Lidget Green Primary School – Progression in Multiplication 2016

Year group	Objective	Method	Practical methods	Pictorial/written methods	Vocabulary	Mental recall
EYFS	Repeated grouping Counting in pairs Doubling	Practical / recorded using ICT (eg digital photos / pictures on IWB)	Toys, Beads, Rhymes, Counters, objects, number lines, stories, role play, number lines- hopping on Counting pairs	Drawings of problems Begin to record using marks they can explain 	Double, pair, twos, fives, tens, group, set	Chanting of counting in 2s and 10s

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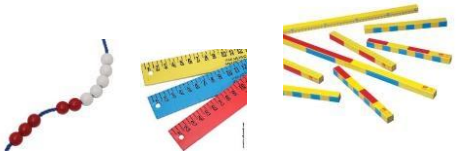
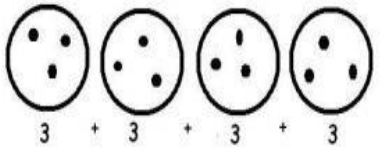
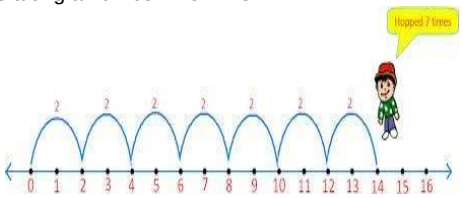
Y1	Consolidation of EYFS Begin to understand multiplication through grouping small quantities, Solve one-step problems involving multiplication Make connections between arrays and number patterns Double numbers and quantities Count in multiples of twos, fives and tens	Practical / recorded using ICT Informal written methods Horizontal recording	long number lines, tapes, 100 square, counting sticks, Dienes, coins, cubes, bead strings, peg boards  counting on in groups of… counting groups of objects arranging objects in arrays	Pictures to represent working out  Jumps along a number line in 2s 	As previous. Count on in…, lots of, groups of pattern,	Consolidation of EYFS Chanting of counting in 2s, 5s 10s Double pairs to 10, then 20

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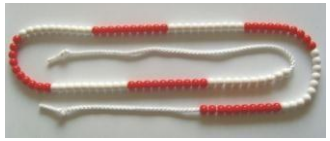
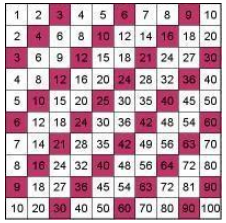
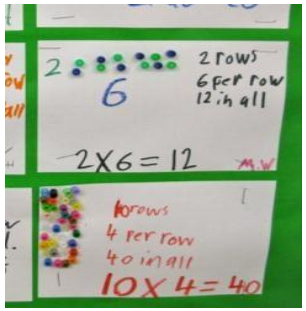
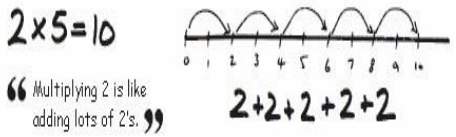
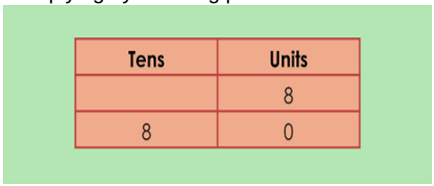
Y2	Consolidation of Y1 Count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs Show that multiplication of two numbers can be done in any order (**commutativity**) Solve problems involving multiplication using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts. Connect the 10 x multiplication table to place value Relate multiplication to grouping discrete and continuous quantities, to arrays and to repeated addition. Use **commutativity** and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).	Practical Informal written methods Horizontal recording	Counting sticks, bead strings, number lines, 100 squares, Dienes, objects in groups and arrays  Counting groups of…  Counting on in… Arranging objects in arrays	Arrays  Repeated addition in groups Horizontal recording as repeat addition and using x and =  Multiplying by 10 using place value 	As previous. odd, even, every other, how many times, multiple of, sequence, times, multiply, multiplied by, multiple of, once, twice, three times, four times, five times… ten times… as (big, long, wide and so on), repeated addition, array, row, column, double	Consolidation of Y1 Count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

