Mathematics

Start | *Emerging* | *MET-* | ***MET*** | *MET+* | *Deep*

NUMBER

- Count up to 100 in 1s beginning with 0 or 1
- Read numbers up to 100 in numerals.
- Count up in 2s, 5s and 10s from 0.
- Identify one more and one less than any number up to 20.
- Begin to estimate a sets of objects up 20 and use the language of more than, less than to compare with another number.
- Read numbers up to 20 in numerals and words

- Count to and across 100, forwards and backwards, beginning from 0 or 1, or from any given number.
- Count, read and write numbers to 100 in numerals with correct orientation.
- Count in multiples of twos, fives and tens (up and back).
- Given a number, identify one more and one less up to 100.
- Identify and represent numbers using objects.
- Identify and represent numbers using pictorial representations including the number line.
- Use the language of: equal to, more than, less than (fewer), most, least.
- Read and write numbers from 1 to 20 in numerals and words and spelling them correctly.

- Use numerals to explain why counting across 100 is tricky.
- Identify multiples of 2s, 5s and 10s in a set of numbers and explain how they know.
- Identify 2 and 5 more/ less than a given number mentally and explain their approach.
- Reason about how estimating can help when problem solving.
- Justify their ordering of numbers up to 100 on an empty number line.

- Count up in 2s, 3s, 5s and 10s from 0.
- Know how to partition 2-digit numbers.
- Accurately estimate sets of objects up to 50.
- Order numbers up to 100. Know that the = sign means 'the same as'.
- Read numbers up to 100 in numerals and words.

- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- *Recognise the place value of each digit in a 2-digit number*.
- Identify, represent and estimate numbers using different representations, including the number line.
- *Compare and order numbers to at least 100 and use the <> and = sign.*
- *Read and write numbers to at least 100 in numerals and in words.*
- Use place value and number facts to solve problems.

- Categorise numbers in a set as multiples of 2s, 3s, 5s and 10s and explain why some sit in more than one category.
- Explain how a set of objects can be represented in different ways, but the total number remains the same.
- Compare and contrast a set of 2-digit numbers, reasoning about similarities and differences.
- Explain why = means 'balance'.
- Explain how estimating can help when solving problems with larger numbers.

• Count up in 4s, 10s, 50s, 100s from 0. • Find 10 more and less than any given number mentally. • Know how to partition 2-digit and 3-digit numbers. • Order numbers up to 1000. • Read numbers up to 1000 in numerals and words. • Accurately estimate larger sets of objects.	• Count from 0 in multiples of 4, 8, 50 and 100 (up and back). • *Find 10 or 100 more or less than a given number mentally.* • *Recognise the place value of each digit in a 3 digit number (including with zero value).* • *Compare and order numbers up to 1000 (e.g. using number lines and <>).* • *Read and write and spell numbers up to 1000 in numerals and in words.* • *Identify, represent and estimate numbers using different representations (e.g. grouping, tallying etc.)*	• Reason using knowledge of 4s, 8s, 50s and 100s (e.g. explain why 38 is not a multiple of 4). • Explain how some tables can help you with others (e.g. 2s and 4s, 3s and 6s) • Justify their method when adding and subtracting multiples of 10 and 100 (e.g. 20 or 400). • Explain why the value of a digit changes when it moves columns. • Compare and contrast a set of 3-digit numbers, reasoning about similarities and differences. • Justify why their approach to solving place value and number facts problems was efficient.
• Count up in 3s, 6s, 25s and 1000s from 0. • Find 1000 more than any given number. • Order a set of 4-digit numbers. • Know how to partition 3-digit and 4-digit numbers. • Read 4-digit numbers in numerals. • Begin to use strategies to estimate larger sets of objects. • Round to the nearest 10 using number lines. • Know that our number system has changed over time. • Read Roman Numerals to 10 (X).	• Count in 6s, 7s, 9s 25s and 1000s from 0 (up/back). • Find 1000 more or less than any given number mentally. • Recognise the value of each digit in a 4 digit number. • Compare and order a set of numbers beyond a 1000 (e.g. using number lines and <>). • Identify, represent and estimate numbers using groupings (tallies, groups of 25, 50, 100). • Read and write 4-digit numbers in numerals and words (including accurate spelling). • Round any number to the nearest 10, 100 and 1000 (using number lines). • Read Roman numerals to 100 (I to C). • Know that over time, the numeral system changed to include the concept of zero and place value. • Solve number and practical problems using all of the above and with increasingly larger positive numbers.	• Generalise using knowledge of 6s, 7s, 9s 1000s and beyond (e.g.I know that 18 is a multiple of 6 therefore is must also be a multiple of 3, I know that 77 is multiple of 7 therefore 7777 will be too). • Know why other tables can't help with 7s and 11s. • Justify their method when adding and subtracting multiples of 1000s mentally (e.g. 4000). • Justify how larger and smaller numbers can be created using the same 4 digits. • Explain how their methods make estimating and grouping of larger sets of objects more efficient. • Use rounding as part of problem solving. • Argue which system is more effective - Roman numerals or the Arabic system we use today.

