Maths Progression Map

Number and Place Value in the National Curriculum	LOWER KEY STAGE 2	UPPER KEY STAGE 2
	*Pupils should be taught to:* ***Year 3*** • 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. • read and write numbers up to 1000 in numerals and in words. • solve number problems and practical problems involving these ideas ***Year 4*** • count in multiples of 6, 7, 9, 25 and 1000 • find 1000 more or less than a given number • count backwards through zero to include negative numbers • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, ones) • order and compare numbers beyond 1000 • Identify, represent and estimate numbers using different representations • Round any numbers 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.	*Pupils should be taught to:* ***Year 5*** • 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 problems and practical problems that involve all of the above • Read Roman numerals to 1000 (M) and recognise years written in Roman numerals. ***Year 6*** • Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit • Round any whole number to required degree of accuracy • Use negative numbers in context and calculate intervals across zero • Solve number and practical problems that involve all of the above.

Skills:	Year 3	Year 4	Year 5	Year 6
	• Children build on their understanding of tens and links this to 100 using a variety of concrete equipment, children understand that ten tens makes 100 and a hundred ones make 100. • Children will count objects and numbers in multiples of 100 up to 1,000. • Children will recognise zero as a place holder. • Children understand a 3-digit number is made up of hundreds, tens and ones. • Children are able to represent different 3 digit numbers in various ways using place value understanding. • Children estimate, work out and write numbers accurately in their places on a number line. • Children find 10 more and 10 less than a given number. • Children represent 3-digit numbers in various ways and use comparative language and symbols to determine which greatest/smallest. • Children order sets of numbers from greatest to smallest. • Children use their knowledge of the patterns in the 5 times table to count in steps of 50, starting from any given multiple of 50 counting forwards and backwards. **Symbols:** <, >, =	• Children build on their knowledge of numeral to 12 on a clock face to explore Roman Numerals to 100. They explore what is the same and what is different between the number systems including the fact that in the Roman system there is no symbol for zero and so no place holders. • Children use and understand the purpose of rounding, recognising the importance of 5 and the idea that although it is in the middle of 0, by convention any number ending in 5 is always rounded up to the nearest 10. • Children compare rounding to the nearest 10 to rounding to the nearest 100. • Children round 3-digit numbers to the nearest 100 and then to the nearest 1,000 • Children explore 4-digit numbers using concrete and pictorial representations to recognise that 1,000 is made up of 10 hundreds. • Children count in multiples of 1,000 representing numbers in numerals and in words. • Children understand that a 4-digit number is made up of 1,000s, 100s, 10s and 1s. • Children partition in different ways using place value counters. • Children estimate, label and draw numbers in a number line to 10,000. • Children find 1,000 more or less than any given number.	• Children represent numbers to up to 10,000 using concrete manipulatives and pictorial representations. • Children revise adding and subtracting 10, 100 and 1,000. • Children explore Roman Numerals to 1,000. Children write the date in Roman Numerals everyday. • Children practise rounding to 10, 100, 1,000 and up to and within 10, 000 and then to the nearest 100,000. • Children represent numbers on a place value grid , read and write numbers and place them on a number line to 10,000. • Children will compare and order numbers up to 100, 000, using place value counters, part-whole models, Roman Numerals, etc. • Children read, write and represent numbers to 1,000,000. • Children complete number sequences and describe the rule including sequences that go down as well as those that go up. • They count forwards and backwards in powers of ten up to 1,000,000. • Children compare and order numbers up to 1,000,000 using comparison vocabulary and symbols. • Children continue to use negative numbers and explore their place on a number line. **Symbols:** Roman numerals – I, V, X, M, C.	• Children read, write and represent numbers to ten million in different ways. • Children understand the placement of commas to support the reading of 7-digit numbers. • Children will compare and order whole numbers up to ten million using numbers represented in different ways. • Children use correct mathematical vocabulary (greater than/less than) alongside inequality symbols. • Children are able to round any number within ten million. • Children continue working on negative numbers by counting forwards and backwards through zero. Children see negative numbers in relevant contexts. **Symbols:** <, >, = , - (negative numbers) **Language:** multiples, more, less, same, equal to, thousands, hundreds, tens, ones, digit/number, ascending, descending, partition, rounding, nearest, Roman Numerals, negative numbers, sequence, order.

	Language: multiples, more, less, the same, hundreds, tens, ones, greater, smaller, digit/number, ascending, descending, partition.	• Children represent 4-digit numbers in various ways and use comparative language and symbols to determine which greatest/smallest. • Children order sets of numbers in ascending and descending order and find the largest and smallest number from a set. • Children use their knowledge of patterns to count fluently in multiples of 25s. • Recognise and use number facts: - two 25s are 50 - four 25s are 100 • Children recognise that there are numbers below zero using real life concepts such as temperature, water depth, etc. **Symbols:** Roman numerals – I, V, X, M, C. <, >, = , - (negative numbers) **Language:** multiples, more, less, same, equal to, thousands, hundreds, tens, ones, digit/number, ascending, descending, partition, rounding, nearest, Roman Numerals, negative numbers.	<, >, = , - (negative numbers) **Language:** multiples, more, less, same, equal to, thousands, hundreds, tens, ones, digit/number, ascending, descending, partition, rounding, nearest, Roman Numerals, negative numbers, sequence, order.	

SEND Provision:

'Word walls' or similar to develop an understanding of new vocabulary
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KIRF reinforcement

Maths Progression Map

Addition and Subtraction in the National Curriculum	LOWER KEY STAGE 2		UPPER KEY STAGE 2	
	Pupils should be taught to: ***Year 3*** • add and subtract numbers mentally, including: - a three-digit number and ones - a three-digit number and tens - a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction • 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. ***Year 4*** • add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate • estimate and use the 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.		*Pupils should be taught to:* ***Year 5*** • 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. • 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. ***Year 6*** • Perform mental calculations, including with mixed operations and large numbers • Use knowledge of the order of operations to carry out calculations involving the four operations • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. 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.	
Skills:	**Year 3**	**Year 4**	**Year 5**	**Year 6**
	• Children explore adding and subtracting ones, then tens and then hundreds from a 3-digit number without an exchange and then later with an exchange. • Children understand the use of zero as a place holder. • Children add and subtract up to 3-digit numbers where there are exchanges in both the ones and tens columns. • Children are introduced to the formal written method of	• Children are introduced to adding and subtracting thousands using concrete representations and pictorial before moving on the abstract and mental methods. • Children use the place value grid and concrete representations to support their understanding alongside the column method. • Children add and subtract two 4-digit numbers without exchanging and then move on	• Children use a range of manipulatives to demonstrate their understanding and use pictorial representations to support their problem solving involving addition and subtraction of numbers with more than four digits. • Children recognise when an exchange is not needed in subtraction and understand the function of zero as a place holder. • Children use estimating and rounding to predict answers to a calculation.	• Children progress to multi-digit calculations considering whether the column method is always appropriate and use these skills to solve multi-step problems in a range of contexts. • Children look at different operations within a calculation and how the order of operations affects the answer. • Children recognise that in mused operation calculations, calculations are not carried out from left to right. • Children use known facts from one calculation to determine the answer of

	columnar addition and subtraction and will be able to determine when it is better to use mental strategies. • Children use various strategies to build mental calculation skills. (counting on, near subtraction, number bonds, splitting a number, etc). • Children check answers using the inverse. **Symbols:** +, -, = **Language:** hundreds, tens, ones, columns, regrouping, exchanging, augend, addend, total, sum, minuend, subtrahend, difference, inverse, part-whole model, bar model.	to explore exchanging in different columns. • Children compare different methods of subtraction and identify whether they would partition, take away or find the difference. • Children use their knowledge of rounding to estimate answers for calculations and word problems. Children build on their understanding of 'near numbers' to make sensible estimates. • Children check answers using the inverse. **Symbols:** +, -, = **Language:** thousands, hundreds, tens, ones, columns, regrouping, exchanging, augend, addend, total, sum, minuend, subtrahend, difference, inverse, rounding, near numbers, part-whole model, bar model.	• Children consider the most appropriate value to round to, e.g. to the nearest ten, hundred or thousand. • Children are able to use the commutative law. • Children use their knowledge of addition and subtraction to solve multi-step problems. **Symbols:** +, -, = **Language:** tens of thousands, thousands, hundreds, tens, ones, columns, regrouping, exchanging, augend, addend, total, sum, commutative, minuend, subtrahend, difference, inverse, rounding, approximate, near numbers, part-whole model, bar model.	another similar calculation without starting afresh. • Children reason and apply their understanding of commutativity and inverse operations. • Children explore simple one-step function machines. Explain that a one-step function is where they perform just one operation on the input. • Children understand that for each number they put into a function machine, there is an output. They should also be taught to "work backwards" to find the input given the output. Given a set of inputs and outputs, they should be able to work out the function. • Children build on their knowledge of one-step functions to look at two-step function machines. Discuss with children whether a function such as + 5 and + 6 is a two-step function machine or whether it can be written as a one-step function. • Children look at strategies to find the functions. They can use trial and improvement or consider the pattern of differences. Children record their input and output values in the form of a table. • children use simple algebraic inputs e.g. y. • Using these inputs in a function machine leads them to forming expressions e.g. y + 4. The use of cubes to represent a variable can aid understanding. • Children substitute into simple expressions to find a particular value. • Children will need to understand that the same expression can have different values depending on what has been substituted.

				• Building on the earlier step of forming expressions, children now use algebraic notation to form one-step equations. • They need to know the difference between an expression like $x + 5$, which can take different values depending on the value of x, and an equation like $x + 5 = 11.2$ where x is a specific unknown value. This is best introduced using concrete materials e.g. cubes, can be used to represent the unknown values with counters being used to represent known numbers. • Children solve simple one step equations involving the four operations. • Children should explore this through the use of concrete materials such as cubes, counters and cups. • Children learn to solve equations using a balancing method using inverse operations. • Children progress from solving equations that require one-step to equations that require two steps. • Children think of each equation as a balance and solve it through doing the same thing to each side of the equation. This is introduced using concrete and pictorial methods alongside the abstract notation as shown. Only when secure in their understanding children try this without the support of bar models or similar representations. • Children use their understanding of substitution to consider what possible values a pair of variables can take. • At this stage we should focus on integer values, but other solutions could be a point for discussion.

