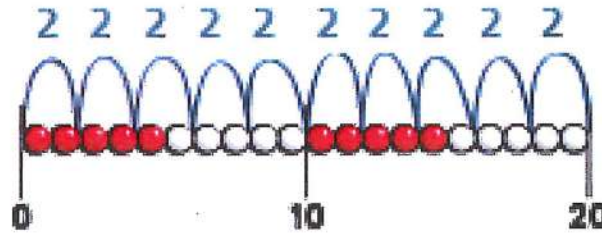# Barker's Lane Community School Calculation Policy

Year 1 Mental Multiplication

1. Counting in steps:

Count in twos. Multiplication is related to doubling and counting groups of the same size.

Repeated addition can be shown on a number line and on a bead bar.

Count in tens

1	2	3	4	5	6	7	8	9	
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Looking at columns

2 + 2 + 2

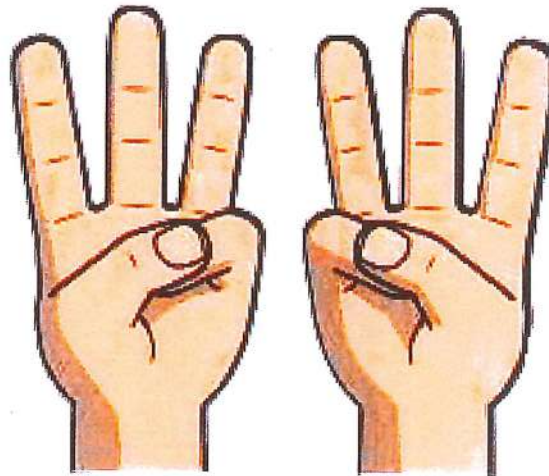3 groups of 2

Looking at rows

3 + 3

2 groups of 3

Year 1 Mental Multiplication continued

2. Doubling and halving:

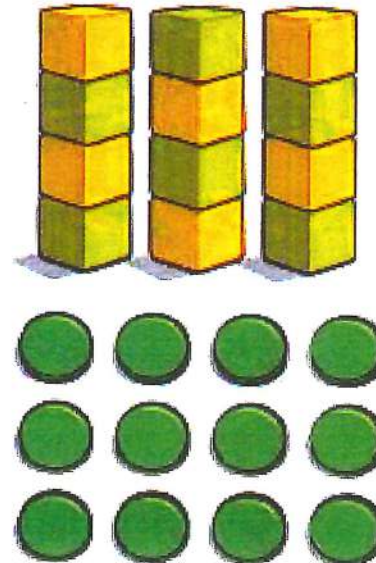Find doubles to double 5 using fingers

e.g. double 3

3. Grouping:

Begin to use visual and concrete arrays and sets of objects to find the answers to

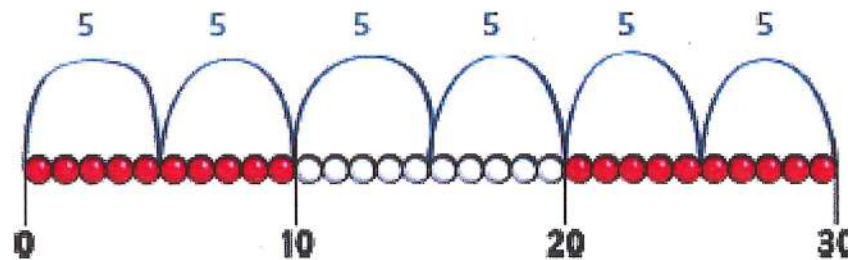'three lots of four' or 'two lots of five'

e.g. three lots of four

Year 2 Mental Multiplication

1. Counting in steps:
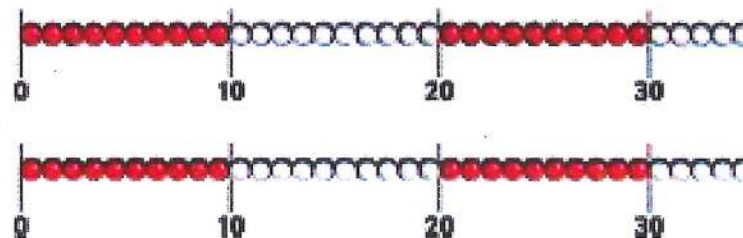
Count in twos, fives and tens

Begin to count in threes

2. Doubling and halving:

Begin to know doubles of multiples of 5 to 100

e.g. double 35 is 70

Begin to double 2 digit numbers less than 50 with ones digits of 1, 2, 3, 4 or 5

3 times 5 is 5 + 5 + 5 –15 or 3 lots of 5 or 3 x 5

Partition

Children need to be secure with partitioning numbers into 10s and 1s and partitioning in different ways: 6 = 5 + 1 so

e.g. Double 6 is the same as double five add double one.