• Begin to read and write numbers bigger than 1000. • Count forwards and backwards in steps of 10s, 100s and 1000s (eg 127, 227, 337 / 1237, 1137, 1037, 937) • Count forwards and backwards into negative numbers insteps of one. • Round any number less than 10,000 to the nearest 10, 100 or 1000. • Solve simple number and practical problems that involve some of the above. • Read Roman numerals to 500.	• 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 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.	• Explain the position of numbers on a line and add in missing numbers. • Recognise when it would be useful to count in powers of 10. • Explore patterns and sequences using negative numbers and continue them e.g. -2, -5, -8 • Explain how/why to use rounding to solve problems in a range of contexts. • Justify the methods chosen to solve number problems. • Teach someone how to write the date in Roman numerals.
• Know the value of each digit up to 1,000,000. • Know the method for rounding numbers and be able to round where only one digit needs contracting (e.g. 1420 to the nearest 100.) • Continue a number sequence according to a given rule. • Begin to use symbols to describe a generalised relationship. • Check if a pair of numbers satisfies an equation with two unknowns. • Know that there can be more than one pair of numbers satisfying a rule with two variables.	• Read, write, order and compare numbers up to 10,000, 000 and determine the value of each digit. • Round any whole number to a required degree of accuracy. • Use negative numbers in context, and calculate intervals across zero. • 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	• Use the pattern of place value language to read increasingly large numbers involving billions and trillions. • Explain why different degrees of accuracy might be needed in different contexts, for example, why it is inappropriate to measure the distance between two cities to the nearest cm. • Explore contexts when it might be necessary to round up or down disregarding rounding rules (e.g. how many cars to carry 11 people.) • Explain similarities and differences between number sequences. • Use algebraic notation to describe a number sequence in more than one way and explain why the expressions are equivalent. • Explain and demonstrate how algebraic expressions can be used to model real life situations

CALCULATION & RATIO AND PROPORTION

- Recognise the function of the – and + symbols.
- Recall number bonds up to 10, use these in a range of real life contexts, and role-play.
- Add and subtract single digit numbers in a range of real life situations and role-play using concrete objects.

- Double numbers up to 10 using objects, recognising that you add the same number twice.
- Share up to 10 objects between 2 and 4 groups.
- Use sharing and doubling in a range of real life and role-play contexts.

- Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs.
- Represent and use number bonds and related subtraction facts within 20.
- Add and subtract one-digit and two-digit numbers to 20, including zero.
- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ☐ – 9.

- Solve one-step problems involving multiplication *(by 2 and 5)* and division *(by 2 and 4)* using concrete objects
- Solve one-step problems involving multiplication *(by 2 and 5)* and division (*by 2 and 4*) using pictorial representations and arrays with the support of the teacher.

- Compose oral maths stories and role-play around given number sentences.
- Know that re-ordering numbers in a number sentence 'may' affect the answer.
- Explain links between addition and subtraction facts up to 20.
- Use empty number lines to solve addition and subtraction calculations.
- Create their own missing number problems; explain how they tested that their solution is correct.
- Explain their solutions to addition and subtraction problems which involve two 2-digit numbers up to 20 , but where the answer is over 20 (e.g. 12+17)

- Predict when a number will not share equally by 2 and explain how they know.
- Explain the relationship between arrays and multiplication.
- Solve problems involving multiplication and division using repeated addition or subtraction.

- Recall number bonds up to 20 and use these in a range of real life contexts and role-play.
- Add and subtract 2-digit numbers and ones to solve problems.
- Beginning to use commutativity to solve addition calculations (e.g. start with the bigger number first).
- Recognise when an answer is sensible or not (e.g. 73+4=57).

- Solve problems with addition and subtraction using concrete objects and pictorial representations including those involving numbers, quantities and measures and applying their increasing knowledge of mental and written methods (not necessarily column)
- Recall and use addition and subtraction facts up to 20 fluently and derive and use related facts up to 100.
- Add and subtract numbers using concrete objects, pictorial representations and mentally Including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers

- Make some choices between mental and written methods.
- Use columnar (expanded) addition and subtraction appropriately and accurately in a range of real life contexts and role-play.
- Explain patterns in number facts to 100 and how they can help us solve other calculations.
- Explain how partitioning numbers helps when adding and subtracting.
- Explain the links between related addition and subtraction calculations (e.g. 5+6=11 so 11-6=5).

