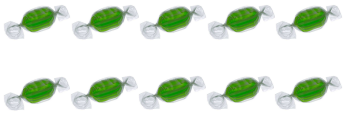
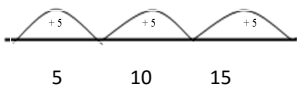
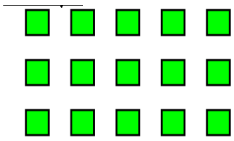
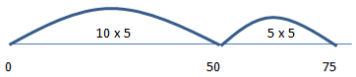
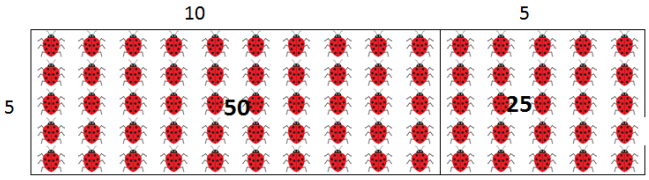
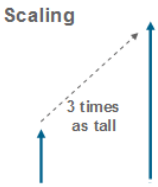
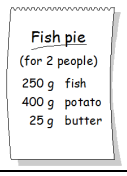
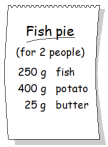
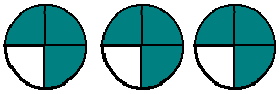
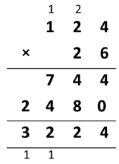
Progression in Calculation – Minimum Expectations in Multiplication

Year	Calculating	Counting & Mental Calculation
Minimum expectations by end of EYFS	Jumping along number tracks/lines in steps of 1 and 2 using practical equipment. Grouping- counting in equal sized groups, e.g. coins, numicon, base 10 and socks. 1, 2, 3,..	Teacher recording if appropriate
Y1	Introduce the concept that multiplication is repeated addition. = 10 + 10 + 10 = 3 x 10 Pupils solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher, e.g. I have 5 sweets and my friend has 5 sweets. How many sweets do we have altogether? 5 + 5 = 2 x 5  Using a 100 square to look at patterns of multiples of 2, 5 and 10, e.g. multiples of 5 end in 0 and 5.	Counting in 2, 5 and 10 from zero forwards and backwards.
Y2	Pupils calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs, e.g. 2 x 5 = 10 15 = 3 x 5 Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts, e.g. 3 friends have 5 pencils each. How many pencils do they have altogether? *(repeated addition)*  0 5 10 15 This array can be described as:  5 x 3 = '5 multiplied by 3' or '5 times 3' or '5, three times' or 5 x 3 To know that 2 x 3 is the same answer as 3 x 2 (commutativity) but 12 ÷ 3 is not the same as 3 ÷ 12. To explore problems such as: If you had the numbers 2, 5 and 10. How many different numbers sentences could you make? 2 x 5 =, 2 x 10 =, 5 x 10 =, 2 x 5 x 10 =	• Counting forwards and backwards in steps of 2, 5 and 10. <u>Mental Calculations</u> • Practise and become fluent in the 2, 5 and 10 multiplication tables up to 12 x 2, 12 x 5, 12 x 10 and their related division facts

