Darley Dene - Calculation Policy - Multiplication
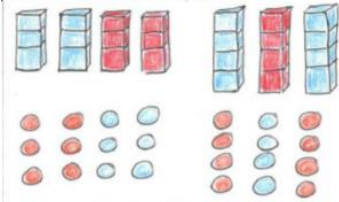
Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

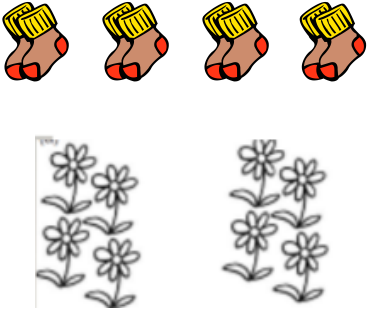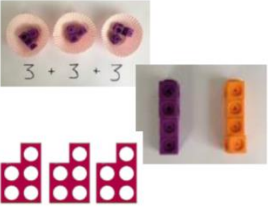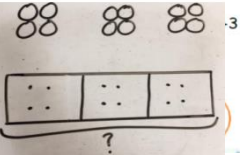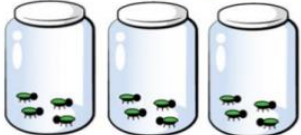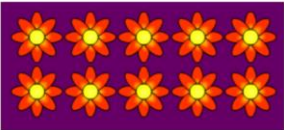| Year 1 Multiplication	
Fluency	**End of year expectations**
Count in twos, fives and tens from different multiples e.g. 6, 8, 10, 12 etc Emphasise number patterns Double numbers and quantities **10 x 2 = 20** 10 times 2 10 groups of 2 10 lots of 2	O x O • Solve single step practical problems involving multiplication • Numbers up to 20 • Use concrete objects, pictorial representations • Double numbers and quantities • Make connections between arrays, number patterns and counting in • twos, fives and tens

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Doubling	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling double 4 is 8 4×2=8	Draw pictures to show how to double numbers | 10	
5	5	 Double 4 is 8 	Partition a number and then double each part before recombining it back together. 16 10 6 x2 x2 20 + 12 = 32
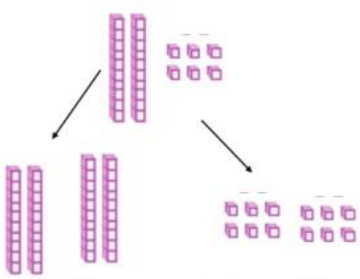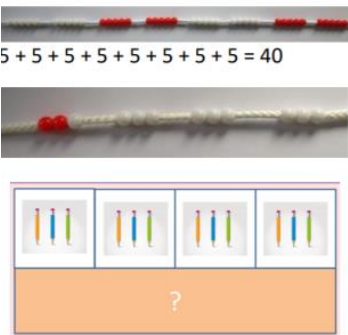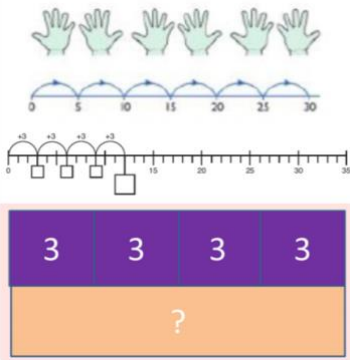
Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Counting in multiples	Count the groups as children are skip counting, children may use their fingers as they are skip counting	Children make representations to show counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30
Making equal groups and counting the total	Use manipulatives to create equal groups.	Draw and make representations	4 x 2 = 8 2 x 4 = 8
Repeated addition	Use different manipulatives to add equal groups	Use pictures including number lines to solve problems There are 3 sweets in one bag. How many sweets are in 5 bags altogether?	Write addition sentences to describe objects and pictures. 2 + 2 + 2 + 2 + 2 = 10
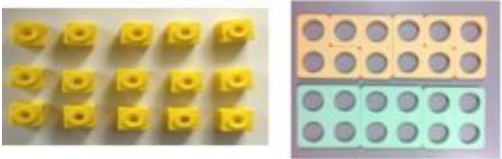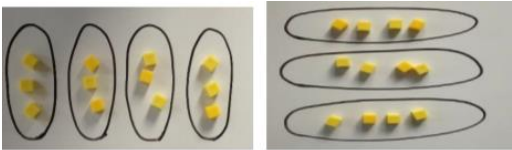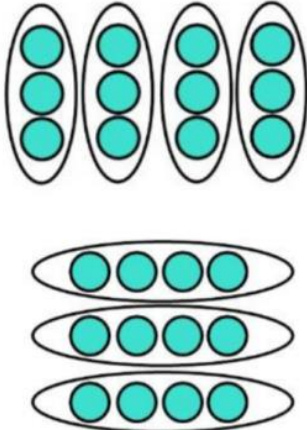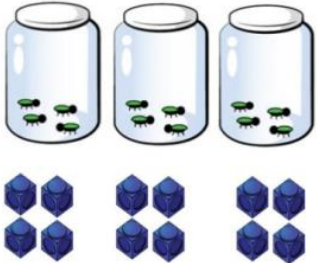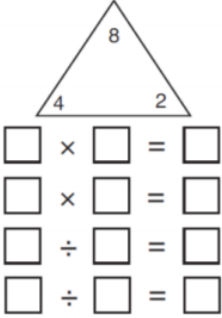
There are 3 equal groups, with 4 in each group.