• Solve calculations using the same numbers (eg x+y & y+x or x+y and x-y) and spot that some give the same answer. • Use multiplication facts relating to 2s, 5s and 10s in a range of contexts and role-play, relying on concrete objects. • Know that some numbers are classed as odd and some even. • Recognise the x and ÷ signs. • Know that grouping can help with multiplication and division. • Solve pairs of calculations using the same numbers and spot that some give the same answer. • Solve simple x and ÷ problems using grouping or repeated addition/ subtraction in a range of contexts. • **Add and subtract mentally 3-digit numbers and ones.** • **Add and subtract 2-digit numbers in a range of real life contexts and role play.** • **Use partitioning to support addition and subtraction.** • **Recognise when an answer is sensible or not (e.g. 354+9=4321).** • **Use inverse to check answers.** • **Recall and use multiplication facts for the 3 and 4 multiplication tables.** • **Know that multiplication is commutative and division is not.** • **Solve problems involving multiplication and division.** • **Recognise patterns in numbers based on multiples**	▪ adding three one-digit numbers • Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot. • Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. • Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even • Calculate mathematical statements for multiplication and division within the taught multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs. • Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division fact, including problems in contexts. • ***Add and subtract numbers mentally, including;*** ○ ***3-digit number and ones*** ○ ***3-digit number and tens*** ○ **3-digit numbers and hundreds.** • ***Add and subtract numbers with up to 3-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.** • ***Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.*** • **Write and calculate mathematical statements for multiplication and division including for two-digit numbers times one-digit numbers.** • **Solve problems, including missing number problems, involving multiplication and division.** • **Solve positive integer scaling problems and correspondence problems in which n objects are connected to m objects.**	• Use practical resources to teach another pupil about the commutativity of addition. • Rearrange the order in a missing number problem (e.g. 7+___=10 and 10=7+ ___) • Explain links between other multiples based on 2s, 5s, 10s (e.g. 100s and 50s). • Justify why a statement may incorrectly written using their knowledge of multiplication and division. • Use practical resources to explain why multiplication is commutative and division is not. • Evaluate their approach to a multiplication or division problem and conclude whether it was efficient or not suggesting improvements. • **Experiment with mental methods to suit different contexts and use formal methods of addition and subtraction.** • **Explain why the formal method is more efficient than the partitioning method.** • **Explain the links within a family of calculations across all 4 operations.** • **Explain how they approach problems with multiple solutions in an efficient and logical manner (e.g. Find two numbers whose total is 325.)** • **Explain links between other multiples based on 2s, 3s, 4s and 8s (e.g. 40s, 6s, 16s).** • **Generalise about commutativity to help solve problems involving unfamiliar multiplication and division facts (e.g. 40 x 3 = 4 x 10 x 3 = 4 x 3 x 10).** • **Prove an hypothesis using scaling as evidence.**

• Effectively choose when it is more efficient to calculate mentally rather than use a written method (e.g. 1000+9 or 1020-19). • Add and subtract 3-digit numbers using formal written methods in a range of real life contexts and single step problems. • Use inverse operations to check their answers. • Solve missing number addition and subtraction problems.	• Add and subtract numbers with up to 4 digits using the formal written methods of addition and subtraction where appropriate. • Estimate and use inverse operations to check answers to a calculation. • Solve addition and subtraction two-step problems in contexts. • Decide which operations and methods to use and why within problem solving. • Recall multiplication and division facts for multiplication tables up to 12 × 12. • Use place value, known and derived facts to multiply and divide mentally. • Multiplying by 0 and 1; dividing by 1; multiplying together three numbers.	• Explain how their approach to a calculation depends on the context and range of numbers. • Use formal methods of addition and subtraction accurately in a range of real life contexts. • Justify their approaches to multi-step addition and subtraction problems and use inverse operations across the steps to check their answers. • Spot calculations within real life scenarios and role play (e.g. shop or bank corner). • Explain links between known tables and other multiples (e.g. 24s, 20s, 18s, 33s etc.).
• Recall and use multiplication facts for the 2s, 3s, 4s, 5s, 6s and 10s in a range of real life contexts and role play. • Use a multiplication square for remaining tables to help solve problems. • Use commutativity to make mental multiplication easier. • Use partitioning with written multiplication including 2-digit by 1-digit numbers. • Use multiplication and division to solve problems in a range of contexts. • Spot relationships between integer ratios based on 2,3,5 and 10 (i.e. 1:2 or 3:9)	• Recognise and use factor pairs. • Understand commutatively 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. • Use the distributive law to multiply two digit numbers by one digit. • Solve harder correspondence problems such as n objects are connected to m objects.	• Explain what happens when you multiply by 0 and divide by 1, using examples to explain their reasoning. • Identify common factors within a set. • Solve multi-step problems that involve mixed calculations and explain their methods. • Reason about their methods when using the distributive law and explain how this makes mental calculation easier. • Prove an hypothesis using scaling as evidence using n:m notation.