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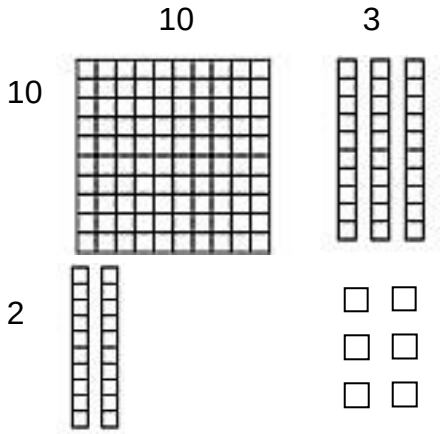
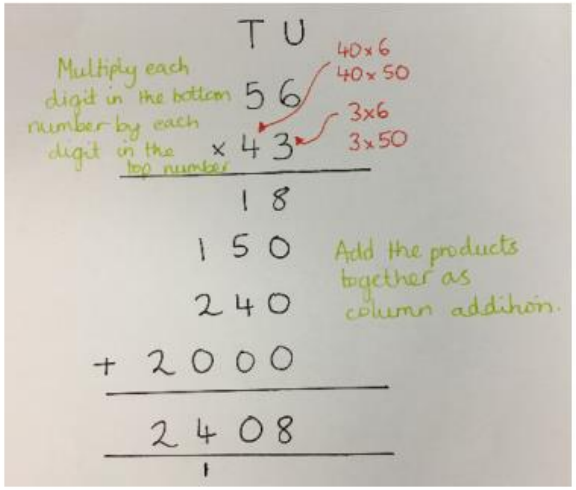
Y3	Consolidation of Y2 Count from 0 in multiples of 4, 8, 50 and 100 Connect the 2, 4 and 8 multiplication tables through doubling. Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables Multiply TU x U using mental methods and progressing to formal written methods Solve problems, including missing number problems, involving multiplication including positive integer **scaling** problems and **correspondence** problems in which n objects are connected to m objects Pupils develop efficient mental methods, for example, using commutativity and **associativity** (for example, 4 × 12 × 5 = 4 × 5 × 12 = 20 × 12 = 240) and multiplication facts to derive related facts (for example, 3 x 2 = 6, 30 × 2 = 60).	Practical Informal written methods Horizontal recording Formal written method	Counting sticks, dienes, number lines, hundred square, tape measures, 13 x 12 =  	Partitioning 32 x 6 = 30 x 6 = 180 2 x 6 = 12 180 + 12 = 192 Written method: grid method | ×	30	5 | |---|---|---| | 7 | 210 | 35 | **210 + 35 = 245** Introduce formal written method (expanded form):  	As previous. Count on in hundreds, multiplication, product	Count from 0 in multiples of 4, 8, 50 and 100 Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables Multiply TU x U using mental methods

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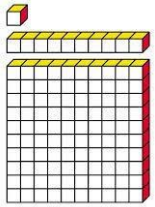
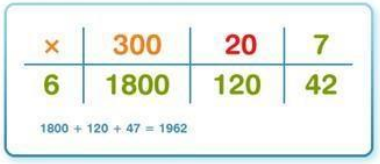
Y4	Consolidation of Y3 Count in multiples of 6, 7, 9, 25 and 1000 Recall multiplication facts for multiplication tables up to 12 × 12 Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1 and multiplying together three numbers Recognise and use factor pairs and **commutativity** in mental calculations Multiply TU x U using formal written layout Multiply HTU x U using formal written layout Solve problems involving multiplying and adding, including using the **distributive law** to multiply two digit numbers by one digit, integer scaling problems and harder **correspondence** problems such as n objects are connected to m objects.	Practical Informal written methods Formal written method	Dienes, place value counters, coins 	Written method: grid method (to be used when introducing)  Formal written method (expanded form) 327 x 6 42 120 1800 1962 Formal written method (compact form) 327 x 6 1962 1 4	As previous. factor	As previous with increasing fluency Count in multiples of 6, 7, 9, 25 and 1000 Recall multiplication facts for multiplication tables up to 12 × 12 Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1 and multiplying together three numbers Recognise and use factor pairs and commutativity in mental calculations

