Knowledge Progression in multiplication and division

ELG-End of Reception Assessment	Mathematics	Numerical Patterns	• Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed evenly.

Year Group	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number facts	• To be able to count in steps of 2, 5 and 10 •Recognise that counting in twos, fives and tens are linked to time tables. •Understand multiplication as repeated addition •Use arrays to represent x tables (2x) <u>Doubles to 20 (10+10)</u> <u>To be able to halve even numbers to 20</u>	•Recall and use multiplication and division facts for the 2, 5 and 10 times tables •To begin to recall and use multiplication and division facts for the 3x tables •To be able to use the correct signs to write number statements involving division and multiplication <u>Doubling and halving</u> <u>To know all doubles to 20 + 20</u> <u>To be able to double all multiples</u>	•Recall multiplication and division facts for times tables for 3x, 4x 6x and 8x tables <u>Doubling and halving</u> <u>To be able to double and half all 2 digit odd and even numbers</u> <u>To be able to double and halve all multiples of 10 to 1000 e.g.</u> <u>half of 900 is 450</u> <u>half of 36 is 18</u>	•Recall multiplication and division facts for times tables up to 12 × 12 •To understand the term square numbers To be able to identify factor pairs and multiples of numbers	•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 •To be able to calculate cubed numbers	•identify common multiples •To be able to identify prime factors e.g. Prime factors of 15 are 3 and 5 because 3×5=15, and 3 and 5 are prime numbers.

		of 10 to 100 (100+ 100) To be able to half all numbers to 20. To be able to halve all multiples of 10				
Mental x/ ÷	Near Doubles •To know 5 + 6 is double 5 and add 1 or double 6 and subtract 1	Near doubles •To know 13 + 14 is double 14 and subtract 1 or double 13 and add 1 •Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs •Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	Near doubles To know 40 + 39 is double 40 and subtract 1 18 + 16 is double 18 and subtract 2 or double 16 and add 2 60 + 70 is double 60 and add 10 or double 70 and subtract 10 •To be able to use doubling and halving to solve multiplication sentences E.g. 14 x 5 = 14 x 10 ÷ 2 12 x 20 = 12 x 2 x 10 60 x 4 = 60 x 2 x 2 •To be able to multiply and divide a multiple of 10 by 10 •Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental methods	Near doubles 1.5 + 1.6 is double 1.5 and add 0.1 or double 1.6 and subtract 0.1 Doubling and halving •To be able to double and halve all 3 digit numbers by partitioning e.g. 346 x2 = 600 + 80 + 12 Half of 960 = 480 •To be able to multiply by 4 by using repeated doubling 34 x 4 = 34 x 2 x 2 26 x 8 = 26 x 2 x 2 x 2 •To be able to use doubles and halves to solve more complex multiplication sentences e.g. 36 x 50 = 36 x 100 ÷ 2 15 x 6 = 30 x 3	Near doubles 421 + 387 is double 400 add 21 and then subtract 13 •Multiplying and dividing by multiples of 10 •Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 To know 9357 x 100 9900 ÷ 10 737 ÷ 10 2060 ÷ 100 23 x 50 637.6 x 10 135.4 ÷ 100 •To be able to apply all the multiplication tables and related	•Perform mental calculations, including with mixed operations and large numbers

			E.G. 16 X 4 = 10 X 4 = 6 X 4 =	•To <u>be able to find a quarter of 3 digit numbers by halving twice</u> <u>e.g. Quarter of 64 = Half of half of 64</u> To be able to multiply and divide numbers by 10, 100, <u>Multiplying and dividing by a multiples of 10</u> <u>To know</u> <u>6 x 10</u> <u>26 x 10</u> <u>4 x 60</u> <u>3 x 80</u> <u>700 ÷ 10</u> •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	<u>division facts frequently and use them confidently to make larger calculations.</u> <u>3x7= 21</u> <u>3x 70 = 210</u> <u>3 x 700 = 2100</u> •<u>Multiply and divide numbers mentally drawing upon known facts</u>	