• Accurately add and subtract 4 digit numbers using formal written methods. • Multiply a 2 digit number by a 2 digit number using a formal written method. • Add and subtract some 3 or 4 digit numbers mentally. • Multiply numbers mentally drawing on known facts. • Divide a 3 digit number by a one digit number using a formal written method of short division where there is a whole number answer. • Use rounding to check calculations. • Multiply and divide whole numbers by 10, 100 and 1000 where there are whole number answers. • Solve addition and subtraction multistep problems in context • Know the difference between factors and multiples. • Know that a prime number has only 2 factors and recall prime numbers up to 10. • Recognise square numbers and use the notation for squared (^{2}). • Understand the meaning of the equals sign (equivalence/balance). • Know that scaling and rates problems involve multiplication and division.	• Add, subtract and multiply whole numbers with more than 4 digits, including using formal written methods. • Calculate mentally using all 4 operations with increasingly large numbers. • 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. • Solve multi-step problems in contexts, deciding which operations and methods to use and why. • Solve scaling problems by simple fractions and problems involving simple rates. • 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. • Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3). • Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes.	• Compare and contrast expanded and formal methods and explain when one is more efficient than the other and how they can be applied to numbers of any size. • Defend the reasons for choosing one method over another being aware of any shortcomings. • Explain chosen mental strategies when calculating with large numbers. • Teach another child how to interpret remainders appropriately, linking them to fractions • Invent contexts and stories to fit increasingly complex multistep problems. • Solve problems involving multiplying and dividing any number by 10, 100 or 1000. • Use a systematic approach to identify whether or not a number is prime. • Use knowledge of multiples and factors to help simplify multiplication and division problems. • Explore number patterns involving square and cube numbers. • Create problems requiring addition, subtraction, multiplication and division and any combinations of these. • Evaluate the best methods for solving problems through peer marking and be able to justify choices.

• Multiply a 4 digit number by a 2 digit number using expanded written methods. • Divide numbers up to 4 digits by a two-digit whole number using expanded written methods and jottings. • Interpret remainders as whole number remainders or fractions (eg r 3 or 3/8) • Begin to use efficient strategies to perform mental calculations. • Find common factors and multiples using knowledge of tables. • Know what a prime factor is. • Use the correct order of operations when carrying our multi-step calculations. • Begin to choose appropriate methods for solving addition and subtraction problems. • Solve problems involving addition, subtraction, multiplication and division. • Use estimation to check answers to calculations and recognise when answers are obviously incorrect by a factor of 10 or more.	• Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. • Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context • Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context • Perform mental calculations, including with mixed operations and large numbers. • Identify common factors, common multiples and prime numbers. • Use their 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. • Solve problems involving addition, subtraction, multiplication and division. • Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	• Use efficient methods to multiply and divide increasingly large numbers by 2 digit numbers. • Explain how taught methods could be extended to multiply and divide by numbers with more than 2 digits or by decimals. • Use efficient short cuts to facilitate performing more complex mental calculations. • Investigate the range of possible answers using different operations with a fixed set of numbers, (e.g. use 5 2's to make all the numbers from 1 – 20). • Explain why some answers may not be possible. • Explore patterns within sets of prime numbers, factors and multiples and use knowledge of these to help solve problems. • Create contexts for increasingly complex multistep problems involving addition, subtraction, multiplication and division. • Have a strong sense of number and use this to recognise when answers are obviously incorrect. • Explain why a given degree of accuracy is appropriate.

Mathematics

Start	*Emerging*	*MET-*	***MET***	*MET+*	*Deep*

FRACTIONS

- Know that half is dividing into two equal parts and that you can find half of a quantity by sharing into 2 groups.
- Know that a quarter is dividing into four equal parts and know that you can find quarters of a quantity by sharing into 4 groups.

- Recognise, find and name a half as one of two equal parts of an object or shape.
- Recognise, find and name a half of a quantity.
- Recognise, find and name a quarter as one of four equal parts of an object, shape. Recognise, find and name a quarter of a quantity.

- Explain why some shapes are difficult to halve or quarter.
- Predict which quantities cannot be halved or quartered equally and explain their reasoning

- Count up and down in ½ s, ¼ s and ⅓ s to make 1.
- Recognise that thirds arise by dividing into 3 equal parts.
- Correctly place ¼, ½ and ¾ in order.
- Find ½ and ¼ of given lengths.
- Find ¾ of a quantity.

- *Recognise, find, name and write fractions 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity.*
- Write simple fractions for example, ½ of 6=3. Recognise the equivalence of 2/4 and 1/2.

- Use the terms numerator and denominator independently when talking about fractions.
- Order ⅓, ½ , ¼ and ¾ on an empty number line and justify their position.
- Based on their understanding of halves and quarters, begin to generalise about other equivalent fractions.

- Know that a tenth arises from dividing an object into 10 equal parts and write this as $^{1}/_{10}$.
- Know the role of the numerator and denominators (with denominator being the divisor).
- Count up and down in taught fractions including tenths, including beyond 1.
- Place ½ values on a number line (eg placing 4 ½ between 4 & 5)
- Compare and order $^{1}/_{3}$s, ¼ s and ½ s..
- Know that fractions other than ½ have equivalent forms. Add and subtract using ½ s and ¼s.