				• Children can find values by trial and improvement, but should be encouraged to work systematically. • Building on from the last step, children find possible solutions to equations which involve multiples of one or more unknown. • They should be encouraged to try one number for one of the variables first and then work out the corresponding value of the other variable. Children should then work systematically to test if there are other possible solutions that meet the given conditions. **Symbols:** +, -, = **Language:** millions, hundred thousands, tens of thousands, hundreds, tens, ones, columns, regrouping, exchanging, augend, addend, total, sum, minuend, subtrahend, difference, inverse, rounding, approximate, near numbers, part-whole model, bar model, formula, variables, unknown, equation, sequences, algebra,

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Maths Progression Map

Multiplication and Division in the National Curriculum	LOWER KEY STAGE 2	UPPER KEY STAGE 2
	*Pupils should be taught to:* ***Year 3*** • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables. • write and calculate mathematical statements for multiplication and division using the multiplication tables 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. ***Year 4*** • recall multiplication and division facts for multiplication tables up to 12 × 12 • use place value, known and derived facts to multiply and divide mentally, 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 • solve problems 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.	*Pupils should be taught to:* ***Year 5*** Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit. • 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 • multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 ***Year 6*** • 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 • Identify common factors, common multiples and prime numbers • Use knowledge of the order of operations to carry out calculations involving the four operations. 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.

	Year 3	Year 4	Year 5	Year 6
	• Children recognise multiplication as equal groups and link to repeated addition. • Children count in 3s and solve problems involving multiplying by 3. • Children explore dividing by 3, 4 and 8 through sharing into equal groups and grouping in threes, fours and eights. • Children use knowledge of the inverse to check their answers. • Children become fluent in the 3 times table, 4 times table and 8 times table. • Children use their knowledge of their 2 times table to multiply by 4 and move on to use their knowledge of the 4 times table to multiply by 8. • Children recognise commutativity of multiplication. • Children use their knowledge of known multiplication and division facts to compare statements using inequality symbols. • Children use arrays and repeated addition to support their understanding. • Children use known multiplication facts to solve other multiplication problem. • Children represent a two-digit number multiplied by a one-digit number with concrete manipulatives. • Children use the formal written method of column multiplication alongside the concrete representations. • Children apply their understanding of partitioning to represent and solve calculations without and later with exchanging.	• Children visualise and understand making a number ten times bigger as the same as 'multiply by ten'. • Children understand the commutative law seeing calculations such as 10 x 3 and 3 x 10 as equal. • Children make links between multiplying by 10 and multiplying by 100. • Children use place value charts to divide by 10 to recognise the change in the position of the digits before and after the calculation. • Children understand multiplying and dividing by 10 as the inverse of each other. • Children divide by 100 with whole number answers using money and measurement. • Children understand the result of multiplying by 1 and 0 using concrete equipment and pictorial representations. • Children learn what happens to a number when you divide it by 1 or by itself. • Children demonstrate how both sharing and grouping structures of division can be used to divide a number by 1 or by itself. • Children multiply and divide by 6 using knowledge of times tables facts and solve multiplication and division problems using concrete and pictorial methods. • Children apply knowledge of the 3 times table by understanding that each multiple of 6 is double the equivalent multiple of 3. • Children multiply by 10 and 100 by using known facts. • Children use their previous knowledge of multiplying to become fluent in the 9 and then the 7 times table. • Children explore commutativity and understand that multiplication and division are inverse operations. • Children explore facts from their times tables to solve calculations with larger numbers. • Children explore the 11 and 12 times tables through partitioning.	• Children find multiples of whole numbers by building on their times tables knowledge. They build multiples of a number using concrete and pictorial representations such as an array. • Children multiply whole numbers and decimal numbers by 10, 100 and 1,000. They look at numbers in a place value grid and discuss the number of places to the left digits move when you multiply by different multiples of 10. • Children look at dividing 10, 100 and 1,000 using a place value chart. They use counters and digit cards to learn that the digits move to the right when dividing by powers of ten. They develop an understanding of how many places to the right to move the counters to the right. • Children use arrays to demonstrate their understanding of the relationship between multiplication and division. • Children use their knowledge of other multiples of 10, 100 and 1,000 to answer related questions. • Children learn that factors of a number multiply together to give that number, meaning that factors come in pairs. They understand that factors are the whole numbers that you multiply together to get another whole number (factor x factor = product). • Children find the common factors of two numbers using their knowledge of factors. They use arrays to compare the factors of a number and use Venn diagrams to show their results. • Children are taught that some numbers that only have two factors are called prime numbers and that non-primes are called composite numbers. • Children recall prime numbers up to 19 and are able to establish whether a number is prime up to 100. Using primes, they break a number down into its prime factors. • Children learn that 1 is not a prime number because it does not have exactly two factors (it only has 1 factor). • Children need to be able to find factors of numbers. • Children recognise that square numbers have an odd number of factors and are the result of	• Children consolidate their knowledge of column multiplication, multiplying numbers with up to 4-digits by a 2-digit number. They use these skills to solve multi-step problems in a range of contexts. • Children build on their understanding of dividing up to 4-digits by 1-digit by now dividing by up to 2-digits. They the short division method and focus on the grouping structure of division. • Children list multiples of a divisor (number being divided by) to help them solve the division more easily. • Children should experience contexts where the answer ''4 r 1'' means both 4 complete boxes or 5 boxes will be needed. • Children use their number sense, specifically their knowledge of factors, to be able to see relationships between the dividend (number being divided) and the divisor (the number that the dividend is being divided by). • Children are introduced to long division as a different method of dividing by a 2-digit number. • Children divide 3-digit numbers by a 2-digit number without remainders, starting with a more expanded method (with multiples shown), before progressing to the more formal long division method. • Children move on to dividing 4-digit numbers by 2-digit numbers using the long division method. • Children use their knowledge of multiples and multiplying and dividing by 10 and 100 to calculate more efficiently. • Children move on to using long division where answers have remainders. After dividing, they check that the remainder is smaller than the divisor. • Children understand how to interpret the remainder. • Children start to understand when rounding is appropriate to use for interpreting the remainder and when the context means that it is not applicable. • Children find the common factors of two numbers. • Children find common multiples of numbers continuing use visual representations to support their thinking. • Children use abstract methods to calculate multiples, including numbers outside of those known in times tables facts. • Children should know and use the vocabulary of prime numbers, prime factors, prime factors and composite (non-prime) numbers.

	• Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups. • Children start with dividing numbers with no exchange or remainders and then move on to numbers that involve exchanging between the tens and ones and then move on to solve division problems with a remainder. • Children use their times-tables to partition the number into the multiples of the divisor. • Children make links between division and repeated subtraction. • Children are exposed to problems involving scaling using the vocabulary "times as many'. • Children systematically list the possible combinations resulting from two groups of objects. **Symbols:** x, ÷ , = , <, > **Language:** multiply, equal groups, lots of, repeated addition, arrays, product, multiplicand, multiplier, divisible, dividend, divisor, quotient, obelus, sharing, grouping, times, 'times as many', systematic, commutative.	• Children are introduced to the 'associative law' to multiply 3 numbers and link this idea to commutativity. They change the order of the numbers to group them more efficiently. • Children learn that a factor is a whole number that multiplies by another number to make a product (factor x factor = product). • Children develop their understanding of factor pairs using concrete resources to work systematically. • Children develop their mental multiplication by exploring different ways to calculate. • Children partition two-digit numbers into factor pairs in order to multiply one and two digit numbers. • Children use a variety of informal written methods to multiply a two-digit number and a one-digit number. • Children recognise when it would be more efficient to use a mental method to multiply and when we need to represent our thinking by showing our working. • Children are introduced to the formal short multiplication method. • Children use their knowledge of exchanging ten ones for one ten in addition and apply this to multiplication, including exchanging multiples groups of tens. Place value counters support their understanding of this. • Children represent a three-digit number multiplied by a one-digit number with concrete manipulatives. • Children build on knowledge of dividing a 2-digit number by a 1-digit number by sharing into equal groups. • Children use examples where the tens and ones are divisible by the divisor. They then move on to calculations where they exchange between tens and ones. • Children explore dividing 2-digit numbers by 1-digit numbers involving remainders.	multiplying a whole number by itself. Children learn the notation for a squared number is n^2. • Children learn that a cube number is the result of multiplying a whole number by itself three times (6 x 6 x 6). Children learn the notation for a squared number is n^3. • Children use Base 10 to represent the area model of multiplication, which will enable them to see the size and scale linked to multiplying. • Children will then move on to representing multiplication more abstractly with place value counters and then numbers. • Children will move on from the area model and work towards more formal multiplication methods. • Children understand the importance of the zero in the column method of multiplication and can explain its role. They understand what is happening within each step of the calculation process. • Children extend their multiplication skills to multiplying 3-digit numbers by 2-digit numbers. They will use multiplication to find area and solve multi-step problems. • Children apply their understanding to multiplying 4-digit numbers by 2-digit numbers. • Children use their knowledge from Year 4 to divide up to 4-digit numbers by a 1-digit number. • Children use place value counters to partition their number and then group to develop their understanding of the short division method. • Children begin to focus on remainders and build on their learning to understand remainders in context. They **do not** represent their remainders as a fraction at this point in year 5. **Symbols:** x, ÷ (& division bracket symbol), = , <, > , n^2 (squared numbers), n^3 (cubed numbers) **Language:** multiply, equal groups, lots of, repeated addition, arrays, product, multiplicand, multiplier, divisible, dividend, divisor, quotient, obelus, vinculum line, division bracket, sharing, grouping, times, 'times as	• Children should work out whether or not numbers up to 100 are prime. Using primes, they break a number down into its prime factors. • Children explore the relationship between squared and cubed numbers and solve problems involving them. • Children look at different operations within a calculation and consider how the order of operations affects the answer. • Children will learn that in mixed operation calculations, calculations are not carried out from left to right. • Children learn the convention that when there is no operation sign written this means multiply. • Children should use known facts from one calculation to determine the answer to another similar calculation without starting afresh. • Children should use reasoning and apply their understanding of commutativity and inverse operations. • Children are introduced to conventions that we use when writing algebraic expressions. e.g. y × 4 as $4y$. • Children substitute into familiar formulae such as those for area and volume. • They also use simple formulae to work out values of everyday activities such as the cost of a taxi or the amount of medicine to take given a person's age. • Children solve simple one step equations involving the four operations. • Children should explore this through the use of concrete materials such as cubes, counters and cups. • Children learn to solve equations using a balancing method using inverse operations. • Children progress from solving equations that require one-step to equations that require two steps. • Children think of each equation as a balance and solve it through doing the same thing to each side of the equation. This is introduced using concrete and pictorial methods alongside the abstract notation as shown. Only when secure in their understanding children try this without the support of bar models or similar representations. • Children use their understanding of substitution to consider what possible values a pair of variables can take. • Children focus on integer values, but other solutions could be a point for discussion. • Children can find values by trial and improvement, but should be encouraged to work systematically.