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Understanding arrays	Use objects laid out in arrays to find the answers to 2 lots of 5, 3 lots of 2 etc.	Draw representations of arrays to show understanding	$3 \times 2 = 6$ $2 \times 5 = 10$

Year 2 Multiplication

Fluency	End of year expectations
Count in twos, threes, fives from zero and tens from any number e.g. 6, 8, 10, 12 etc Emphasise number patterns Introduction to Multiplication tables. Practise to become fluent in multiplication facts for 2, 5 and 10 Solve multiplication problems mentally $10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$	Understand multiplication as repeated addition Understand and solve problems involving arrays Calculate mathematical statements for multiplication within the tables and write them using symbols x = Ensure children understand that multiplication is commutative (can be done in any order) Understand that multiplication and division are inverse operations

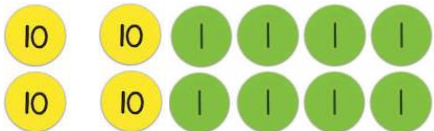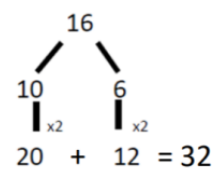| Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Doubling	Model doubling using dienes and PV counters Double 26 is 52 	Draw pictures and representations to show how to double numbers Double 24 is 48 	Partition a number and then double each part before recombining it back together. 16 10 6 x2 x2 20 + 12 = 32

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Repeated Addition **(counting in multiples of 2, 3, 4, 5, 10 from 0)**	Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models. 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40	Number lines, counting sticks and bar models should be used to show representation of counting in multiples. | 3	3	3	3
?					Write sequences with multiples of numbers. 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25 , 30

Multiplication is commutative	Create arrays using counters, cubes and Numicon Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer. 	Use representations of arrays to show different calculations and explore commutativity. 	$12 = 3 \times 4$ $12 = 4 \times 3$ Use an array to write multiplication sentences and reinforce repeated addition. $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$
Using the Inverse *(This should be taught alongside division, so pupils learn how they work alongside each other)*	Use manipulatives to build understanding of the inverse. $4 \times 3 = 12$ $12 \div 3 = 4$ 	Use pictures and fact family triangles to build understanding. 	Show all 8 related fact family sentences. $2 \times 4 = 8$ $4 \times 2 = 8$ $8 \div 2 = 4$ $8 \div 4 = 2$ $8 = 2 \times 4$ $8 = 4 \times 2$ $2 = 8 \div 4$ $4 = 8 \div 2$