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Y5

Consolidation of Y4

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

ThHTU x U using a formal written method

ThHTU x TU
using a formal written method, including long multiplication for two-digit numbers

Multiply numbers mentally drawing upon known facts

Multiply whole numbers and those involving decimals by 10, 100 and 1000

Recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3})

Solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes

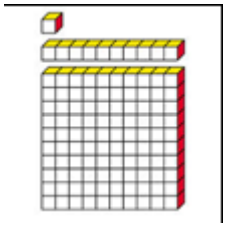
Solve problems involving multiplication.

Practical

Informal written methods

Formal written method

Dienes, place value counters, coins



Written method: grid method (to be used when introducing)

	1 000	600	20	4
6	6 000	3 600	120	24

6000
3600
120
+ 24
9744

	1000	600	20	4
30	30 000	18 000	600	120
6	6 000	3 600	120	24

30000
18000
6000
3600
600
120
120
+ 24
58464
1 1

Formal written method (expanded form)

1624 x 6	1624 x 26
24	24
120	120
3600	3600
6000	6000
9744	80
	400
	12000
	20000
	42224
	1 1 1

Formal written method (compact form)

1624 x 6	1624 x 26
9744	9744
3 1 2	32480
	42224
	1 1 1

As previous.

Factorise, prime, prime fctor

As previous with increasing fluency

Multiply numbers mentally drawing upon known facts eg 300 x 6 = 1800

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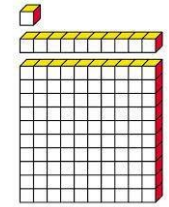
Y6	Consolidation of Y5 ThHTU x TU using the formal written method of long multiplication Identify common factors, common multiples and prime numbers Explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9. Use common factors to find equivalent fractions. Multiply simple pairs of proper fractions, writing the answer in its simplest form (1/2 x 2/4 = 2/8 = 1/4)	Practical Informal written methods Formal written method	Dienes, place value counters, coins  	As Year 5 Equivalent Fractions: 3 (x3) = 9 5 (x3) =15 Multiplying fractions 1 3 3 (multiply numerators) 2 x 8 = 16 (multiply denominators)	As previous. Common denominator	As previous with increasing fluency Subtract mentally with increasingly large numbers and mixed operations.

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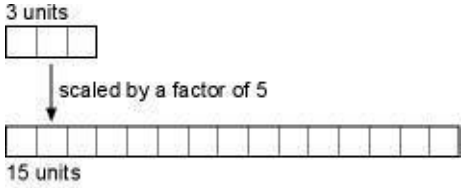
Glossary:

Commutativity: can be done in any order: 3 x 5 = 5 x 3. Multiplication and addition are commutative. Subtraction and division are not.

Scaling: increasing a number by a scale factor



A scaling model is also used to compare two numbers or amounts involving phrases such as 'so many times as much (or as many)'

Correspondence: If you know a fact for one object, this can be used to find further facts, e.g. 1 sandwich costs £2, so 4 sandwiches cost £8

Associativity: The property that if the same operation is applied to the same numbers, the answer will be the same.

Addition is associative, e.g. $1 + (2 + 3) = (1 + 2) + 3$.

Multiplication is associative, e.g. $1 \times (2 \times 3) = (1 \times 2) \times 3$.

Subtraction and division are not associative because, as counter examples, $1 – (2 – 3) \neq (1 – 2) – 3$ and $1 \div (2 \div 3) \neq (1 \div 2) \div 3$.

We can use the associative law to help with multiplication calculations. For example: Find 5×26:

Factorise 26 as 13×2, so we now have $13 \times 2 \times 5$. Use the associative law to associate the 2 with the five, rather than with the 13 in order to make the calculation easier. $(13 \times 2) \times 5 = 13 \times (2 \times 5) = 13 \times 10 = 130$.

Distributive law: The property that you will get the same answer when you: multiply a number by a group of numbers added together, or do each multiplication separately then add them, eg 3 x (2 + 4) is the same as (3 x 2) + (3 x 4)