		• Children understand that the remainder can never be greater than the number you are dividing by. • Children apply previous knowledge of dividing 2-digit numbers to divide 3-digit numbers by a 1-digit number. • Children use place value counters and part-whole models to support their understanding. They divide numbers with and without remainders. • Children solve more complex problems building on their understanding from Year 3 of when n objects relate to m objects. • Children find all solutions systematically and notice how to use multiplication facts to solve problems. **Symbols:** x, ÷ , = , <, > **Language:** multiply, equal groups, lots of, repeated addition, arrays, product, multiplicand, multiplier, divisible, dividend, divisor, quotient, obelus, sharing, grouping, times, 'times as many', systematic, commutative, associative law, factor, factor pairs.	many', systematic, commutative, associative law, factor, factor pairs, prime numbers, prime factors, composite numbers, efficient methods.	• Building on from the last step, children find possible solutions to equations which involve multiples of one or more unknown. • They should be encouraged to try one number for one of the variables first and then work out the corresponding value of the other variable. Children should then work systematically to test if there are other possible solutions that meet the given conditions. **Symbols:** x, ÷ (& division bracket symbol), = , <, > , n^2 (squared numbers), n^3 (cubed numbers), χ, y **Language:** multiply, equal groups, lots of, repeated addition, arrays, product, multiplicand, multiplier, divisible, dividend, divisor, quotient, obelus, vinculum line, division bracket, sharing, grouping, times, 'times as many', systematic, commutative, associative law, factor, factor pairs, prime numbers, prime factors, composite numbers, efficient methods. formula, variables, unknown, equation, sequences, algebra,

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Maths Progression Map

Fractions, Decimals and Percentages in the National Curriculum	LOWER KEY STAGE 2	UPPER KEY STAGE 2
	Pupils should be taught to: ***Year 3*** • 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 • recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators • recognise and show, using diagrams, equivalent fractions with small denominators • add and subtract fractions with the same denominator within one whole (for example: $\frac{1}{7}+\frac{4}{7}=\frac{5}{7}$ • compare and order unit fractions, and fractions with the same denominators • solve problems that involve all of the above. ***Year 4*** • 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 • recognise and write decimal equivalents of any number of tenths or hundredths • recognise and write decimal equivalents to $\frac{1}{4},\frac{1}{2},\frac{3}{4}$. • 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.	*Pupils should be taught to:* ***Year 5*** • 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 $\frac{2}{5}+\frac{4}{5}=\frac{6}{5}=1\frac{1}{5}$ • add and subtract fractions with the same denominator and denominators that are multiples of the same number • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams • read and write decimal numbers as fractions [for example, 0.71 = $\frac{71}{100}$ • 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 • 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 • solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2},\frac{1}{4},\frac{1}{5},\frac{2}{5},\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25. ***Year 6*** ***Fractions*** • use common factors to simplify fractions; use common multiples to express fractions in the same denomination • compare and order fractions, including fractions > 1 • 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 - for example, $\frac{1}{4}$ x $\frac{1}{2}=\frac{1}{8}$ • divide proper fractions by whole numbers - for example $\frac{1}{3}\div 2=\frac{1}{6}$

		• associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction (for example $\frac{3}{8}$) • 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 • 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 which require answers to be rounded to specified degrees of accuracy • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. **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 [for example, of measures, and such as 15% of 360] 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.

	Year 3	Year 4	Year 5	Year 6
	• Children explain the difference between unit and non-unit fractions • Children are introduced to fractions with denominators other than 2, 3 and 4 which they used in Year 2. • Children understand what the numerator and denominator represent. • Children look at whole shapes and quantities and see that when a fraction is equivalent to a whole, the numerator and denominator are the same. • Children use models to partition the whole into fractional parts, building on using the part-whole model with whole numbers. • Children recognise that tenths arise from dividing one whole into ten equal parts. • Children represent tenths in different ways and use different words and fractions to describe them. For example – one tenth and $\frac{1}{10}$ • Children count up and down in tenths using different representations. • Children explore what happens when counting past $\frac{10}{10}$. Children are not required to write mixed numbers, however children may see $\frac{11}{10}$ as $1\ \frac{1}{10}$ due to their understanding of 1 whole. • Children are introduced to tenths as decimals for the first time. They compare fractions and decimals and link them to pictorial representations. • Children learn that the number system extends to the right of the decimal point into the tenths column. • Children use a number line to represent fractions beyond one whole. They count forwards and backwards in fractions. • Children need to know how to divide a number line into specific fractions – i.e. when dividing into quarters, we need to ensure our number line is divided into four equal parts.	• Children explore fractions in different representations, for example – fractions of shapes, quantities and fractions on a number line. • Children use strip diagrams to investigate and record equivalent fractions. They start by comparing two fractions before moving on to finding more than one equivalent fraction on a fraction wall. • Children continue to understand equivalence through diagrams. They move on to using proportional reasoning to find equivalent fractions. • Children should learn that they need to multiply the numerators and denominators by the same number to ensure that fractions are equivalent. • Children use manipulatives and diagrams to show that a fractions can be split into wholes and parts. • Children focus on how many equal parts make a whole dependent on the number of equal parts altogether. • Children explore fractions greater than one on a number line and start to make connections between improper and mixed numbers. • Children use cubes and bar models to represent fractions greater than a whole. • Children use practical equipment and pictorial representations to add two or more fractions. • Children record their answers as an improper fraction when the total is more than 1. • Children explore adding fractions more efficiently by using known facts or number bonds to help them. • Children use practical equipment and pictorial representations to subtract fractions with the same denominator. • Children explore subtraction as take away and as difference. Difference can be represented on a bar model by using a comparison model and making both fractions in the subtraction. • Children subtract fractions from a whole amount.	• Children explore equivalent fractions using models and concrete representations. • Children use models to make the link to multiplication and division to apply the abstract method to find equivalent fractions. • Children are introduced to converting improper fractions to mixed numbers. • Children convert mixed numbers to improper fractions. • Children count up or down in a given fraction. • Children find missing fractions in a sequence and determine whether the sequence is increasing or decreasing and by how much. • Children build on their equivalent fractions knowledge to compare and order fractions less than 1 where the denominators are multiples of the same number. • Children compare the fractions by finding a common denominator or a common numerator. They use bar models to support their understanding. • Children use their knowledge of ordering fractions less than 1 to help them compare and order fractions greater than 1. They use their knowledge of common denominators to help them. • Children will compare both improper fractions and mixed numbers. • Children add and subtract fractions with different denominators where one denominator is a multiple of the other. They use pictorial representations to convert the fractions so they have the same denominator. • Children subtract fractions as both take away and finding the difference. • Children add more than 2 fractions where two denominators are a multiple of the other. • Children explore adding two or more proper fractions where the total is greater than 1.	• Children use their understanding of highest common fact to simplify fractions, building on their knowledge of equivalent fractions. • Children apply their understanding when calculating with fractions and simplifying their answers. • Children count forwards and backwards in fractions. They compare and order fractions with the same denominator or denominators that are multiples of the same number. • Children use the divisions on the number line to support in finding the difference between fractions. • Children use their knowledge of equivalent fractions to compare fractions where the denominators are not multiples of the same number. • Children find the lowest common multiple of the denominators in order to find equivalent fractions with the same denominators. • Children compare numerators to find the larger or smaller fraction. • Children consider the most efficient method when comparing fractions and decide whether to find common numerators or common denominators. • Children add and subtract fractions within 1 where the denominators are multiples of the same number. • Children find the lowest common multiple to find a common denominator. • Children add and subtract fractions where the denominators are not multiples of the same number. They continue to find the lowest common multiple but need to find equivalent fractions for both fractions in the calculation to find a common denominator. • Children add and subtract mixed numbers. • Children exchange wholes for fractions and subtract the whole and fractions separately and convert the mixed number to an improper fraction. • Children solve problems that involve adding and subtracting fractions and mixed numbers. • Children multiply fractions and mixed numbers by integers. • Children use concrete and pictorial representations to support them to multiply fractions. • Children understand the link between multiplying fractions and finding a fraction of an amount. • Children are introduced to dividing fractions by integers for the first time. They focus on dividing fractions where