- 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*
- *Compare and order unit fractions, and fractions with the same denominators*
- Solve problems that involve fractions and decimals

- Create problems involving tenths. Reason about the position of non-unit fractions on a number line.
- Generalise using numerators and denominators and equivalence across taught fractions.
- Create contextualised problems involving + and - with fractions.

• Spot equivalence involving ⅓, ½, ¼ and 1/10 . • Count up and down in taught fractions, including hundredths. • Know that $^{1}/_{100}$ arises by dividing an object or quantity by 100. Add and subtract fractions with the same denominator where the answer goes beyond one whole (e.g. 1 $^{1}/_{3}$). • Know the function of the decimal point and relate this to measures and money. • Know that fractions have a decimal equivalent.	• 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. • Use 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 ½, ¼, ¾. • Find the effect of dividing a one- or two-digit number by 10 and 100. • 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 problems involving increasingly harder fractions and some decimals (e.g. time, money, measures)	• Create problems involving hundredths. • Explain the link between fractions and multiplication (e.g. 20 x ¼ = 5 is equivalent to $^{20}/_{4}$ = 5). • Explain how to calculate decimal equivalents of simple fractions. Reason about what happens to the value of numbers as they pass the decimal point when multiplying or dividing by 10 and 100. • Compare numbers with different decimal places and explain their reasoning.

• Order pairs of fractions with the same denominator. • Find families of equivalent fractions using diagrams. • Recognise that improper fractions can be written as mixed numbers and that they represent numbers >1. • Begin to add fractions with denominators that are multiples of the same number with support. • Multiply proper fractions by 2 or 3 with support. • Read and write single digit decimals as fractions (e.g. 0.8; 0.02). • Begin to recognise thousandths as the third decimal place. • Round decimals with 2 decimal places to the nearest whole number. • Read write order and compare numbers up to 2 decimal places. • Solve problems with numbers up to 2 decimal places in the context of money. • Notice percent symbols in everyday contexts (such as test scores out of 100) and know that this relates to 'parts out of hundred'.	• 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 [for example, 2/5 + 4/5 = 6/5 = 1 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 = 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.	• Place a range of fractions in order and justify their position using equivalence. • Explain how equivalence is helpful when adding or subtraction fractions with different denominators. • Explore number patterns involving fractions including top heavy fractions or mixed numbers. • Explore fractions that result in recurring decimals (e.g. 1/3). • Explain how to extend the decimal system using the patterns of the place value system. • Defend the reason for rounding up/down to a specific number of decimal places in different contexts. • Justify reasons for one number being of higher/lower value than another using knowledge of place value. • Demonstrate how to solve a problem using up to 3 decimal places. • Create suitable contexts for a range of different levels of accuracy (e.g. metres and centimetres: 2 dp). • Work efficiently with percentages in a range of representations, %, decimal or fraction and justify the use of each or any of these.

• Continue number patterns using given ratio • Can calculate simple %s of amounts with support (eg 10% of 100, 20% of 1000) • Use standard methods to simplify simple fractions dividing denominator and numerator by a common factor. • Know how scale factors are used in every day life (eg scale drawings, maps) • Compare pairs of fractions by converting both to the same denominator. • Add and subtract fractions with different denominators where these can be easily converted (e.g. fifths and tenths, thirds and sixths). • Find halves of unit fractions and know that 'x ½' is equivalent to '÷ 2'. • Identify digits in the tenths, hundredths and thousandths column. • Multiply and divide numbers by 10, 100 and 1000 where up to one decimal place will result. • Multiply numbers with up to one decimal place by whole numbers. • Use written division methods and begin to use decimal results instead of remainders. • Solve problems which require answers to be rounded. • Recall equivalences between simple fractions, decimals and percentages.	• 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. • 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. M • Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ × ½ = 1/8. • Divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6]. • Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 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 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.	• Fluently express fractions, including those >1, in a range of equivalent forms and use these representations to evaluate differences. • Use knowledge of addition and subtraction of fractions to solve problems and explore fractional number patterns. • Multiply and divide pairs of fractions cancelling down answers to their simplest forms. • Use fractions to maintain accuracy when use of a decimal would result in recurring places (e.g. thirds, sevenths or ninths). • Explore patterns with recurring decimals (e.g. sevenths). • Move fluently between different representations of fractional parts, (decimals, fractions and percentages) and justify which is appropriate to use in a given contexts.

Mathematics

Start	*Emerging*	*MET-*	***MET***	*MET+*	*Deep*

MEASURES

- Make direct comparisons between lengths/heights, (longer/shorter, taller/shorter) mass/weight (heavier, lighter), capacity/volume (full/empty, more full, less full) and time (earlier, later).
- Recognise a variety of different coins and notes.
- Use simple language to describe the chronology of events (e.g. today, yesterday, tomorrow, tonight, last night, this morning).
- Know the days of the week, months of the year.
- Know that a clock 'measures' time.
- Know and name the standard units of length/height (m/cm); mass (kg/g); temperature (°C) and capacity (l/ml).
- Identify the correct equipment for a given measuring task or role play situation (e.g. ruler for length vs thermometer for temperature).
- With support measure using cm/m, litres and kgs where the answer is a whole.
- Becoming fluent in counting using coins, including counting in 2s, 5s and 10s.
- Add together small numbers of coins and record the calculation using the (p) pence symbol (e.g. 5p+2p+1p=).