AND double 15

10 + 5

20 + 10 = 30

Year 2 Mental Multiplication continued

3. Grouping:

Use arrays to find answers to multiplication and relate to 'clever' counting. *(NSP page 309)*

e.g. 3 x 4 as three lots of four things

e.g. 6 x 5 a six steps in the fives count as well as six lots of five

Learners should be able to model a multiplication calculation using an
array. This knowledge will support the development of the grid method.

5 x 6 = 30

6 x 5 = 30
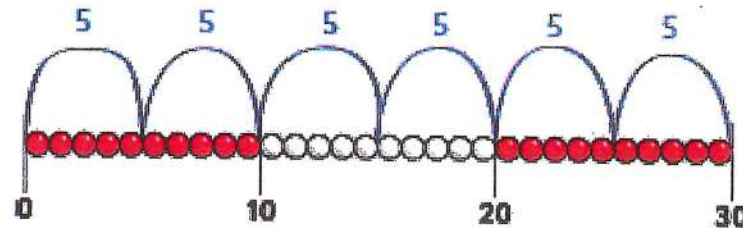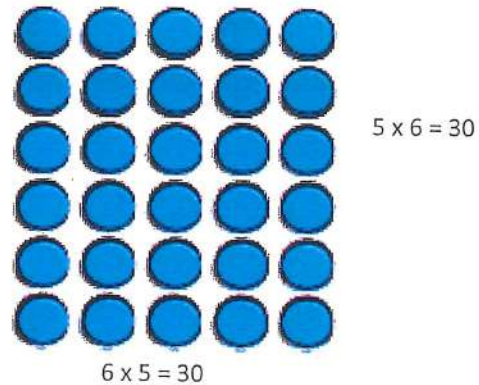
Understand that 5 x 3 can be worked out as three fives or five threes.

Using a scale:

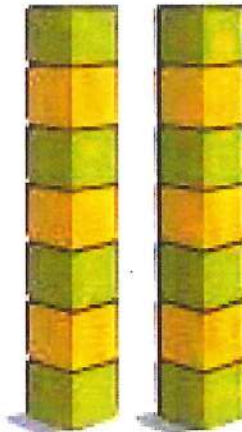5cm   20 cm

e.g. Find a ribbon that is 4 times as long as the first ribbon

Year 2 Mental Multiplication continued (3)

4. Using number facts:

Know doubles to double 20

e.g. double 7 is 14

x = signs and missing numbers

7 x 2 = □	□ = 2 x 7
7 x □ = 14	14 = □ x 7
□ x 2 = 14	14 = 2 x □
□ x ?= 14	14 = □ x ?

Start learning that x2, x5, x10 tables, relaing these to 'clever' counting in 2s, 5s and 10s

e.g. 5 x 10 = 50, and five steps in the 10s count = 10, 20, 30, 40, 50

Year 3 Mental Multiplication

1. Counting in steps:

Counting 2s, 3s, 4s, 5s, 8s and 10s.

x = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate numbers.

Arrays and repeated addition

Continue to understand multiplication as repeated addition and continue to use

arrays (as in Year 2).

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
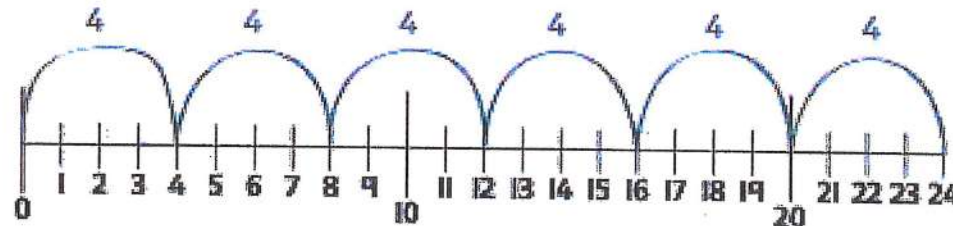
Year 3 Mental Multiplication continued

2. Doubling and halving:

Find doubles of numbers to 50 using partitioning

e.g. double 48

48

80   16

96

Use doubling as a strategy in multiplying by 2

e.g. 18 x 2 is double 18 = 36

3. Grouping:

Recognise that multiplication is commutative

e.g. 4 x 8 = 8 x 4

Multiply multiples of 10 by 1 digit numbers

e.g. 30 x 8 = 3 x 10 x 8 = 24 x 10 = 240

Multiply 'friendly' 2 digit numbers by 1 digit numbers

e.g. 13 x 4   Using symbols to stand for unknown numbers to complete equations using inverse operations e.g. ? x 5 = 20