	• Children find a unit fraction of an amount by dividing an amount into equal groups. • Children build on their understanding of division by using place value counters to find fractions of larger quantities including where they need to exchange tens for ones. • Children need to understand that the denominator of the fraction tells us how many equal parts the whole will be divided into for example: $\frac{1}{3}$ means dividing the whole into 3 equal parts. • Children need to understand that the numerator tells them how many parts of the whole there are – for example: $\frac{2}{3}$ means dividing the whole into 3 equal parts, then counting the amount in 2 of these parts. • Children apply their knowledge and understanding of fractions to solve problems in various contexts. • Children use Cuisenaire rods to investigate and record equivalent fractions. They then move on to exploring equivalent fractions through bar models. • Children explore equivalent fractions in pairs and can start to spot patterns. • Children use Cuisenaire rods and paper strips alongside number lines to deepen their understanding of equivalent fractions. • Children focus on how the number line can be divided into different amounts of equal parts and how this helps to find equivalent fractions – e.g.: a number line divided into twelfths can also represent halves, thirds, quarters and sixths. • Children use proportional reasoning to link pictorial images with abstract methods to find equivalent fractions. They look at the links between equivalent fractions to find missing numerators and denominators. • Children look for patterns between numerators and denominators to support their understanding of why fractions are equivalent – e.g.: fractions equivalent to half	• Children need to understand how many equal parts are equivalent to a whole. • Children use their knowledge of finding unit fractions of a quantity, to find non-unit fractions of a quantity. • Children solve more complex problems for fractions of a quantity. • Children recognise tenths and hundredths using a hundred square. • Children see that tenths are equivalent to one tenth and can use a part-whole model to partition a fraction into tenths and hundredths. • Children can recognise the relationship between $\frac{1}{10}$ and 0.1 and between $\frac{1}{100}$ and 0.01. • Children write tenths and hundredths as decimals and as fractions. They write any number of tenths and hundredths as a decimal and represent them using concrete and pictorial representations. • Children understand that a tenth is part of a whole split into 10 equal parts and a hundredth is part of a whole split into 100 equal parts. • Children are introduced to decimals greater than one. • Children use number lines to explore relative scale. • Children understand that when dividing by 10, the number is being split into 10 equal parts and is 10 times smaller. They also recognise that when dividing by 100, the number is being split into 100 equal parts and is 100 times smaller. • Children use counters on a place value chart to see how the digits more when dividing by 10 or by 100. • Children should make links between the understanding of dividing by 10 and this more efficient method. • Children must understand the importance of 0 as a place holder. • Children use a place value chart to understand how 2-digit numbers move when dividing by 10. • Children recognise that hundredths arise from dividing one whole into one hundred equal parts. They see that one tenth is ten hundredths.	• Children move on to adding two fractions where one or both are mixed numbers or improper fractions. • Children use the method of adding the wholes and then adding the parts. Children record their answers in its simplest form. • Children subtract fractions where one denominator is a multiple of the other to subtract proper fractions from mixed numbers. • Children use prior knowledge of fractions to subtract two fractions where one is a mixed number and you need to break one of the wholes up. • Children use the method of flexible partitioning to create a new mixed number so they can complete the calculation. • Children convert mixed numbers to improper fractions when an exchange is involved for subtraction. • Children are introduced to multiplying fractions by a whole number. They link this to repeated addition and see that the denominator stays the same while the numerator is multiplied by the integer. • Children apply prior knowledge of multiplying a unit fraction by a whole number to multiplying a non-unit fraction by a whole number. • Children use their knowledge of fractions to multiply a mixed number by a whole number. They use the method of repeated addition, multiplying the whole and part separately and the method of converting to an improper fraction then multiplying. • Children link their understanding of fractions of amounts and multiplying fractions to use fractions as operators. • Children use their knowledge of commutativity to help them understand that you can change the order of multiplication without changing the product.	the numerator is a multiple of the integer they are dividing by. • Children link dividing fractions to multiplying by unit fractions. • Children divide fractions where the numerator is not a multiple of the integer they are dividing by. • Children find equivalent fractions to support the divisions and draw diagrams to model how this works. • Children combine the four operations when calculating with fractions. • Children calculate fractions of an amount. • Children find the whole amount from the known value of a fraction. • Children recap their understanding of numbers with up to 3 decimal places. They look at the value of each place value column and describe its value in words and digits. • Children use concrete resources to investigate exchanging between columns e.g. 3 tenths is the same as 30 hundredths. • Children multiply numbers with up to three decimal places by 10, 100 and 1,000 • Children recognise that digits move to the left when they are multiplying and use zero as a place value holder. The decimal point does not move. • Once children are confident in multiplying by 10, 100 and 1,000, they use these skills to investigate multiplying by multiples of these numbers e.g. 2.4 × 20 • Children use concrete resources to multiply decimals and explore what happens when you exchange with decimals. • Children use their skills in context and make links to money and measures. • Children divide decimals and explore what happens when exchanges take place. • Children build on their knowledge of sharing and grouping when dividing and apply this skill in context. • Children apply their understanding of division to solve problems in cases where the answer has up to 2 decimal places. • Children convert from a decimal to a fraction and simplify the fraction to show patterns. • Children find fractions as decimals by dividing the numerator by the denominator. • Children understand that 'percent' means 'out of 100'.

	have a numerator that is half the denominator. • Children compare unit fractions or fractions with the same denominator. • Children recognise that by dividing something into more equal parts makes each part smaller. • Children order unit fractions and fractions with the same denominator. They use bar models and number lines to order the fractions and write them in ascending and descending order. • Children explain why they can compare fractions when the numerators or denominators are the same. • Children use practical equipment and pictorial representations to add two or more fractions with the same denominator where the total is less than 1. • Children understand that only the numerators are added or subtracted and the denominators stay the same. • Children use practical equipment and pictorial representations to subtract fractions with the same denominator within one whole. **Symbols:** $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$, $\frac{1}{10}$ **Language:** fraction, whole, numerator, denominator, equivalent, vinculum, divide, share, fraction wall, decimal, decimal point, ascending, descending, tenth, half, third, quarter, three quarters, etc.	• Children count in hundredths and represent tenths and hundredths on a place value grid and number line. They see that the hundredths column is to the right of the decimal point and the tenths column. • Children make a whole from any number of tenths and hundredths. • Children read and write numbers with up to two decimal places and understand the value of each digit. • Children show their understanding of place value by partitioning numbers with decimals in different ways. • Children apply their understanding of place value to compare numbers with decimals with up to two decimal places. • Children order numbers with decimals with up to two decimal places. • Children round numbers with one decimal place to the nearest whole number. They look at the digit in the tenths column to understand whether to round a number up or not. • Children write $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$, as decimals . • Children use their knowledge of equivalent fractions to write fractions as hundredths and then write the fractions as halves or quarters. **Symbols:** $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$, $\frac{1}{10}$ **Language:** fraction, whole, numerator, denominator, equivalent, vinculum, divide, share, fraction wall, decimal, decimal point, ascending, descending, integer, tenth, hundredth,	• Children use place value counters and a place value grid to make numbers with up to two decimal places. • Children read and write decimal numbers and understand the value of each digit. They show their understanding of place value by partitioning decimal numbers in different ways. • Children explore the relationship between decimals and fractions. They start with a fraction (including concrete and pictorial representations of fractions) convert it into a decimal and as they progress, children will see the direct link between fractions and decimals. • Children concentrate on more complex decimal numbers (e.g.: 0.96, 0.03, 0.27) and numbers greater than 1 (e.g.: 1.2, 2.7, 4.01). They are able to represent them as fractions and as decimals. • Children record decimal numbers in multiple representations, including expanded form and in words. • Children explore the relationships between tenths, hundredths and thousandths, considering decimal and mixed number equivalences. • Children represent decimals in different ways and also explore deeper connections such as $\frac{100}{1000}$ is equivalent to $\frac{1}{10}$ • Children develop their understanding of rounding to the nearest whole number and to the nearest tenth. • Children order and compare numbers with up to three decimal places. • Children are introduced to 'per cent' for the first time and will understand that 'per cent' relates to 'number of parts per hundred'. They will explore this through different representations which show different parts of a hundred. • Children use 'number of parts per hundred' alongside the % symbol.	• Children learn to convert fractions to equivalent fractions where the denominator is 100 in order to find the percentage equivalent. • Children convert between fractions, decimals and percentages to enable them to order and compare them. • Children use known fractional equivalences to find percentages of amounts. • Bar models and other visual representations may be useful in supporting this e.g. 25% = $\frac{1}{4}$ so we divide into 4 equal parts. • Children focus on converting 50%, 25%, 10% and 1%. • Children find multiples of 10% and other known percentages. • Children explore different methods of finding certain percentages e.g. Finding 20% by dividing by 10 and multiplying by 2 or by dividing by 5. They also explore finding 5% by finding half of 10%. Using these methods, children build up to find percentages such as 35%. • Children use their understanding of percentages to find the missing whole or a missing percentage when the other values are given. • Children will understand that a ratio shows the relationship between two values and can describe how one is related to another. • They will start by making simple comparisons between two different quantities. For example, they may compare the number of boys to girls in the class and write statements such as, "For every one girl, there are two boys". • Children use objects and diagrams to compare ratios and fractions. • Children are introduced to the colon notation as the ratio symbol, and continue to link this with the language 'for every..., there are...' • They need to read ratios e.g. 3 : 5 as "three to five". • Children understand that the notation relates to the order of parts. For example, 'For every 3 bananas there are 2 apples would be the same as 3 : 2 and for every 2 apples there are 3 bananas would be the same as 2 : 3 • Children build on their knowledge of ratios and begin to calculate ratios. They answer worded questions in the form of 'for every... there are ...' and need to be able to find both a part and a whole.

			• Children represent percentages as fractions using the denominator 100 and make the connection to decimals and hundredths. • Children will recognise percentages, decimals and fractions are different ways of expressing proportions. • Children recognise simple equivalent fractions and represent them as decimals and percentages. • Children become secure with the percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and consider denominators with a multiple of 10 or 25. • Children add decimals within one whole. They use place value counters and place value charts to support adding decimals and understand what happens when we exchange between columns. • Children build on their understanding that 0.45 is 45 hundredths, children can use a hundred square to add decimals. • Children subtract decimals using a variety of different methods: using place value counters on a place value grid. • Children also explore subtraction as difference by using a number line to count on from the smaller decimal to the larger decimal. • Children use their knowledge of exchange within whole numbers to subtract decimals efficiently. • Children find the complements which sum to make 1 • Children see the links with number bonds to 10, 100 and 1000 which supports them when finding complements to 1, up to three decimal places. • Children can use a hundred square, part-whole models and number lines to support finding complements to one. • Children add and subtract numbers greater than one with the same number of decimal places. • Children add and subtract numbers with different numbers of decimal places. They	• They should be encouraged to draw bar models to represent their problems, and clearly label the information they have been given and what they want to calculate. • children enlarge shapes to make them 2 or 3 times as big etc. They need to be introduced to the term “scale factor” as the name for this process. • Children should be able to draw 2-D shapes on a grid to a given scale factor and be able to use vocabulary, such as, “Shape A is three times as big as shape B”. • Children find scale factors when given similar shapes. They need to be taught that ‘similar’ in mathematics means that one shape is an exact enlargement of the other, not just they have some common properties. • Children use multiplication and division facts to calculate missing information and scale factors. • Children apply skills they have learnt to a wide range of problems in different contexts. • Children will see that different situations are in fact alternative uses of ratio. **Symbols:** $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$, $\frac{1}{10}$ %, : **Language:** fraction, whole, numerator, denominator, equivalent, vinculum, divide, share, fraction wall, decimal, decimal point, ascending, descending, integer, improper fraction, mixed number, sequence, increasing, decreasing, operators, percent, ratio, colon notation, scale factors

			focus on the importance of lining up the decimal point in order to ensure correct place value. • Children add and subtract numbers with decimals from whole numbers. Highlight that whole numbers are written without a decimal point. • Children look at decimal sequences and create simple rules, for example: adding 0.5 every time. • Children learn how to multiply numbers with decimals by 10, 100 and 1,000. They look at moving the counters in a place value grid to the left in order to multiply by multiples of 10. • Children learn how to divide numbers with decimals by 10, 100 and 1,000 **Symbols:** $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$, $\frac{1}{10}$ % **Language:** fraction, whole, numerator, denominator, equivalent, vinculum, divide, share, fraction wall, decimal, decimal point, ascending, descending, integer, improper fraction, mixed number, sequence, increasing, decreasing, operators, percent	