- Measure and begin to record lengths and heights, mass/weight, capacity/volume (non-standard measures) and time (hours, minutes, seconds).
- Compare, describe and solve practical problems across a range of measures including lengths and heights, mass/weight, capacity and volume.
- Recognise and know the value of different denominations of coins and notes.
- Sequence events in chronological order using language (e.g., before and after, next, first).
- Use language relating to dates, including days of the week, weeks (e.g. fortnight, weekend) months and years when talking about events.
- Tell the time to the hour and half past the hour.
- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels.
- Compare and order lengths, mass, volume/capacity and record the results using >, < and =
- Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value.
- Find different combinations of coins that equal the same amounts of money.
- Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.
- Compare and sequence intervals of time.
- Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.

- Explain why it is important to use the same units of measure when comparing lengths etc.
- Explain the methods used to solve practical problems across a range of methods.
- Order the denominations of coins and notes and explain their thinking.
- Make comparisons between different passages of time e.g. a week being 7 days; a school week is 5 days; 2 days in a weekend
- Justify their thinking when comparing and ordering measures, including linking to fractions (e.g., this is half the length of that).
- Calculate differences between different measures where the unit is the same.
- Explain relationships between rising denominations and the reducing number of coins needed to make the same amount (e.g. 4 x 2p vs 8 x 1p or 10 x 2p vs 4 x 5p)
- Justify why some amounts cannot be made with certain coins (e.g. 17p using 10ps and 5ps).
- Explain how a money problem has been solved, using the appropriate vocabulary.
- Calculate differences between events that are on the hour and half past the hour (e.g. 8.30 and 10.00 = 1 and ½ hours).
- Explain the relationship between 5s, 15s and 30s within time, linking with ¼ past, ½ past and ¼ to).

• Use addition of coins in practical role play situations and to solve problems. • Use the correct interval of time when discussing events (e.g. minute, second, hour, day, week, and year). • Read the time to quarter past/quarter to the hour.		
• Meaure and compare using appropriate standard metric units to the nearest appropriate unit. • Know that perimeter means to' measure around the outside'. • Add and subtract using pence in practical contexts. • Know there are 100p in £1. • Know that time can be displayed in different ways. • Know how many minutes in ½ hour, ¼ hour and ¾ hour. • Accurately record time in minutes and hours. • Use vocabulary such as o'clock, morning, afternoon. • Know there are 60 seconds in a minute. • Know what 'duration' means	• ***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 (single unit only). • 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.	• Compare using mixed units of measure (e.g. 1kg and 200g). • Measure the perimeter of shapes involving mixed units (e.g. cm and mm). • Explain how the formal method is more efficient than converting between units of money. • Calculate and explain differences in time involving a mix of 12 and 24 hour clocks. • Estimate and read time with increasing accuracy on faces without minute markings. • Record and compare time with mixed seconds, minutes and hours. • Consistently use correct vocabulary across a range of time contexts. • Explain wider time groupings (e.g. decade and century). • Explain why different 3D shapes can cast the same shadow.
• Sort measures into the correct families (e.g. cm, mm, m = length / mg, g, kg = mass / ml, cl, l = volume etc.). • Identify the context of a measure problem e.g. a time problem or a capacity problem. • Measure the perimeter of a simple shape using cm.	• Convert between different units of measure [e.g., kilometre to metre; hour to minute]. • Estimate, compare and calculate different measures, including length, mass and money in pounds and pence in order to solve problems. • Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres. • Find the area of rectilinear shapes by counting squares.	• Explain the relationships between different units of measure and the calculations needed to convert between them (e.g. I need to multiply a length in m by 100 to measure it in cm). • Justify and explain their approach to solving problems that involve mixed measures. • Articulate the difference between perimeter and area using mathematical terminology. • Use their knowledge of squares and oblongs to calculate perimeters. • Explain how to find a range of different areas all with the same perimeter.