Y3	Build on their understanding of repeated addition and arrays to multiply two digits by one digit using tables they know, e.g. 15 x 5  Informal recording of partitioned numbers, 15 x 5 = 10 x 5 + 5 x 5 Link arrays to introduce grid multiplication to multiply HTU, e.g. 15 x 5 (up to 99 x)  Use grid method to multiply HTU , progressing to formal written methods when appropriate (see year 4) | x | 10 | 5 | = 75 | |---|---|---| | 5 | 50 | 25 | 15 x 5 = 10 x 5 = 50 5 x 5 = + 25 75  Relate multiplication to scaling. My string is 12cm long. Cut a piece of string three times longer.	• Counting forwards and backwards in steps of 2, 3, 4, 5, 8, 10, 50, 100 <u>Mental Calculations</u> • To know 2, 3, 4, 5, 8, 10 times tables up to 12 x **and** their related division facts.
Y4	Pupils recap TU x U before moving to HTU x U and U x U x U using grid multiplication. Multiplying by 0 and 1 Multiply two-digit and three-digit numbers by a one-digit number using grid multiplication progressing to expanded formal short multiplication. *(short for multiplication of type TU x U or HTU x U)* | x | 100 | 30 | 6 | Grid Multiplication |---|---|---|---| | 5 | | | | Leading to: 136 <u>x 5</u> 30 150 <u>500</u> <u>680</u> Expanded short multiplication Applying skills to word problems of the type: A bus has enough seats for 42 children. How many children could travel in 6 buses? <u>Scaling</u> : recipes  Using simple scaling to solve problems, e.g. What ingredients would you need for 6 people?	• Counting forwards and backwards in steps of 6, 7, 9, 25, 100 <u>Mental Calculations</u> • Know times tables up to 12 x 12 and their related division facts • Factor pairs of a number, e.g. 12 = 1 x 12, 2 x 6, 3 x 4 • Using the associative law to make calculations easier, e.g. 2 x 3 x 4 is the same as 2 x 4 x 3

	To be able to solve subtraction multiplication problems in contexts.	
Y5	Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication *(long for multiplication of type TU x TU or HTU x TU).* Multiply ThHTU x U using an expanded short multiplication written method, e.g. 1345 x 6 1345 x 6 30 240 1800 6000 8070 Leading to: 1345 x 6 8070 2 23 Multiply TU x TU using the grid method, e.g. 38 x 72 **x** | **30** | **8** **70** | 2100 | 560 **2** | 60 | 16 2160 576 2736 Progressing to: 72 x 38 16 (2 X 8) 560 (70 X 8) 60 (2 X 30) 2100 (70 X 30) 2736 1 Application in word problems, e.g. A shop sells DVDs for £2.50 each. What is the cost of 16 DVDs? Scaling Solve simple scaling problems, e.g. If £1.00 = $1.50, how many dollars would you get for £4.00? How many mm are in 1.2 cm?  Fish pie (for 2 people) 250 g fish 400 g potato 25 g butter What ingredients would be needed for 7 people? Multiplying proper fractions by a whole number, e.g. $\frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}$ Pupils could use diagrams to support (linked to repeated addition)  $= \frac{9}{4} = 2\frac{1}{4}$ To also multiply mixed numbers by whole numbers.	• Counting in ½, ¼ etc Mental Calculations • Consolidate times tables up to 12 x 12 and their related division facts • Know square numbers up to 144 (1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144) with notation (^{2}) • Know prime numbers to 19 (2, 3, 5, 7, 11, 13, 17, 19) • Know cube numbers up to 125 (1, 8, 27, 64, 125) with notation (^{3}) • To know and use the terms: factor, multiple and prime • x by 10, 100, 1000 by moving the digits, including decimals • Multiply numbers mentally using known facts, e.g. 25 x 36 = 5 x 5 x 4 x 9 = 100 x 9

Y6	Pupils multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. 124 × 26 becomes  Answer: 3224 To multiply U.th x U, ThHTU x TU, HTU.t x TU To multiply pairs of proper fractions and simplifying, e.g. $\frac{3}{8} \times \frac{2}{3} = \frac{6}{24} = \frac{1}{4}$ Using an estimate to position the decimal point when dealing with decimals. E.g. 3.24 x 4 ≈ 3 x 4 324 x 4 1296 If the estimate is 12 then 3.24 x 4 = 12.96	<u>Mental Calculations</u> • Find common factors multiples of a pair of numbers, e.g. the common multiple of 12 and 18 multiples of 12 are 12, 24, **36**, 48, 60, 72,… multiples of 18 are 18, **36**,… so common multiple is 36 • know prime numbers up to 30 • x numbers by 10, 100, 1000 involving decimals