SEND Provision:

'Word walls' or similar to develop an understanding of new vocabulary

Coloured background on whiteboard

KIRF reinforcement

Maths Progression Map

Measurement in the National Curriculum	LOWER KEY STAGE 2		UPPER KEY STAGE 2	
	*Pupils should be taught to:* ***Year 3*** • measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) • measure the perimeter of simple 2-D shapes • add and subtract amounts of money to give change, using both £ and p in practical contexts • 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]. ***Year 4*** • Convert between different units of measure [for example, kilometre to metre; hour to minute] • measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres • find the area of rectilinear shapes by counting squares • 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.		*Pupils should be taught to:* ***Year 5*** • Read, write, 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, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes • □ estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water] • □ solve problems involving converting between units of time • □ use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling. ***Year 6*** • □ solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate • □ 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 (for example: mm^3 and km^3)	
Skills:	**Year 3**	**Year 4**	**Year 5**	**Year 6**

	Year 3:	Year 4:	Year 5:	Year 6:
	Length & Perimeter • Children are introduced to millimetres for the first time and build on their understanding of centimetres and metres. • Children use different measuring equipment including rulers, tape measures, metre sticks and trundle wheels. They discuss which equipment is the most appropriate depending on the object they are measuring. • Children recognise that 100 cm is equivalent to 1 metre and that 10mm is equivalent to 1cm. . They use this knowledge to convert other multiples of 100 cm into metres and vice versa as well as 10mm into centimetres. • When looking at lengths that are not multiples of 100 or 10, they partition the measurement and convert into metres and centimetres or centimetres and millimetres. At this stage, children do not use decimals. This is introduced in Year 4. • Children compare and order lengths based on measurements in mm, cm and m. • They use their knowledge of converting between units of measurement to help them compare and order. Children are encouraged to convert all the measurements to the same unit of length before comparing. • Children add lengths given in different units of measurement. They convert measurements to the same unit of length to add more efficiently. Children should be encouraged to look for the most efficient way to calculate and develop their mental addition strategies. • Children use take-away and finding the difference to subtract lengths. Children should be encouraged to look for the most efficient way to calculate and develop their mental subtraction strategies.	*Length & Perimeter* • Children multiply and divide by 1,000 to convert between kilometres and metres. They apply their understanding of adding and subtracting with four-digit numbers to find two lengths that add up to a whole number of kilometres. • Children find fractions of kilometres using their Year 3 knowledge of fractions of amounts. Children are encouraged to use bar models to support their understanding. • Children calculate the perimeter of rectilinear shapes by counting squares on a grid. Rectilinear shapes are shapes where all the sides meet at right angles. • Children label the length of each side and mark off each side as they add the lengths together. Children are given centimetre squared paper to draw the shapes on to support their calculation of perimeter. • Children calculate the perimeter of rectangles (including squares) that are not on a squared grid. When given the length and width, children explore different approaches of finding the perimeter; adding all the sides together, and adding the length and width together then multiplying by 2. • Children use their understanding of perimeter to calculate missing lengths to investigate the possible perimeters of squares and rectangles. • Children begin to calculate perimeter of rectilinear shapes without using squared paper. They use addition and subtraction to calculate the missing sides. *Area* • Children are introduced to area for the first time. They understand that area is the amount space is taken up by a 2D shape or surface. • Children investigate different shapes that can be made with sets of sticky notes. They should be encouraged to see that the same number of sticky notes can make different	*Perimeter & Area* • Children measure the perimeter of rectilinear shapes from diagrams without grids. They will recap measurement skills and recognise that they need to use their ruler accurately in order to get the correct answer. They should consider alternative methods when dealing with rectangles – e.g. l + w + l + w or (l x w) x 2. • Children apply their knowledge of measuring and finding perimeter to find the unknown side lengths. They find the shapes with and without grids. • Children mark off the sides when calculating perimeter of shapes as they add them up to prevent repetition of counting/omission of sides. • Children build on previous knowledge from Year 4 by counting squares to find the area. They then move on to using a formula to find the area of rectangles. • Children learn to calculate area of compound shapes. They need to be careful when splitting shapes up to make sure they know which lengths correspond to the whole shape, and which to the smaller shapes they have created. They will discover that the area remains the same no matter how you split up the shapes. • Children have experience of drawing their own shapes. • Children use their knowledge of counting squares to estimate the areas of shapes that are not rectilinear. They use their knowledge of fractions to estimate how much of a square is covered and combine different part-covered squares to give an overall approximate area. • Children need to physically annotate to avoid repetition when counting the squares. *Converting Units* • Children focus on the use of the prefix 'kilo' in units of length and mass, meaning a thousand. They convert from metres to kilometres (km), grams to kilograms (kg) and vice versa. It is useful for children to feel the weight of a kilogram and various other weights in order for them to have a	*Perimeter, Volume & Area* • Children will find and draw rectilinear shapes that have the same area. • Children will use their knowledge of factors to draw rectangles with different areas. They will make connections between side lengths and factors. • Children should calculate area and perimeter of rectilinear shapes. They must have the conceptual understanding of the formula for area by linking this to counting squares. Writing and using the formulae for area and perimeter is a good opportunity to link back to their algebra understanding. • Children explore that shapes with the same area can have the same or different perimeters. • Children will use their previous knowledge of approximating and estimating to work out the area of different triangles by counting. • Children will begin to see the link between the area of a triangle and the area of a rectangle or square. • Children use their knowledge of finding the area of a rectangle to find the area of a right-angled triangle. They see that a right-angled triangle with the same length and perpendicular height as a rectangle will have an area half the size. • Children will learn to use the formula to calculate the area of a triangle using the link between the area of a rectangle and a triangle. • Children will extend their knowledge of working out the area of a right-angled triangle to work out the area of any triangle. They use the formula, base x perpendicular height ÷ 2 to calculate the area of a variety of triangles where different side lengths are given and where more than one triangle make up a shape. • Children use their knowledge of finding the area of a rectangle to find the area of a parallelogram. • Children investigate the link between the area of a rectangle and parallelogram by cutting a parallelogram so that is can be rearranged into a rectangle. This will help them to understand why the formula to find the area of a parallelograms works. • Children should understand that volume is the space occupied by a 3-D object.

	• Children are introduced to perimeter for the first time. They explore what perimeter is and what it isn't. • Children measure the perimeter of simple 2-D shapes. They may compare different 2-D shapes which have the same perimeter. • Children make connections between the properties of 2-D shapes and measuring the perimeter. • Children use their understanding of the properties of shape to calculate the perimeter of simple 2-D shapes. • It is important to note they will not explore the formula to find the perimeter of a rectangle at this point. • They explore different methods for calculating the perimeter of a shape. For example, they may use repeated addition or they may make connections to multiplication. *<u>Money</u>* • Children need to know the value of each coin and note and understand what these values represent. • They should understand that money can be represented in different ways but still have the same value. • Children will need to be able to add coin values together to find the total amount. • Children convert between pounds and pence using the knowledge that £1 is 100 pence. • They group 100 pennies into pounds when counting money. They apply their place value knowledge and use their number bonds to 100 • Children add two amounts of money using pictorial representations to support them. • They are encouraged to add the pounds first and then add the pence. Children then exchange the pence for pounds to complete their calculations.	shapes but they cover the same amount of surface. We call this the area of a shape. • Once children understand that area is measured in squares, they use the strategy of counting the number of squares in a shape to measure and compare the areas of rectilinear shapes. • They explore the most efficient method of counting squares and link this to their understanding of squares and rectangles. • Children make rectilinear shapes using a given number of squares. • Children understand that the rectilinear shapes they make need to touch at the sides not just at the corners. They can work systematically to find all the different rectilinear shapes by moving one square at a time. • Children compare the area of rectilinear shapes where the same size square has been used. • Children will be able to use < and > with the value of the area to compare shapes. • They will also put shapes in order of size by comparing their areas. *<u>Money</u>* • Children develop their understanding of pounds and pence. This is the first time they are introduced to decimal notation for money. Once children are confident with this, they can move on to convert between different units of money. • Children can use models, such as the part-whole model, to recognise the total of an amount being partitioned in pounds and pence. • Children use their knowledge of £1 = 100 p to compare amounts. Children begin by ordering amounts represented in the same format e.g. 4,562 p and 4,652 p, or £45.62 and £46.52 and relate this to their place value knowledge. • Once children understand this, they look at totals that include mixed pounds and pence	better understanding of their value. Bar models and double number lines are useful for visualising the conversions. • Children focus on the use of mili – in units of length and mass. They understand that mili means $\frac{1}{1000}$ • Children convert from metres to millimetres (mm), litres to millilitres (ml) and vice versa. • Children get a better understanding of the conversions using rulers, metres sticks, jugs and bottles. • Children convert between different units of length and choose the appropriate unit for measurement. They recap converting between millimetres, metres and kilometres to now include centimetres (cm). • Children see that they need to divide by different multiples of 10 to convert between the different measurements. • Children are introduced to imperial units of measure for the first time. They understand and use approximate equivalences between metric units and common imperial units such as inches, pounds (lbs) and pints. • Children get an understanding of the conversions using the measurements in the classroom such as with rulers, pint bottles, weights and so forth. 1kg is sometimes seen as approximately 2.2lbs. • Children convert between different units of time including years, months, weeks, days, hours, minutes and seconds. Bar modelling will support these conversions. Use of time lines, calendars, clocks is recommended to enhance pupils' understanding. It is worth reminding pupils that time is not decimal so some methods may not be effective for conversions. • Children use timetables to retrieve information. They convert between different units of time in order to solve problems using the timestables. • Children will be tempted to use the column method to find the difference between times. Time lines are a more efficient method since time is not decimal. Children create their own timestables based on start and end times of their day.	• Children will start by counting cubic units ($1cm^3$) to find the volume of 3D shapes. They will then use cubes to build their own models and describe the volume of the models they made. • Children make the link between counting cubes and the formula ($l \times w \times h$) for calculating the volume of cuboids. • They realise that the formula is the same as calculating the area of the base and multiplying this by the height. *<u>Converting Units</u>* • Children read, write and recognise all metric measures for length, mass and capacity. They may need to be reminded the difference between capacity (the amount an object can contain) and volume (the amount actually in an object). • They develop their estimation skills in context and decide when it is appropriate to use different metric units of measure. • Children will use their skills of multiplying and dividing by 10, 100 and 1,000 when converting between units of length, mass and capacity. • Children will convert in both directions e.g. m to cm and cm to m. Using metre sticks and other scales will support this step. They will need to understand the role of zero as a place holder when performing some calculations, as questions will involve varied numbers of decimal places. • Children use and apply their conversion skills to solve measurement problems in context with the support of modelled use of pictorial representations, such as bar models, to represent the problem and help them decide which operation to use. • Children need to know that 5 miles is approximately equal to 8 km. They should use this fact to find approximate conversions from miles to km and from km to miles. • They should be taught the meaning of the symbol '≈' as "is approximately equal to". • Children need to know and use the following facts: - 1 foot is equal to 12 inches - 1 pound is equal to 16 ounces - 1 stone is equal to 14 pounds - 1 gallon is equal to 8 pints - 1 inch is approximately 2.5cm