• Order families of metric measures by size (e.g. mm < cm < m < km). • Know that we commonly use metric units today, but some imperial measures are still in use. • Identify metric and imperial units in everyday contexts. • Calculate the perimeter and area of squares and oblongs in cms and metres. • Identify composite rectilinear shapes and split them into their composite parts. • Know the difference between volume and capacity and the metric measures used for each.	• Convert between different units of metric measure (e.g., 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 (oblongs and squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes. • Estimate volume [e.g., using 1 cm^3 blocks to build cuboids (including cubes)] and capacity [e.g., using water]. • Use all four operations to solve problems involving measure [e.g., length, mass, volume, money] using decimal notation, including scaling and converting units of time.	• Order a range of different mixed metric and imperial measures e.g. 192cm, 1.3 m and 124mm using formula or conversion charts to help them. • Explain approaches to solving problems which involve mixed imperial and metric measures (e.g. Patrick says 'I travelled 9 miles to school'. Bob says 'I travelled 18km'. Who travelled the furthest?) • Articulate the difference between cm and cm^2 and cm^3 etc. • Test conjectures about relationships between perimeter and area of given shapes, proving or disproving using algebraic language. • Begin to use formula when calculating volumes in real life and problem solving contexts.
• Convert between metric units of measure up to 2 decimal places. • Explain relationships between metric measures and how these are used to convert (e.g. I need to multiply m by 100 to convert into cms). • Convert between metric and imperial measures using conversion charts. • Sort metric measures into families based on function (e.g. cm^3, m^3, km^3 = volume, ml, cl, l= capacity). • Select the correct measurement for the task in hand (e.g. mm for small perimeter or litres for larger capacity). • Use a formula to calculate the area of squares and oblongs.	• 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 (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3].	• Construct conversion charts using their understanding of two different units of measure (e.g., miles and kilometres) and explain direct relationships using ratios. • Create their own multi-step problems based on conversion graphs. • Test conjectures involving volume (e.g. this cube has a volume of 729 cm^3 sides. I think I could fit 3 cubes which have a side length of 3cm inside my bigger cube. Am I right?) • Justify why the formulae for area or volume of certain shapes always work, regardless of size. • Begin to use formulae to calculate the area of triangles and parallelograms.

Mathematics

Start | *Emerging* | *MET-* | ***MET*** | *MET+* | *Deep*

GEOMETRY

• Handle and talk about the different common 2-D and 3-D shapes.	• Recognise and name common 2-D and 3-D shapes, including rectangles (oblongs and squares), circles and triangles and cuboids (including cubes), pyramids and spheres.	• Sort and compare 2-D and 3-D shapes, explaining your reasoning.
• Use the language of left, right, top, middle and bottom to talk about position, direction and movement.	• Describe position, direction and movement, including whole, half, quarter and three-quarter turns.	• Create and record simple sequences of movement including changes in direction and turns. • Explain how many half and quarter turns is the same as a full turn.
• Link shapes with written name labels. • Explain the difference between 2-D and 3-D using shapes to support their thinking. • With support describe simple properties of 2-D and 3-D shapes, (e.g. faces, edges, sides using word prompts). • Complete given patterns and sequences. • Spot patterns and sequences in the real world. • Know that rotation means turn and begin to use clockwise and anti-clockwise to describe turns.	• Pupils read and write names for shapes that are appropriate for their word reading and spelling. • Pupils draw lines and shapes using a straight edge .Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line. • Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces. • Identify 2-D shapes on the surface of 3-D shapes [e.g., a circle on a cylinder and a triangle on a pyramid]. • Compare and sort common 2-D and 3-D shapes and everyday objects. • Order and arrange combinations of mathematical objects in patterns and sequences. • Use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)	• Compare and contrast across a range of 2-D and 3-D shapes using technical mathematical language to describe similarities and differences. • Sort and re-sort shapes according to different criteria and explain why some shapes moved groups while others stayed together. • Justify their thinking when solving and creating sequence puzzles. • Generalise about patterns, explaining how they know what the nth term in a pattern will be (e.g. Using the first 5 shown I know the 10th will be…. because….) • Solve and create maze puzzles involving quarter, half and three-quarter turns.
• Describe the properties of common 2-D and 3-D shapes using accurate language, including angles and symmetry. • Recognise angles as a description of a turn. • Identify right angles around them in the real world. • Compare whether angles are greater than or less than a right angle. • Know what horizontal and vertical mean and can identify parallel lines in 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 and 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 (in shapes). Identify pairs of perpendicular and parallel lines in shapes.	• Explain the differences between 2 shapes using the language of angles. • Solve and create maze puzzles involving multiples of quarter turns. • Distinguish between angles that are greater than or less than a right angle within complex patterns. • Create shapes and patterns with a given number of vertical or horizontal sides. • Explain why a pair of lines are parallel or perpendicular.