4. Using number facts:

Know doubles to double 20

e.g. double 15 is 30

Know doubles of multiples of 5 to 100

e.g. double 85 is 170

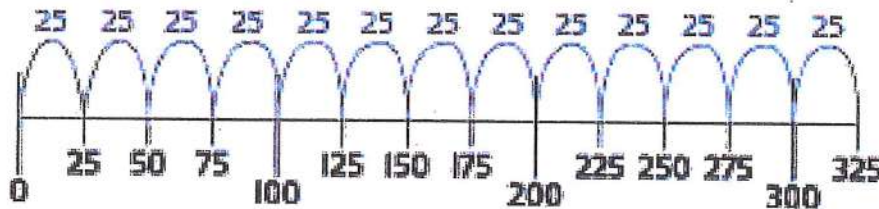Know x2, x3, x4, x5, x8, x 10 tables facts

Year 4 Mental Multiplication

1. Counting in steps (sequences):

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s

2. Doubling and halving:

Find doubles to double 100 and beyond using partitioning

e.g. double 126

Begin to double amounts of money

e.g. £3.50 doubled is £7

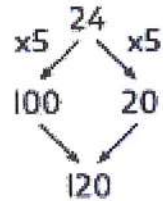Use doubling as a strategy in multiplying by 2, 4 and 8

e.g. 34 x 4 is double 34 (68) doubled again = 136

Year 4 Mental Multiplication continued

2. Grouping:

Use partitioning to multiply 2 digit numbers by 1 digit numbers

e.g. 24 x 5

$$24$$
x5 / \ x5
$$100 \quad 20$$
\ /
$$120$$

Multiply multiples of 100 and 1000 by 1 digit numbers using tables facts

e.g. 400 x 8 = 3200

Multiply near multiples by rounding

e.g. 24 x 19 as (24 x 20) - 24 = 456

3. Using number facts:

Know times tables up to 12 x 12

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	11	24
3	3	6	9	12	15	18	21	24	27	30	22	36
4	4	8	12	16	20	24	28	32	36	40	33	48
5	5	10	15	20	25	30	35	40	45	50	44	60
6	6	12	18	24	30	36	42	40	54	60	55	72
7	7	14	21	28	35	42	49	56	63	70	66	84
8	8	16	24	32	40	48	56	64	72	80	77	96
9	9	18	27	36	45	54	63	72	81	90	88	108
10	10	20	30	40	50	60	70	80	90	100	99	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Year 5 Mental Multiplication

1. Doubling and halving:

Double amounts of money using partitioning

e.g. double £6.73

£6·73

£12   £1·46

£13·46
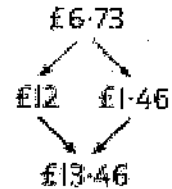
Use doubling and halving as a strategy in multiplying by 2, 4, 8, 5 and 20

e.g. 58 x 5 is half of 58 x 10 (580) = 290

2. Grouping:

Multiply whole numbers and decimals by 10, 100, 1000

e.g. 3.4 x 100 = 340   (*NSP page 305*)

402

x6   x6

2400   12

2412

Use partitioning to multiply 'friendly' 2 and 3 digit numbers by 1 digit numbers

e.g. 402 x 6 as 400 x 6 (2400) and 2 x 6 (12) = 2412

Knowing the effect of multiplying by 10 is the digit(s) moving one place to the left.

Knowing that the effect of multiplying by 100 is the digit(s) moving two places to the left
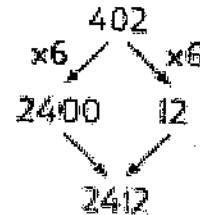
Use partitioning to multiply decimal numbers by 1 digit numbers

