two decimal places
	solve simple measure and money problems involving fractions and decimals to two decimal places
MEASURES	Convert between different units of measure <i><eg>kilometre to metre; hour to minute</eg></i>
	measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres
	find the area of rectilinear shapes by counting squares <i>They relate area to arrays and multiplication.</i>
	estimate, compare and calculate different measures, including money in pounds and pence
	read, write and convert time between analogue and digital 12- and 24-hour clocks
	solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days

GEOMETRY	compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes, <i>extending to classifying different triangles (e.g. isosceles, equilateral, scalene) and quadrilaterals (e.g. parallelogram, rhombus, trapezium). compare lengths and angles to decide if a polygon is regular or irregular.</i>
	identify acute and obtuse angles and compare and order angles up to two right angles by size
	identify lines of symmetry in 2-D shapes presented in different orientations <i>including where the line of symmetry does not dissect the reflected shape</i>
	complete a simple symmetric figure with respect to a specific line of symmetry <i>including where the line of symmetry does not dissect the reflected shape</i>
Position and	describe positions on a 2-D grid as coordinates in the first quadrant <i>draw a pair of axes in one quadrant, with equal scales and integer labels</i>
	describe movements between positions as translations of a given unit to the left/right and up/down
	plot specified points and draw sides to complete a given polygon
statistics	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts <i>use a greater range of scales (yr 3 uses 2, 5, 10 and time graphs begin to relate the graphical representation of data to recording change over time.</i>
	solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

Number & Place Value	read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
	interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
	round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
	solve number practical problems that involve ordering and comparing numbers to 1 000 000, counting forwards or backwards in steps, interpreting negative numbers and rounding
	read Roman numerals to 1000 (M) and recognise years in Roman numerals
	<i>recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule</i>
Add and Subtract	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
	add and subtract numbers mentally with increasingly large numbers (<i>e.g. $12\ 462 - 2\ 300 = 10\ 162$</i>).
	use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
Multiply and Divide	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
	know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
	establish whether a number up to 100 is prime and recall prime numbers up to 19
	multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
	multiply and divide numbers mentally drawing upon known facts
	divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context <i>including with remainders, as fractions, as decimals or by rounding ($.98 \div 4 = 24r2 = 24.5$)</i>
	multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 <i>e.g., powers of 10 in scale drawings powers of a 1000 converting between km and m</i>
	recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
	solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
	solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign including missing number problems <i>for example $13+24= 12 + ?$ $33=5x?$</i>
solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	
Fractions	compare and order fractions whose denominators are all multiples of the same number
	identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
	recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number <i><eg>$2\frac{4}{5} + \frac{4}{5} = \frac{5}{6} = 1\frac{1}{5}$</i></i>
	add and subtract fractions with the same denominator and denominators that are multiples of the same number <i>counting forwards and backwards in simple fractions and decimals bridging zero, for example on a number line. calcs that exceed 1 as a mixed no.</i>
	multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
	read and write decimal numbers as fractions <i><eg>$0.71 = \frac{71}{100}$</i></i>
	recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
	round decimals with two decimal places to the nearest whole number and to one decimal place
read, write, order and compare numbers with up to three decimal places	