	• Children use different methods to subtract money. • They will see examples where they can physically remove the coins, and examples where they will need to use their knowledge of converting money to exchange £1 for 100 pence. Children also use number lines to count on or back to calculate the difference between two amounts. • Children use a number line and a part-whole model to subtract to find change. • Teachers use coins to practically model giving change. Encourage role-play to give children a context of giving and receiving change. *Time* • Children look at the concept of years and months. They are introduced to leap years and how they are different from a non-leap year. • Children should explore years using calendars to investigate the number of days in each month. Rhymes and songs are helpful for children to remember the number of days in each month. • Children recap the number of hours in a day and are introduced to language such as 'noon', 'midday', 'midnight'. They do not need to know the difference between a.m. or p.m. at this point. • Other facts such as days in a week/month are also reviewed. Attention should be drawn to the difference between a school week and a calendar week and between day-time and a day. • Children tell the time to the nearest 5 minutes on an analogue clock. They focus on the language of "past" and "to", and will recognise and use Roman numerals on a clock face. • Attention should be drawn to the differences between the minute hand and the hour hand. This is especially important	and also totals represented in decimal notation. Using real notes and coins could support some children. • Children solve simple problems with money, involving all four operations. Children are not expected to formally add with decimals in Year 4 but could explore other methods, such as partitioning and recombining to add money. They could use prior knowledge of converting, as well as number bonds, to help them. • Children solve simple problems with money, involving all four operations. Children are not expected to formally add with decimals in Year 4 but could explore other methods, such as partitioning and recombining to add money. They could use prior knowledge of converting, as well as number bonds, to help them. *Time* • Children recap the number of minutes in an hour and seconds in a minute from Year 3. They use this knowledge, along with their knowledge of multiplication and division to convert between different units of time. • Children recap the concept of a year, month, week and day from Year 3. • They use this knowledge, along with their knowledge of addition, subtraction, multiplication and division to convert between the different units of time. • Children convert between analogue and digital times using a format up to 12 hours. They use a.m. and p.m. to distinguish between times in the morning and afternoon. • They understand that how many minutes past the hour determines the digital time. • Children recognise that digital time need to be written in 4-digit format. For example, 09:30 a.m. not 9:3 • Children now move on to convert between analogue and digital times using a 24 hour clock.	*Volume* • Children understand that volume is the amount of solid space sometimes takes up. They look at how volume is different to capacity, as capacity is related to the amount a container can hold. • Children use their understanding of volume (the amount of solid space taken up by an object) to compare and order different solids that are made of cubes. centimetre cubes to make solid shapes. Through this, they recognise the conservation of volume by building different solids using the same amount of centimetre cubes. • Children develop an understanding of volume by building shapes made from centimetre cubes and directly comparing two or more shapes. • Children estimate volume and capacity of different solids and objects. They build cubes and cuboids to aid their estimates. Children need to choose the most suitable unit of measure for different objects e.g. using m^3 for the volume of a room. • Children should understand that volume is the amount of solid space taken up by an object, whereas capacity is the amount a container can hold. • Children estimate capacity using practical equipment such as water and rice. • Children explore how containers can be different shapes but still hold the same capacity. • Children will understand that we often use the word capacity when referring to liquid, rather than volume. **Symbols:** km, m, cm, l, ml, g, kg, cm^2, m^2, m^3 , **Language:** Perimeter, area, length, sides, rectilinear, capacity, volume.	• Children should use these to perform related conversions, both within imperial measures and between imperial and metric. **Symbols:** km, m, cm, l, ml, g, kg, cm^2, m^2, m^3 , **Language:** Perimeter, area, length, sides, rectilinear, triangles, parallelograms, foot, inches, pound, ounces, stone, gallon, pints, centimetres, metres, metric, imperial, conversions, capacity, volume,

	for times that are close to the next hour, for example, 5 minutes to 12 • Children tell time to the nearest minute using an analogue clock. They use the terms 'past' and 'to'. • When telling time 'to' the next hour, children may need to count on to find how many minutes are left in the hour. • Children use 'morning', 'afternoon', 'a.m.' and 'p.m.' to describe the time of day. • Children continue using analogue clocks and will be introduced to digital time for the first time. • Children are introduced to telling the time on a 24-hour digital clock for the first time. • Children spend time looking at analogue and digital clocks at various times throughout the day, in order to compare what is the same and what is different. • Children find the durations of events using both analogue and digital clocks. They should be given opportunities to practically work out durations of time using clocks with moveable hands. Number lines are also a useful model. • Children explore the most efficient ways of breaking the time down in order to work out the duration. For example: half hours, quarter of an hour and five minutes. • Children compare durations of time using analogue and digital clocks. They could use empty number lines to model the situations as these will assist with bridging over hours. • They use their knowledge of addition and subtraction, and that there are 60 minutes in an hour, to compare the length of time taken by particular events or tasks. • Children find start and end times to the nearest minute using both analogue and digital times. • They could use real clocks with moveable hands whilst learning how to add and subtract times, and then move to number lines to help calculate start and end times.	• They use 12 and 24 hour digital clocks, and a number line, to explore what happens after midday. **Symbols:** Analogue and digital clocks, < , >, =, m, cm, m, km, g, kg, I, V, X, L, C, l, ml, am, pm, **Language:** Length, side, perimeter, rectilinear, fraction, kilometre, metre, right angles		

	• Part-whole models could also be used to split longer intervals. • Children measure and compare durations of time in seconds. It is important for children to have a realistic sense of what time in seconds feels like, as they often count in seconds too quickly. They could use a stopwatch to compare, for example, counting to 10 seconds in their heads with the actual timed duration. • They recognise that there are 60 seconds in one minute and use this to write durations of time in different ways e.g. 80 seconds is the same as 1 minute and 20 seconds. *Mass and Capacity* • Children learn how to read a range of scales to measure mass, including scales with missing intervals. • Children measure the mass of objects and record them as a mixed measurement in kilograms and grams. When given a mixed measurement, children can record the mass on scales by calculating the intervals and identifying where the arrow will go. • Children build on Year 2 knowledge and use 'lighter' and 'heavier' to compare mass. • They use their understanding that kilograms are used for heavier objects and will use this to help them compare mass. For example 500 g is less than 500 kg. • Children compare mixed measurements using the inequality symbols. For example, 1 kg and 500 g < 2 kg. • Children add and subtract mass. They use a range of mental and written methods, choosing the most efficient one for each question. • Children may use concrete resources to represent kilograms and grams. Children could also use bar models to support them to represent calculations.			

	• Children use litres, millilitres and standard scales to explore capacity. Children focus on the capacity in either litres or millilitres and not as a mixed measurement, for example 5 l and 500 ml. • Children continue to use place value skills to explore scales. Children build on their knowledge from KS1, recognising the capacity is the amount of liquid a container can hold and the volume is how much liquid is in the container. • Children use litres and millilitres and standard scales to explore capacity. • Children measure capacity with litres and millilitres together and record measurements as __ l and __ ml, for example 5 l and 500 ml. • Children continue to use place value skills to read and interpret scales. • Children continue to build on Year 2 and use 'full' and 'empty' to compare capacity. • They use their understanding that litres are used for larger containers and will use this to help them compare capacity. For example 500 ml is less than 5 l. • Children also compare actual numerical measures, including mixed measurements using the inequality symbols. For example, 1 l and 500 ml < 2 l. • Children add and subtract volumes and capacities. They can apply their understanding of different methods such as column addition/subtraction, finding the difference etc. Children should choose the correct method depending on the context of the problem. They continue to use mixed measures. • Children may use concrete resources to represent litres and millilitres. Children could also use bar models to represent calculations. • **Symbols:** < , >, =, m, cm, m, km, g, kg, I, V, X, L, C, l, ml, am, pm, analogue & digital clocks.			