e.g. 4.5 x 3 as 4 x 3 (12) and 0.5 x 3 (1.5) = 13.5

Multiply near multiples by rounding

e.g. 32 x 29 as (32 x 30) - 32 = 928

Year 5 Mental Multiplication continued

3. Using number facts:

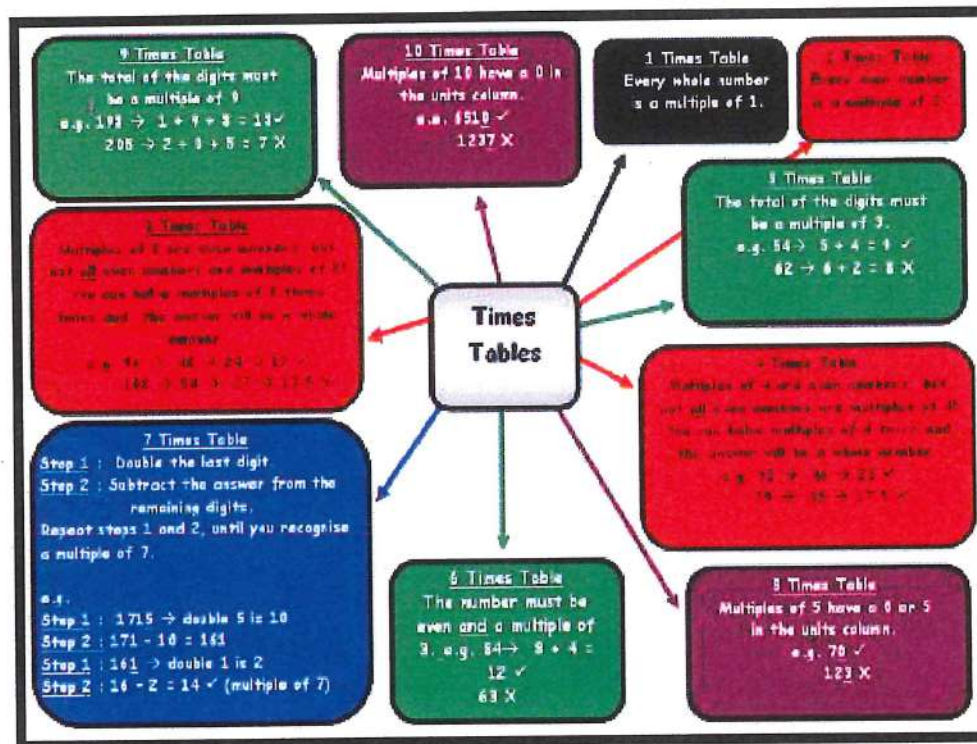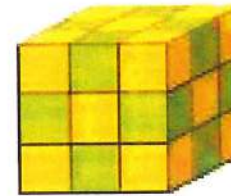Use times tables facts up to 12 x 12 to multiply multiples of 10/100 of the multiplier
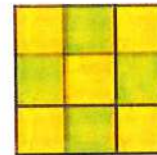
e.g. 4 x 6 = 24 so 40 x 6 = 240 and 400 x 6 = 2400

Use knowledge of factors and multiples in multiplication

e.g. 43 x 6 is double 43 x 3

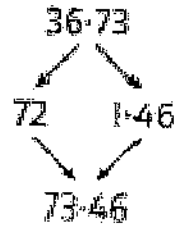e.g. 28 x 50 is half of 28 x 100 (2800) = 1400

Know square numbers

Year 6 Mental Multiplication

1. Doubling and halving:

Double decimal numbers with up to 2 places using partitioning

e.g. double 36.73

$$36\cdot73$$

$$72 \qquad 1\cdot46$$

$$73\cdot46$$

Use doubling and halving as strategies in mental multiplication

2. Grouping:

Use partitioning as a strategy in mental multiplication, as appropriate

e.g. 3060 x 4 as 3000 x 4 (12000) and 60 x 4 (240) = 240

e.g. 3.42 x 5 as half of 3.42 x 10 = 17.1

Multiply deciml numbers using near multiples by rounding

e.g. 4.3 x 19 as (4.3 x 20) - 4.3 = 81.7

3. Using number facts:

Use times tables facts up to 12 x 12 in mental multiplication of large numbers or numbers with up to 2 decimal places

e.g. 6 x 4 = 24 and 0.06 x 4 = 0.24

Year 3 Written Multiplication

Build on partitioning to develop grid multiplication

e.g. 23 x 4

Learners will approximate first

20 x 4 = 80

x	20	3	
4	80	12	= 92

23 x 4 = (20 x 4) + (3 x 4)

= 80 + 12

= 92

Year 4 Written Multiplication

Use grid multiplication to multiply 3 digit numbers by 1 digit numbers

e.g. 253 x 6 Learners will approximate first 250 x 6 = 1500

x	200	50	3	
6	1200	300	18	= 1518

$6 \times 200 = 6 \times 2 \times 100 = 12 \times 100 = 1200$

Use a vertical written algorithm to multiply 3 digit numbers by 1

digit numbers

e.g. 253 x 6

$$
\begin{array}{r}
2\ 5\ 3 \\
\times \quad\quad 6 \\
\hline
1\ 2\ 0\ 0 \quad \longleftarrow 6 \times 200 \quad\quad = 6 \times 2 \times 100 \\
3\ 0\ 0 \quad \longleftarrow 6 \times 50 \quad\quad = 6 \times 5 \times 10 \\
+ \quad\quad 1\ 8 \quad \longleftarrow 6 \times 3 \\
\end{array}
$$

$$1\ 5\ 1\ 8$$

Use grid multiplication to multiply 2 digit numbers by 2 digit numbers

e.g. 16 x 48

x	10	6	
40	400	240	= 640
8	80	48	= 128
			768

e.g. (48 x 10) + (48 x 6)