Apparatus and informal written methods x/ ÷	•Using objects, pictures and bar models to show multiplication as repeated addition Moving onto representing as number sentences e.g. 3x2 = 2+ 2+ 2 •Making arrays with counters and printing to represent multiplication <u>Strategies for division</u> •Using objects to put into 2 groups. •Representing as a picture •Using the division sign to record as a number sentence	<u>Strategies for multiplication (in order)</u> •Using objects, pictures and bar models to show multiplication as repeated addition Moving onto representing as number sentences e.g. 3x4 = 4+ 4+ 4 •Making arrays with counters and drawing arrays to represent multiplication and show commutativity •Children use an array to write a range of calculation e.g. 10 = 2 x 5, 5x2 = 10, 2+ 2+ 2+ 2+ 2= 10, 10 = 5+5 •Using a number line to show repeated groups •Drawing own number line to show repeated jumps <u>Strategies for division (in order)</u> •Sharing using a range of objects •Representing the sharing pictorially •Using arrays to represent division	<u>Strategies for multiplication(in order)</u> •Partition to multiply 2 digit numbers using Numicon, base 10 or Cuisenaire rods Children represent these objects pictorially •Children draw a number line to represent jumps e.g. 14 x 8 = 10 x 8 + 4 x 8 •Children represent partitioning as two number sentences •Children use base 10 / Cuisenaire to represent numbers on a grid when multiplying 2 digit numbers by 2 digit numbers •Children represent counters pictorially on a grid when multiplying 2, 2 digit numbers •Children use the grid method to calculate multiplication of 1 x2 digit number •Children use formal short multiplication method to multiply 2 digit numbers by 1 digit number <u>Strategies for division (in order)</u> •Children use objects to solve division with remainders			

		and understanding division as the inverse to multiplication Recording as a number sentence •Using a number line to show division as repeated subtraction •Drawing own number line to represent the equal jumps that have been subtracted •Beginning to calculate division with remainders by sharing objects	•Use written number lines to solve division with remainders •Children draw jumps on own number lines Children use their knowledge of times tables to work out division facts with a remainder (13 ÷4 = 12÷ 4 r 1) •Children use base ten,/ Cuisenaire rods to partition and divide a two digit number by a 1 digit number e.g. 42 ÷ 3 = 30 ÷ 3 =10, 12 ÷ 3 = 4 •Children draw number lines to show subtraction jumps when solving division e.g. 42 ÷ 3 = 30 ÷ 3 =10, 12 ÷ 3 = 4 •Children represent partitioning as two number sentences •Children continues to show division as the inverse of multiplication			
Written x/÷			•Multiply two-digit numbers by a one-digit number using formal written layout	•Multiply numbers up to 3 digits by a one-digit number using a formal written method, •Divide numbers up to 4 digits by a one-digit number using the formal written method	•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 •Divide numbers up to 4 digits by a one-digit	•Multiply multi-digit numbers 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

				of short division and begin to complete divisions with remainders	number using the formal written method of short division and interpret remainders appropriately for the context •Use the formal written method for long division to divide 3 digit numbers by simple 2 digit numbers	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 long division
Problems x/ ÷	•Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	•Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	•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	•Solve problems involving multiplying and dividing, including using the distributive law to multiply two digit numbers by one digit, scaling problems and harder correspondence problems such as n objects are connected to m objects	•Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes •Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign •Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	•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

New vocabulary for each year group is in bold	Progression in vocabulary- multiplication
EYFS	Sharing, doubling, halving, number patterns
Year 1	**Multiplication, multiply, multiplied by, division, dividing, grouping**, **groups of** sharing, doubling, halving, **array**, number patterns
Year 2	Multiplication, multiply, multiplied by ,**multiple**, groups of, **times, once, twice, three times … ten times repeated addition,** division dividing, **divide, divided by, divided into,** grouping sharing, share, **share equally left, left over one each, two each, three each … ten each group in pairs, threes … tens equal groups of,** doubling, halving, array, **row, column**, number patterns **multiplication table multiplication fact, division fact, inverse**
Year 3	Multiplication, multiply, multiplied by, multiple, **factor**, groups of, times, **product,** once, twice, three times … ten times repeated addition division dividing, divide, divided by, divided into left, left over, **remainder**, grouping, sharing, share, share equally one each, two each, three each … ten each group in pairs, threes … tens equal groups of doubling halving array row, column number patterns multiplication table multiplication fact, division fact, inverse, **scale up**
Year 4	Multiplication, multiply, multiplied by, multiple, factor, groups of, times product, once, twice, three times … ten times repeated addition, division, dividing, divide, divided by, divided into left, left over, remainder grouping sharing, share, share equally one each, two each, three each … ten each group in pairs, threes … tens equal groups of doubling halving array row, column number patterns multiplication table multiplication fact, division fact inverse, **square, squared,**
Year 5	Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times … ten times repeated addition, division dividing, divide, divided by, divided into left, left over, remainder grouping sharing, share, share equally, one each, two each, three each … ten each group in pairs, threes … tens equal groups of doubling halving array row, column number patterns multiplication table multiplication fact, division fact, inverse, squared number, **composite numbers**, **cubed number, prime number, common multiples**
Year 6	Multiplication, multiply, multiplied by, multiple, factor groups of times product once, twice, three times … ten times repeated addition division dividing, divide, divided by, divided into left, left over, remainder grouping sharing, share, share equally one each, two each, three each … ten each group in pairs, threes … tens equal groups of doubling halving array row, column number patterns multiplication table multiplication fact, division fact inverse square, squared number, cubed number, **common factors, prime factors**