	solve problems involving number up to three decimal places <i>finding fractions of numbers and quantities, writing remainders as a fraction.</i>
	recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", and write percentages as a fraction with denominator 100, and as a decimal <i>understand that percentages, decimals and fractions are different ways of expressing proportions.</i>
	<i>mentally add and subtract tenths, and one-digit whole numbers and tenths. adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (e.g. $0.83 + 0.17 = 1$).</i>
Measures	convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
	understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
	measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
	calculate and compare the area of rectangles (including squares), and including using standard units, (cm^2) and (m^2) and estimate the area of irregular shapes <i>including relations of perimeter or area They calculate the area from scale drawings using given measurements</i>
	estimate volume $\langle \text{eg} \rangle$ using 1 cm^3 blocks to build cuboids (including cubes) $\langle \text{eg} \rangle$ and capacity $\langle \text{eg} \rangle$ using water $\langle \text{eg} \rangle$
	solve problems involving converting between units of time
	use all four operations to solve problems involving measure $\langle \text{eg} \rangle$ length, mass, volume, money $\langle \text{eg} \rangle$ using decimal notation, including scaling
Geometry	identify 3-D shapes, including cubes and other cuboids, from 2-D representations
	<i>accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.</i>
	know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
	draw given angles, and measure them in degrees ($^\circ$)
	identify angles at a point and one whole turn (total 360°)
	identify angles at a point on a straight line and $1/2$ a turn (total 180°)
	identify other multiples of 90°
	use the properties of rectangles to deduce related facts and find missing lengths and angles <i>angle sum facts, missing angles and relate to missing number problems.</i>
distinguish between regular and irregular polygons based on reasoning about equal sides and angles	
Position	identify, describe and represent the position of a shape following a reflection or translation, using appropriate language, and know shape has not changed. <i>to use a 2-D grid and coordinates in the first quadrant</i>
statistics	solve comparison, sum and difference problems using information presented in a line graph <i>begin to decide which representations of data are most appropriate and why</i>
	complete, read and interpret information in tables, including timetables

Number & Place Value	read, write, order and compare numbers to at least 10 000 000 and determine the value of each digit
	round any whole number to a required degree of accuracy
	use negative numbers in context, and calculate intervals across zero
	solve number and practical problems that involve ordering and comparing numbers to 10 000 000, rounding to a required degree of accuracy, using negative numbers and calculating intervals across zero
	read Roman numerals beyond 1000 (M)
Add and Subtract	perform mental calculations with mixed operations to carry out calculations involving the four operations
	solve multi-step problems in contexts, deciding which operations and methods to use and why
	solve problems involving addition and subtraction.
	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
	use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
Multiply and Divide	multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
	divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
	divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
	perform mental calculations, including with mixed operations and large numbers
	identify common factors, common multiples and prime numbers
	use his/her knowledge of the order of operations to carry out calculations involving the four operations
	multiply one-digit numbers with up to two decimal places by whole numbers
	use written division methods in cases where the answer has up to two decimal places
	solve problems involving addition, subtraction, multiplication and division
	solve problems which require answers to be rounded to specified degrees of accuracy
	use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
	use common factors to simplify fractions; use common multiples to express fractions in the same denomination
	compare and order fractions, including fractions > 1
Fractions	add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
	multiply simple pairs of proper fractions, writing the answer in its simplest form $\langle eg \rangle 1/4 \times 1/2 = 1/8 \langle /eg \rangle$
	divide proper fractions by whole numbers $\langle eg \rangle 1/3 \div 2 = 1/6 \langle /eg \rangle$
	associate a fraction with division and calculate decimal fraction equivalents $\langle eg \rangle 0.375 \langle /eg \rangle$ for a simple fraction $\langle eg \rangle 3/8 \langle /eg \rangle$
	identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
	recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

Measures	use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
	convert between miles and kilometres
	recognise that shapes with the same areas can have different perimeters and vice versa
	recognise when it is possible to use formulae for area and volume of shapes
	calculate the area of parallelograms and triangles
	calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm ³) and cubic metres (m ³), and extending to other units <eg>mm ³ and km ³ </eg>
	use all four operations to solve problems involving measure <eg>length, mass, volume, money</eg> time using decimal notation, including scaling
Geometry	draw 2-D shapes using given dimensions and angles
	recognise, describe and build simple 3-D shapes, including making nets
	compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons
	illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
	recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles
	identify angles at a point on a straight line and 1/2 a turn (total 180°)
Position	describe positions on the full coordinate grid (all four quadrants)
	draw and translate simple shapes on the coordinate plane, and reflect them in the axis
statistics	interpret and construct pie charts and line graphs and use these to solve problems
	calculate and interpret the mean as an average
Ratio and proportion	solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts
	solve problems involving the calculation of percentages <eg>of measures, and such as 15% of 360</eg> and the use of percentages for comparison
	solve problems involving similar shapes where the scale factor is known or can be found
	solve problems involving unequal sharing and grouping using knowledge of fractions and multiples
Algebra	use simple formulae
	generate and describe linear number sequences
	express missing number problems algebraically
	find pairs of numbers that satisfy an equation with two unknowns
	enumerate possibilities of combinations of two variables