= 480 + 288

= 768

Year 5 Written Multiplication

Partition
47 x 6 = 282

47 x 6 = (40 x 6) + (7 x 6) = 282

or use the grid method of multiplication

Short multiplication of 2, 3 and 4 digit numbers by 1 digit numbers

e.g. 435 x 8. Learners will approximate first

e.g. 400 x 8 = 32000

```
    4 3 5
  x     8
    2 4
  -------
  3 4 8 0
  -------
```

Long multiplication of 2, 3 and 4 digit numbers by 'teen' numbers

e.g. 48 x 16

```
      4 8
  x   1 6      48 x 10
  -------
  4 8 0        48 x 6
  2 8 8
  -------
      1
  -------
  7 6 8
```

	400	30	5
			8
			40
			240
			3200
			3480

Grid method

72 x 38 is approximately 70 x 40 = 2800

x	70	2
30	2100	60
8	560	16

2100 + 60 = 2160

560 + 16 = 576

2160 + 560

= 2736

Grid multiplication of numbers with up to 2 decimal places by 1 digit numbers

e.g. 1.34 x 6

x	1	0·3	0·04
6	6	1·8	0·24

= 8·04

Year 5 Written Multiplication continued

Multiply fractions by 1 digit numbers

e.g. $3/4 \times 6 = 18/4 = 4\ 2/4 = 4\ 1/2$

Learners will approximate first

e.g. $1.5 \times 6 = 9$
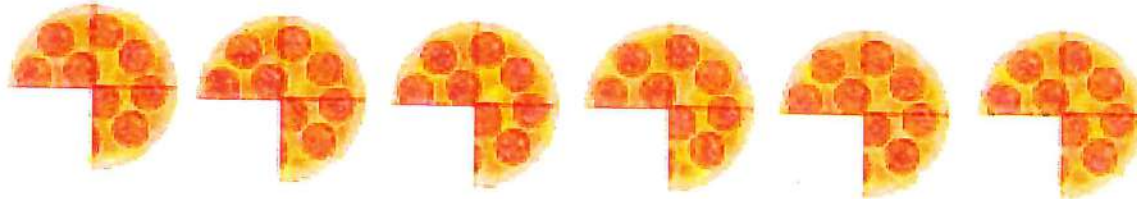
NB Grid multiplication provides a default method for ALL children

Expanded Column Multiplication

Children should describe what they do by referring to the actual values of the digits in the columns. For example, the first step in 38×7 is '30 multiplied by 7, not '3 times 7', although the relationship 3×7 should be stressed.

```
 30 + 8                        38
 x   7                        x 7
   56   (8 x 7 = 56)           56
  210   (30 x 7 = 210)        210
  266                         266
```

Year 6 Written Multiplication

Short multiplication of 2, 3 and 4 digit numbers by 1 digit numbers

e.g. 3743 x 6

Learners will approximate first

e.g. 4000 x 6

= 24000

```
  3 7 4 3
x       6
  4 2 1
2 2 4 5 8
```

Partition
87 x 6 = 522

87 x 6 = (80 x 6) + (7 x 6) = 522

or use grid method

Long multiplication of 2, 3 and 4 digit numbers by 2 digit numbers

e.g. 456 x 38

```
      4 5 6
x      3 8
1 3 6 8 0
3 6 4 8
    1 1
1 7 3 2 8
```

Short multiplication of decimal numbers using x 100 and ÷ 100

e.g. 13.72 x 6 as (1372 x 6) ÷ 100 = 82.32

Learners will approximate first e.g. 14 x 6 = 84

Short multiplication of money

e.g. £13.72 x 6

```
£ 1 3·7 2
x       6
  2 4 1
£ 8 2·3 2
```

Remember, when working with decimals, the deciaml points line up under each other.

Year 6 Written Multiplication continued

Grid multiplication of numbers with up to 2 decimal places by 1 digit numbers

e.g. 6.76 x 4

x	6	0·7	0·06
4	24	2·8	0·24

= 27·04

Multiply simple pairs of proper fractions

e.g. 1/2 x 1/4 = 1/8