• Explain why a shape is a quadrilateral. • Know that triangles is a family of shapes and there are different types of triangles, beyond the right angled triangle. • Know that there are different types of angles beyond right angles and begin to use the terms acute angles, obtuse angles and right angles. • Identify single simple lines of symmetry in shapes. • Plot coordinates in the first quadrant using (x, y) [e.g. (2,4)]. • Know what translation means; understand that while the shape's location will change, the overall form will remain the same (e.g. 'stamping').	• Compare and classify geometric shapes, including different quadrilaterals and different 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. • 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.	• Explain the similarities and differences between isosceles, scalene, right angled and equilateral triangles. • Sort and re-sort within families of shapes using changing criteria explaining why some shapes have moved groups and other remained the same (e.g. a range of triangles or a set of quadrilaterals). • Explain strategies for comparing and ordering angles using correct mathematical language. • Create symmetrical figures based on more than one line of symmetry and explain relationships between the reflections. • Explain the relationship between the number of sides in a regular polygon and its lines of symmetry. • Complete shapes using coordinates (links to quadrilaterals and triangles), explaining their method. • Explain translation using algebraic formula (e.g. (x+4 , y-2))
• Label 2-D pictures of common 3-D shapes. • Know the properties of rectangles (oblongs/squares) and use this to label missing lengths in parallel sides. • Know what regular and irregular means in relation to shapes. • Complete simple symmetrical figures around more than one line of symmetry. • Know that when translating a shape its position changes but its appearance does not. • Translate simple shapes based on given instructions. • Know that angles are measured in degrees. • Order given angles and correctly categorise them as acute, obtuse, reflex or right angles. • Identify the missing angles in a square or rectangle. Calculate missing angles to total a right angle.	• Identify a range of 3-D shapes from 2-D representations (eg nets). • Use the properties of rectangles (oblongs/squares) to deduce related facts and find missing lengths and angles. • Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • 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. • Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles. • Draw given angles, and measure them in degrees (o). • Identify angles at a point and one whole turn (total 360o), angles at a point on a straight line and ½ a turn (total 180o) and other multiples of 90o.	• Justify multiple possibilities as what a 3-D shape may be when only one or two faces are shown in a 2-D representation (i.e. It could be a …..OR a ….. because….) • Use algebraic expressions to justify their solutions to missing length and angle problems (including when only given the perimeter of a square). • Predict the location of a shape after a series of translations or reflections, visualising the sequence in their heads and recording the final location using precise co-ordinates. • Link missing angle problems with inverse operations and express their thinking algebraically. • Create their own missing angle problems.

• Draw 2-D shapes using given side dimensions. • Know that a net is the 2-D pattern that creates a 3-D figure. • Use the properties of rectangles (oblongs/squares) to deduce related facts and find missing lengths and angles. • Know there is 360o in a circle and the edge is called the circumference. • Know there are 180o in a straight line and 360o in a full turn and use this to identify missing angles. • Confidently plot coordinates and translate shapes in the first quadrant. • Know that the x and y axes can be positive or negative. • Read coordinates in all four quadrants.	• 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. • 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.	• Link 3-D shapes with their net and explain why a given net would not properly form the desired shape. • Classify geometric shapes on multiple criteria and justify their thinking using precise mathematical language. • Articulate the relationship between radius, diameter and circumference. • Generalise about parts of a circle (e.g. if the diameter is three times as big, the circumference must also be three times as big). • Prove why vertically opposite angles are always equal. • Predict the location of a shape after a series of translations or reflections in all four quadrants, visualising the sequence in their heads and recording the final location using precise co-ordinates.

Mathematics

Start | *Emerging* | *MET-* | ***MET*** | *MET+* | *Deep*

STATISTICS

Emerging	MET-	MET	MET+
• Know that data means information and know that it can be presented in different forms. • Use tallies to record data and interpret information presented in tally charts and pictograms.	• Interpret and construct simple pictograms, tally charts, block diagrams and simple tables. • Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity. Ask and answer questions about totalling and comparing categorical data.		• Rationalise their choices as to recording and presenting data (e.g. why a pictogram was more effective than presenting the data in a table). • Explain how more than one symbol in a pictogram can represent a value greater than than 1. • Explain their method when solving problems involving categorical data.
• **Know the difference between a bar chart and a block graph.** • **Building on Y2, solve one-step questions using information presented in scaled bar charts and pictograms.**	• **Interpret and present data using bar charts, pictograms and tables.** • ***Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables.***		• **Justify choices in presenting data.** • **Prove or disprove given conjecture using information presented in scaled bar charts, pictograms or tables [for example, 'I think that July and August are the hottest months in all parts of the world because…..']**
• **Know the difference between discrete and continuous data.** • **With support answer questions about bar charts, pictograms and tables.**	• **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.**		• **Justify choices when using graphs, including how this is influenced by continuous or discrete data. (e.g. I wouldn't use a line graph to show the results of a poll on favourite pet)**
• **Know the key components of a line graph and when / where it is used.** • **Use line graphs to make direct conversions between metric and imperial measures with support.**	• **Solve comparison, sum and difference problems using information presented in a line graph.** • **Complete, read and interpret information in tables, including timetables.**		• **Solve multi-step problems that draw from more than one source of information.**

• **Interpret and construct tables, bar charts and line graphs and use these to solve problems.** • **Read pie charts.** • **Know that mean is one type of average.**	• **Interpret and construct pie charts and line graphs and use these to solve problems.** • **Calculate and interpret the mean as an average.**	• **Solve multi-step problems that draw across more than one information source, including pie charts.** • **Prove or disprove conjectures using a range of information sources.**