Year 3 Multiplication	
Fluency	**End of year expectations**
Count from 0 in multiples of 4, 8, 50 and 100	TO x O
Use multiples of 2, 3, 4, 5, 8, 10, 50 and 100	Develop reliable written methods
Practise mental recall of multiplication tables – 3, 4 and 8x times tables	Understand and solve scaling problems
Connect the 2, 4 and 8 times tables using doubling	Solve problems involving multiplication including correspondence (a close similarity, connection or equivalence)
Develop efficient mental methods using commutativity and multiplication facts to derive related facts e.g. 4 x 5 x 12 = 12 x 4 x 5 = 12 x 20	
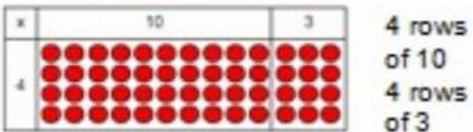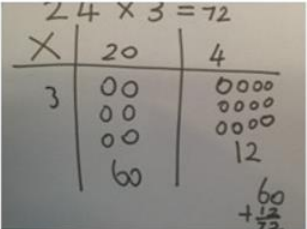
4 x 5 = 20 5 x 4 = 20 20 ÷ 5 = 4 20 ÷ 4 = 5	

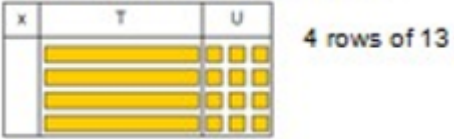| Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Grid method	Show the links with arrays to first introduce the grid method, use counters or place value counters. 4 rows of 10 4 rows of 3	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below. 	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. | ×	30	5
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7	210	35	 210 + 35 = 245

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
	Move onto base ten to move towards a more compact method. 4 rows of 13	Bar models are used to explore missing numbers		×	30	5
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7	210	35	 210 + 35 = 245

Grid method			
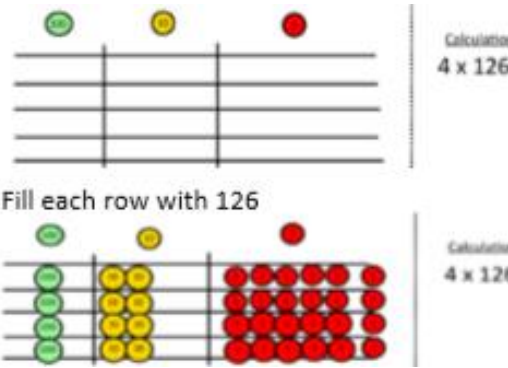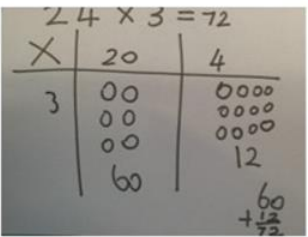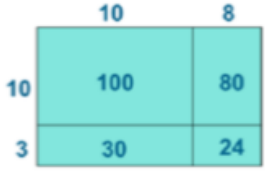
Year 4 Multiplication

Fluency	End of year expectations
Count in multiples of 6, 7, 9, 25 and 1000	TO x O
	HTO x O
Recall and use multiplication facts up to 12 x 12 with increasing fluency	
	Multiplying three numbers 3 x 2 x 6
Derive multiplication facts with up to three-digits	Solve two-step problems
Recognise and use factor pairs and commutativity	Multiplying by 0 and by 1
Use the distributive law	Develop fluency in short multiplication using formal written layout
Combine knowledge of number facts and rules of arithmetic to solve mental and written calculations e.g. 2 x 6 x 5 = 10 x 6	Solve problems involving multiplication including using the distributive law, integer scaling problems and harder correspondence problems

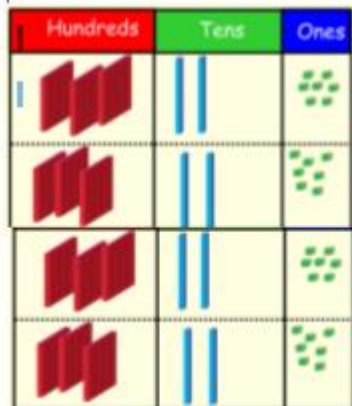| Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Grid method recap from year 3 for 2 digits x 1 digit **Move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)**	Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows Calculation 4 x 126 Fill each row with 126 Calculation 4 x 126	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking 24 X 3 = 72	Multiply by a 2 digit number showing the different rows within the grid method.