	Language: measure, compare, metres, centimetres, millimetres, grams, kilograms, litres, millilitres, length, mass, volume, capacity, pounds, pence, change, Roman Numerals, seconds, minutes, hours, weeks, months, years, leap year, convert, perimeter,			

SEND Provision:

'Word walls' or similar to develop an understanding of new vocabulary
Coloured background on whiteboard
KIRF reinforcement

Maths Progression Map

Geometry in the National Curriculum	LOWER KEY STAGE 2	UPPER KEY STAGE 2
	Pupils should be taught to: ***Year 3*** **Properties of shapes:** • draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them. • 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. ***Year 4*** **Properties of shapes** • Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes • 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 • complete a simple symmetric figure with respect to a specific line of symmetry. **Position and Direction** • describe positions on a 2-D grid as coordinates in the first quadrant • 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.	*Pupils should be taught to:* ***Year 5*** **Properties of shapes** • identify 3-D shapes, including cubes and other cuboids, from 2-D representations • know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles • draw given angles, and measure them in degrees (°) • identify: ➢ angles at a point and one whole turn (total 360°) ➢ angles at a point on a straight line and ½ a turn (total 180°) ➢ other multiples of 90° • use the properties of rectangles to deduce related facts and find missing lengths and angles • distinguish between regular and irregular polygons based on reasoning about equal sides and angles. **Position and Direction** • identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed. ***Year 6*** **Properties of shapes** • 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. **Position and Direction** • describe positions on the full coordinate grid (all four quadrants) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Skills:	Year 3	Year 4	Year 5	Year 6
	Skills: • Children recognise angles as a measure of a turn. They practice making $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$ and whole turns from different starting points in both clockwise and anti-clockwise directions in practical contexts. They should listen to/follow instructions and also give instructions using the correct mathematical language in different contexts. • Children understand that an angle is created when 2 straight lines meet at a point. • Children recognise that a right angle is a quarter turn, 2 right angles make a half-turn, 3 right angles make three-quarters of a turn and 4 right angles make a complete turn. • Children need to see examples in different orientations so that they understand that a right angle does not have to be made up of a horizontal and vertical line. • Children identify whether an angle is greater than or less than a right angle in shapes and turns, by measuring, comparing and reasoning in practical contexts. • Children are introduced to the words 'acute' and 'obtuse' as a way of describing angles. • Children measure and draw straight lines accurately in centimetres and millimetres. They also practice rounding measurements to the nearest centimetre. • Children correctly position the ruler when measuring/drawing the line, by lining up the 0 with the start of the line.	**Skills:** • Children develop their understanding of obtuse and acute angles by comparing with a right angle. They use an angle tester to check whether angles are larger or smaller than a right angle. • Children learn that an acute angle is more than 0 degrees and less than 90 degrees, a right angle is exactly 90 degrees and an obtuse angle is more than 90 degrees but less than 180 degrees. • Children compare and order angles in ascending and descending order. • They use an angle tester to continue to help them to decide If angles are acute or obtuse. • Children identify and order angles in different representations including in shapes and on a grid. • Children understand the definition of a polygon. • Children classify triangles for the first time using the names 'isosceles', 'scalene' and 'equilateral'. Children use rulers to measure the sides in order to classify them correctly. Children will compare the similarities and differences between triangles and use these to help them identify, sort and draw. • Children name quadrilaterals including square, rectangle, rhombus, parallelogram and trapezium. They describe their properties and highlight the similarities and differences between quadrilaterals. • Children draw quadrilaterals accurately using knowledge of their properties. • Children find and identify lines of symmetry within 2-D shapes. • Children explore symmetry in shapes of different sizes and orientations. To help find lines of symmetry children use mirrors and tracing paper.	**Skills:** • Children recap acute and obtuse angles. They recognise a full turn as 360 degrees, a half-turn as 180 degrees and a quarter-turn (or right angle) as 90 degrees. They consider these in the context of compass directions. • Children also deduce angles such as 45 degrees, 135 degrees and 270 degrees. Reflex angles are introduced explicitly for the first time. Children define angles in terms of degrees and as fractions of a full turn. • Children are taught to use a protractor for the first time. They begin with measuring angles less than 90°, acute angles. They use their knowledge of right angles to help estimate the size of acute angles e.g. "It's close to a right angle, so about 80°." • Children need to develop their understanding of using both the inside and outside scales of the protractor, and need to be taught how to decide which to use. • Children continue to learn how to use a protractor and focus on measuring obtuse angles. • They use their knowledge of right angles to help estimate the size of obtuse angles e.g. "It's just over a right angle, so about 100°." • Children need to draw lines correctly to the nearest millimetre. They use a protractor to draw angles of a given size, and will need to be shown this new skill. • Children continue to develop their estimation skills whilst drawing and measuring lines and angles. They also continue to use precise language to describe the types of angles they are drawing. • Children build on their knowledge of a right angle and recognise two right angles are equivalent to a straight line, or a straight line is a half of a turn. • Children are aware that angles on a straight line add to 180 degrees, they use this to calculate missing angles on straight lines. Part-whole and bar models are used to represent missing angles. • Children need to know that there are 360 degrees in a full turn. This connects to their knowledge of right angles, straight lines and compass points.	**Skills:** • Children revisit measuring angles using a protractor from Year 5. • Children recap how to line up the protractor accurately, and identify which side of the scale to read. They link this to their understanding of angle sizes. • Children read the measurement and practise measuring angles given in different orientations. • Children relate angles to compass points. • Children name and describe four different types of angles. • Children build on their understanding of degrees in a right angle and make the connection that there are two right angles on a straight line and four right angles around a point. • Children should make links to whole, quarter, half and three- quarter turns and apply this in different contexts such as time and on a compass. • Children apply their understanding of angles in a right angle, angles on a straight line and angles around a point to calculate missing angles. • They should also recognise right angle notation and identify these on a diagram. Children then use this information to help them calculate unknown angles. • Children recognise that vertically opposite angles share a vertex. They realise that they are equal and use practical examples to show this. • They continue to apply their understanding of angles on a straight line and around a point to calculate missing angles. • Children practically explore interior angles of a triangle and understand that the angles will add up to 180 degrees. • Children should apply their understanding that angles at a point on a straight line add up to 180 degrees. • Children are introduced to hatch marks for equal lengths. They concentrate on angles in right-angled triangles and isosceles triangles. • Children use their understanding of the properties of triangles to reason about angles. • Children build on prior learning to make links and recognise key features of specific types of triangle. They think about using this information to solve missing angle problems.

	• Children identify and find horizontal and vertical lines in a range of contexts. • They identify horizontal and vertical lines of symmetry in shapes and symbols. • Children identify and find parallel and perpendicular lines in a range of practical contexts. • They use the arrow notation to represent parallel lines and the right angle notation for perpendicular lines. • Ensure that children are presented with lines that are not horizontal and vertical. • Children may need to use their right-angle tester to help them check that lines are perpendicular. • Children recognise, describe and draw 2-D shapes accurately. They use properties including types of angles, lines, symmetry and lengths of sides to describe the shape. • They could be given opportunities to identify/draw a hidden shape from a description given and also describe a shape for a friend to identify/draw. • Children recognise and describe 3-D shapes in different orientations. They use properties including the number of faces, edges and vertices to describe the shape. Where a shape has a curved surface, children should know that this is not called a face. e.g. a cylinder has 2 circular faces and a curved surface. • Children should explore the difference between a prism, which has the same shape all the way through, and a pyramid, which tapers to a point. • Children make 3-D shapes (cubes, cuboids, prisms, cylinders, pyramids, cones, spheres) using construction materials.	• Children understand that a shape may be symmetrical but if the pattern on the shape isn't symmetrical, then the diagram isn't symmetrical. • Children use their knowledge of symmetry to complete 2-D shapes and patterns. • Children use squared paper, mirrors and tracing paper to help them accurately complete figures. • Children are introduced to coordinates for the first time and they describe positions in the first quadrant. • Children read, write and use pairs of coordinates. • Children need to be taught the order in which to read the axes, the x-axis first and then the y-axis next. They become familiar with the notation within the brackets. • Children develop their understanding of coordinates by plotting given points on a 2-D grid. • Children need to accurately plot points on the grid lines and not between them. • Children read, write and use pairs of coordinates. • Children move shapes and points on a coordinate grid following specific directions using language such as: left/right and up/down. • Children apply their understanding of coordinates when translating by starting with the left/right translation followed by up/down. • Children understand the idea of 'corresponding vertices' when describing translation of shapes (e.g. vertex A on the object translates to vertex A on the image). **Symbols:** right angle notation, x-axis and y-axis , Coordinates notation within brackets (1,3)	• Children need to know when they should measure an angle and when they should calculate the size of angle from given facts. • Children look at squares and rectangles on a grid to identify right angles. • Children use the square grids to reason about length and angles, for example to deduce that half a right angle is 45 degrees. • Children should be confident in understanding parallel and perpendicular lines and right angles in relation to squares and rectangles. • Children distinguish between regular and irregular polygons. They need to be taught that "regular" means all the sides and angles in a shape are equal e.g. an equilateral triangle and a square are regular but a rectangle with unequal sides and an isosceles triangle are irregular polygons. • Children can calculate the sizes of missing angles and sides. • Children identify 3-D shapes, including cubes and cuboids, from their 2-D nets. They should have a secure understanding of language associated with the properties of 3-D shapes, for example, faces, curved surfaces, vertices, edges etc. • Children also look at properties of 3-D shapes from 2-D projections, including plans and elevations. • Children review their use of coordinates from Year 4. • Children start with an understanding of the origin (0, 0), before moving onto reading other coordinates. They understand that the first number represents the x-coordinate and the second number represents the y-coordinate. • Children understand how a coordinate is fixed (does not move) whereas a point can be plotted at different coordinates, so it can be moved. • Children reflect objects using lines that are parallel to the axes. Children continue to use a 2-D grid and coordinates in the first quadrant. • Children use mirrors, or to count how far the point is away from the mirror line, so that they can work out where the reflected point will be located. • Children should be introduced to the language object (name of shape before reflection) and image (name of shape after reflection).	• They should also use their knowledge of angles on a straight line, angles around a point and vertically opposite angles. • Children use their knowledge of properties of shape to explore interior angles in a parallelogram, rhombus, trapezium etc. They need to learn that angles in any quadrilateral add up to 360°. • Children need to have a secure understanding of the relationship between a rectangle, a parallelogram, a square and a rhombus. • Children use their knowledge of properties of shape to explore interior angles in polygons. • Children explore how they can partition shapes into triangles from a single vertex to work out the sum of the angles in polygons. • They use their knowledge of angles on a straight line summing to 180° to calculate exterior angles. • Children begin by drawing shapes accurately on different grids such as squared and dotted paper. They then move on to using a protractor on plain paper. • Children use their knowledge of properties of shapes and angles, as well as converting between different units of measure. • Children use their knowledge of 2-D and 3-D shapes to identify three-dimensional shapes from their nets. • Children need to recognise that a net is a two-dimensional figure that can be folded to create a three-dimensional shape. • They use measuring tools and conventional markings to draw nets of shapes accurately. • Children recap their learning from Year 4 & 5 on reading and plotting coordinates in the first quadrant (the quadrant where both χ and γ are positive) • Children draw shapes on a 2-D grid from given coordinates and may use their increasing understanding to write coordinates for shapes without plotting the points. • Children extend their knowledge of the first quadrant to read and plot coordinates in all four quadrants. They draw shapes from coordinates given. • Children need to become fluent in deciding which part of the axis is positive or negative. • Children develop an understanding of how to find the length of a line by using the coordinates of its two endpoints.