	Add up each column, starting with the ones making any exchanges needed Then you have your answer.		
Column multiplication	Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642 It is important at this stage that they always multiply the ones first. The corresponding long multiplication is modelled alongside.	 Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	
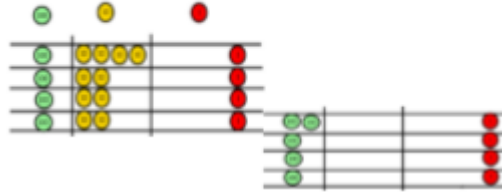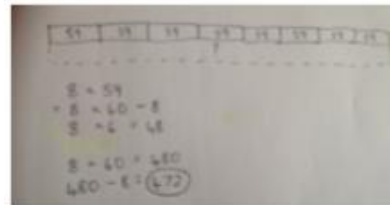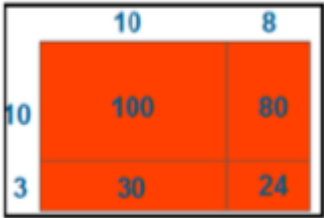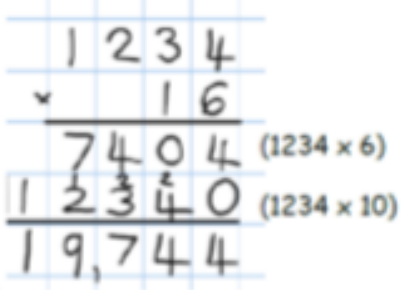
Year 5 Multiplication

Fluency	End of year expectations
Count forwards in steps of powers of 10 from any given number up to 1 000 000	ThHTO x O ThHTO x TO
Practise and extend use of formal written method of short multiplication	Identify multiples and factors including finding all factor pairs of a number, and common factors of two numbers
Apply all multiplication tables frequently. Commit them to memory and use them confidently to make larger calculations	Solve problems involving all operations where larger numbers are used Multiply whole numbers and those involving decimals by 10, 100 & 1000
Multiply numbers mentally drawing upon known facts	Understand and use multiplication and division as inverses including in problems involving missing numbers and balancing equations Solve problems involving multiplication and division including scaling by simple fractions Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) Recognise and square and cube numbers and associated notation

Objective and strategy	Concrete (build it)	Pictorial (draw it)	Abstract (write it)
Column multiplication	Manipulatives may still be used with the corresponding long multiplication modelled alongside.	Continue to use bar modelling to support 	18 x 3 on the first row (8 x 3 =24, carrying the 2 for 20, then 1 x 3) 18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in the ones column first

Year 6 Multiplication

Fluency	End of year expectations
Undertake mental calculations with increasingly large numbers Continue to use all multiplication tables to calculate mathematical statements in order to maintain fluency	Multiply multi-digit numbers up to four-digits by a two-digit whole number Multiply single –digit numbers with up to two-decimal places by whole numbers Identify common factors, common multiples and prime numbers Solve problems including multiplication

Short Multiplication	Long multiplication Whole numbers	Long multiplication Decimal numbers

```
        1   3   2   4
    x               6
    _____
        7   9   4   4
        1   1   2
```

```
            1   3   2   4
    x               2   6
    _____
            7   9   4   4
            /   /   /
        2   6   4   8   0
    _____
        3   4   4   2   4
        1   1   1
```

```
            3   .   2   4
    x               2   6
    _____
        1   9   .   4   4
            /       /
        6   4   .   8   0
    _____
        8   4   .   2   4
        1   1
```