	• They use correct mathematical language to describe the shapes they have made (edges, faces, vertices, curved surfaces). **Symbols:** $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$, cm, mm, right angle notation, arrow notation **Language:** angles, measure, turn, clockwise, anti-clockwise, point, right-angle, half turn, quarter turn, three-quarter turn, whole turn, horizontal, vertical, greater than, less than, acute, obtuse, centimetres, millimetres, rounding, symmetry, shapes, parallel, perpendicular, properties, faces, edges, vertices, curved surface, circular face, cylinder, prism, pyramid, cubes, cuboids, sphere, cones.	**Language:** angles, measure, turn, clockwise, anti-clockwise, point, right-angle, half turn, quarter turn, three-quarter turn, whole turn, horizontal, vertical, greater than, less than, acute, obtuse, centimetres, millimetres, rounding, symmetry, shapes, parallel, perpendicular, properties, faces, edges, vertices, curved surface, circular face, cylinder, prism, pyramid, cubes, cuboids, sphere, cones. ascending, descending, grid, polygon, isosceles, scalene, equilateral, quadrilaterals (square, rectangle, rhombus, parallelogram, trapezium), shape, pattern, diagram, coordinates, quadrants, positions, x-axis and y-axis, plotting, points, left/right, up/down, translate, corresponding vertices, object vs image.	• Children explore what happens to points when they are reflected in lines parallel to the axes. • Children might use mirrors to do this. This might be done through investigation where children record coordinates of vertices of the object and coordinates of vertices of the image in a table. • Children learn to translate shapes on a grid. • Children could focus on one vertex at a time when translating. • Attention should be drawn to the fact that the shape itself does not change size nor orientation when translated. • Children translate coordinates and also describe translations of coordinates. • Attention should be drawn to the effect of the translation on the x-coordinate and the y-coordinate. For example, how does a translation of 3 up affect the x and y-coordinate? **Symbols:** x-axis and y-axis, right angle notation **Language:** angles, measure, turn, clockwise, anti-clockwise, point, right-angle, half turn, quarter turn, three-quarter turn, whole turn, horizontal, vertical, greater than, less than, acute, obtuse, centimetres, millimetres, rounding, symmetry, shapes, parallel, perpendicular, properties, faces, edges, vertices, curved surface, circular face, cylinder, prism, pyramid, cubes, cuboids, sphere, cones. ascending, descending, grid, polygon, isosceles, scalene, equilateral, quadrilaterals (square, rectangle, rhombus, parallelogram, trapezium), shape, pattern, diagram, coordinates, quadrants, positions, x-axis and y-axis, plotting, points, left/right, up/down, translate, corresponding vertices, object vs image. reflex angles, protractor, inside/outside scales, equivalent, regular & irregular polygons, nets,	• Children use knowledge of coordinates and positional language to translate shapes in all four quadrants. They describe translations using directional language and use instructions to draw translated shapes. • Children extend their knowledge of reflection by reflecting shapes in four quadrants. They will reflect in both the χ- axis and the γ-axis. • Children should use their knowledge of coordinates to ensure that shapes are correctly reflected. **Symbols:** x-axis and y-axis, hatch marks, right angle notation, **Language:** angles, measure, turn, clockwise, anti-clockwise, point, right-angle, half turn, quarter turn, three-quarter turn, whole turn, horizontal, vertical, greater than, less than, acute, obtuse, centimetres, millimetres, rounding, symmetry, shapes, parallel, perpendicular, properties, faces, edges, vertices, curved surface, circular face, cylinder, prism, pyramid, cubes, cuboids, sphere, cones. ascending, descending, grid, polygon, isosceles, scalene, equilateral, quadrilaterals (square, rectangle, rhombus, parallelogram, trapezium), shape, pattern, diagram, coordinates, quadrants, positions, x-axis and y-axis, plotting, points, left/right, up/down, translate, corresponding vertices, object vs image. reflex angles, protractor, inside/outside scales, equivalent, regular & irregular polygons, nets, x-coordinate, y-coordinate, point/ coordinate, object/ image, reflection, vertex, interior angles, exterior angles, vertically opposite angles, hatch marks, partition, positive, negative, endpoints.

			x-coordinate, y-coordinate, point/ coordinate, object/ image, reflection, vertex.	

SEND Provision:

'Word walls' or similar to develop an understanding of new vocabulary

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Maths Progression Map

Statistics in the National Curriculum	LOWER KEY STAGE 2		UPPER KEY STAGE 2	
	Pupils should be taught to: ***Year 3*** • interpret and present data using bar charts, pictograms and tables • solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables. ***Year 4*** • □ 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.		*Pupils should be taught to:* ***Year 5*** • solve comparison, sum and difference problems using information presented in a line graph • complete, read and interpret information in tables, including timetables. ***Year 6*** • interpret and construct pie charts and line graphs and use these to solve problems □ • calculate and interpret the mean as an average.	
Skills:	**Year 3**	**Year 4**	**Year 5**	**Year 6**
	Skills: • Children build on their understanding of pictograms from Year 2. They continue to read and interpret information in order to answer questions about the data. It is important that children understand the value of each symbol used and what it means when half a symbol is used. • Children construct pictograms and choose an appropriate key. • Children carry out their own data collection. • Children interpret information in pictograms and tally charts in order to construct bar charts. They interpret information from bar charts and answer questions relating to the data. • Children read and interpret bar charts with scales of 1, 2, 5 and 10. They decide which scale will be the most appropriate when drawing their own bar charts. • Children interpret information from tables to answer one and two-step problems.	**Skills:** • Children revisit how to use bar charts, pictograms and tables to interpret and present discrete data. • They decide which scale will be the most appropriate when drawing their own bar charts. • Children gather their own data using tally charts and then present the information in a bar chart. Questions about the data they have gathered should also be explored so the focus is on interpreting rather than drawing. • Children solve comparison, sum and difference problems using discrete data with a range of scales. • They use addition and subtraction to answer questions accurately and ask their own questions about the data in pictograms, bar charts and tables. • Although examples of data are given, children should have the opportunity to ask and answer questions relating to data they have collected themselves. • Children are introduced to line graphs in the context of time. They use their	**Skills:** • Children read and interpret line graphs. They make links back to using number lines when reading the horizontal and vertical axes. Children can draw vertical and horizontal lines to read the points accurately. • Children label all the intervals on the axes to support them in reading the line graphs accurately. When reading between intervals on a line graph, children can give an estimate of the value that is represented. • Children use their knowledge of scales and coordinates to represent data in a line graph. Drawing line graphs is a Year 5 Science objective and should support this learning and link to reading and interpreting graphs. • Children draw axes with different scales depending on the data they are representing. • Children collect their own data to present in line graphs focusing on accurately plotting the points. • Children use line graphs to solve problems. They use prepared graphs or graphs which they have drawn themselves, and make links to other subjects, particularly Science. • Children solve comparison, sum and difference problems. They also generate their own questions	**Skills:** • Children will build on their experience of interpreting data in context from Year 5, using their knowledge of scales to read information accurately. Examples of graphs are given but real data from across the curriculum e.g. Science, is also used. Please note that line graphs represent continuous data not discrete data. Children need to read information accurately, including where more than one set of data is on the same graph. • Children will build on their experience of reading and interpreting data in order to draw their own line graphs. • Children will need to decide on the most appropriate scales and intervals to use depending on the data they are representing. • Children need to be able to use line graphs to solve problems once they can read, interpret and draw line graphs. • Children need to use their knowledge of scales to read information accurately. They need to be exposed to graphs that show more than one set of data. • Children should be secure with the terms x and y axis, frequency and data. • Children will illustrate and name parts of circles, using the words radius, diameter, centre and circumference

	• They use their addition and subtraction skills to answer questions accurately and ask their own questions about the data in tables. **Language:** pictograms, symbols, half symbol, key, tally chart, bar chart, data, interpret, scale.	knowledge of scales to read a time graph accurately and create their own graphs to represent continuous data. • It is important that children understand that continuous data can be measured (for example time, temperature and height) but as values are changing all the time, the values we read off between actual measurements are only estimates. • They use addition and subtraction to answer questions accurately and ask their own questions about the data in line graphs. Although examples of data are given, children need to have the opportunity to ask and answer questions relating to data they have collected themselves. **Language:** pictograms, symbols, half symbol, key, tally chart, bar chart, data, interpret, scale. Line graphs, time graphs, values, measurements vs estimates,	for others to solve by reading and interpreting the line graphs. • Children read tables to extract information and answer questions. There are many opportunities to link this learning to topic work within class and in other subject areas. • Children generate their own questions about information in a table. They apply their addition and subtractions calculations when solving sum and difference problems. • Children read a range of two-way tables. These tables show two different sets of data which are displayed horizontally and vertically. • Children answer questions by interpreting the information in the tables. They complete two-way tables, using their addition and subtraction skills. • Children read timetables to extract information. Children interpret local timetables making their learning more relevant to their lives. • Children revisit their previous learning on digital times to support them in reading timetables more accurately. **Language:** pictograms, symbols, half symbol, key, tally chart, bar chart, data, interpret, scale. Line graphs, time graphs, values, measurements vs estimates, horizonatal and vertical axes/ lines, intervals, coordinates, scales, tables, two-way tables, digital times.	confidently. They will also explore the relationship between the radius and the diameter and recognise the diameter is twice the length of the radius. • Children will build on their understanding of circles to start interpreting pie charts. They will understand how to calculate fractions of amounts to interpret simple pie charts. • Children should understand what the whole of the pie chart represents and use this when solving problems. • Children will apply their understanding of calculating percentages of amounts to interpret pie charts. • Children know that the whole of the pie chart totals 100 %. • Children recognise fractions in order to read the pie chart more efficiently. • Children build on angles around a point totalling 360 degrees to know that this represents 100 % of the data within a pie chart. • Children will construct a pie chart, using a protractor to measure the angles. A “standard” protractor has radius 5 cm, so if circles of this radius are drawn, it is easier to construct the angles. • Children apply their addition and division skills to calculate the mean average in a variety of contexts. They find the mean by sharing equally or using the formula: Mean = Total ÷ number of items. • Children investigate missing data when given the mean once they understand how to calculate the mean of a simple set of data. **Language:** pictograms, symbols, half symbol, key, tally chart, bar chart, data, interpret, scale. line graphs, time graphs, values, measurements vs estimates, horizonatal and vertical axes/ lines, intervals, coordinates, scales, tables, two-way tables, digital times. pie charts, continuous vs discrete data, x and y axis, frequency, data, circle, radius, diameter, circumference, fractions of amounts, whole, percentages, mean average, formula.

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