

# **Kibworth CE** Primary School

Let Your Light Shine

Matthew 5:16

## **Calculation Policy**

# + Addition

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 1 Vocabulary: sum, total, plus, add, together, more, parts and wholes, 'is equal to', 'is the same as'	Combine two parts to make a whole Combining two sets of objects (aggregation) $\circ$ $5$ $\circ$ $\circ$ $7$ $\circ$ $\rightarrow$ $\rightarrow$ $\circ$	Represent objects as <u>dots/crosses within</u> <u>a part-whole diagram.</u>	4+3=7 7=4+3 5 7 Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.
	Progress onto adding on to a set (augmentation): Encourage children to <u>count on, rather than</u> <u>count all.</u> 4 5 6	Counting on with a given number line or number track	Missing numbers need to be placed in all possible places. 2 + 4 = 0 $= 2 + 44 + 0 = 6$ $6 = 0 + 2Encourage children to use an empty number track.$

# + Addition

	Concrete	Pictorial	Abstract
Year 1 continued	Regrouping to make 10 Using tens frames or Numicon. e.g. 6 + 5	Children to draw onto a ten frame.	Develop an understanding of <u>equality</u> . e.g. $6 + 5 = 10 + 1$ Moving onto <u>missing numbers</u> : $6 + \Box = 11$ $6 + 5 = 5 + \Box$ $6 + 5 = \Box + 4$
Year 2 Vocabulary: sum, total, plus, add, together, more, parts and wholes, 'is equal to', 'is the same as'	TO + O using base 10 equipment. 41 + 8	Children to draw representations	$     \frac{\frac{\text{Tens}}{40} \frac{\text{Ones}}{1}}{40} = 49 $

# + Addition

	Concrete	Pictorial	Abstract	
Year 2 continued	TO + TO using base 10 equipment. 47 + 25 Tens Ones $1000000000000000000000000000000000000$	Tens Ones         Tens       Ones                       40       7                     20       5         60       12       = 72	T         O           40         7           20         5           60         12	 = 72
Year 3 Vocabulary: sum, total, plus, add, together, more, parts and wholes, 'is equal to', 'is the same as'	HTO + HTO using base 10 equipment or place value counters.	Represent base 10 or place value counters with pictures.	Expanded column addition         H       T         200       40         300       60         500       100         Progressing to:       T         1       1         2       4         3       6         6       1	0 3 8 11 =611 0 3 8 1
Year 4, 5 & 6 As above	As above, using larger numbers.	As above, using larger numbers.	As above, using larger numbers.	

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 1 Vocabulary: Subtraction, subtract, take away, distance between, difference between, more	Physically taking away and removing objects from a whole (tens frames, Numicon, cubes and other items such as beanbags could be used ) 4 - 3 = 1	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can be used.	Part-whole diagram and equality $4-3 = \begin{bmatrix} -3 \end{bmatrix} = 4-3$
than, minus, less than, equals = same as, most, least, pattern, odd, even, digit	Counting back (using number lines or number track) children start with 6 and count back 2) 6 - 2 = 4 1 2 3 4 5 6 7 8 9 10	Children to represent what they see pictorially e.g.	Encourage children to use an empty number line.

Year 1 continued	Concrete	Pictorial	Abstract
	Making 10 using ten frames. 14-5 -4 $-1-4$ $-1$	Children to present the tens frame pictorially and discuss what they did to make 10.	Children to show how they can make 10 by partitioning the subtrahend. 14 - 5 = 9 $4 - 1$ $14 - 4 = 10$ $10 - 1 = 9$
	Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5.	Children to draw the cubes/other concrete objects which they have used to illustrate what they need to calculate.	Find the difference between 8 and 5. 8-5, the difference is Children to explore why 9-6 = 8-5=7-4 have the same difference.

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 2	Use partitioning of tens and ones to subtract a 2 digit number from another 2 digit number with no regrouping involved.	Children to present the 2 digit number using a pictorial image.	Children to use a number line to show partitioning of the 2 digit number 10 and 2, then to subtract this from 37 separately.
Vocabulary:	37 - 12 = 37 - 10 = 27 27 - 2 = 25	37-12 (subtract 10, subtract 2) = 25	37 - 12 =
Subtraction,		III IIIIkk	-2 -10
subtract, take			
away, difference,	Column method using base 10. 48-7	Children to represent the base 10 pictorially were no renaming is	Children to use the <u>expanded form of</u> column subtraction.
difference		required	TIO
between, minus	10s 1s 10s 1s	105 1 15	
Tens, ones,			40 8
partition	4 1	((( );222	- /
Near multiple of			40 1 = 41
10, tens boundary		4 1	
Less than, one			
less, two less			
ten less one			
hundred less			

Year 2 continued	Concrete	Pictorial	Abstract
	Column method using base 10 and having to rename. 41-26 $\underbrace{10s \ 1s}_{a} \underbrace{10s \ 1s}_{b} \underbrace{10s \ 1s}_{1} \underbrace{10s \ 1s}_{5}$	Represent the base 10 pictorially, remembering to show the renaming.	Expanded column method $ \frac{1}{30} + \frac{1}{10} + \frac{1}{20} + \frac{1}{10} + \frac{1}{1$
			15

		-	
	Concrete	Pictorial	Abstract
Year 3 Vocabulary: Hundreds, tens, ones, estimate, partition, recombine, difference, decrease, near multiple of 10 and 100, inverse, rounding, column	Concrete Column method using place value counters. 234-88 1005 105 15 0 105 105	Pictorial Represent the place value counters pictorially ; remembering to show what has been renamed.	AbstractExpanded column method $H$ $T$ $O$ $100$ $120$ $14$ $200$ $30$ $14$ $ 80$ $8$ $100$ $40$ $6$ $=$ $146$ Formal column method. Children must understand what has happened when they have crossed out digits. $H$ $T$ $O$ $12$ $12$ $14$ $ 8$ $8$
subtraction, exchange See also Y1 and Y2			1 4 6 = 146
Years 4, 5 and 6	Continue to follow concrete, pictorial and abstract	model from Year 3 to meet the needs of each s	specific year group.

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 1	Repeated grouping/repeated addition Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings etc	Children to represent the practical resources in a picture and using a number line	$2 \times 5 = 10$ 2 + 2 + 2 + 2 + 2 = 10
Vocabulary: multiplication, lots of, groups of, double, arrays, repeated addition			2 multiplied by 5 5 pairs 5 jumps of 2 Abstract number line showing 5 jumps of 2
	Use arrays to understand multiplication can be done in any order (commutative). Counters and other objects can be used $2 \times 5 = 5 \times 2$	Children to represent the arrays pictorially $2 \times 5 = 10$	2 x 5 = 10 5 x 2 = 10
		000 000 000 000	$10 = 2 \times 5$ $10 = 5 \times 2$ 2 + 2 + 2 + 2 + 2 = 10 5 + 5 = 10
	2 lots of 5 5 lots of 2	5 x 2 = 10 5 x 2 = 10 2 x 5 = 10	5 . 5 - 10

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Continue to build on the understanding of Year 1 strategies and vocabulary	Doubling - begin to develop an understanding doubling of 2 digit numbers up to 50 16 x 2	Children <b>may</b> start to represent the materials pictorially	Begin to use jottings <b>towards</b> recording the written method
Year 2 Vocabulary: facts, odd, even, commutative, inverse		$ \begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1^{*2} \\ 1^{*2} \end{array} $	$ \begin{array}{c} 16 \\ 10 \\ 1 \\ x^2 \\ 20 \\ 12 \end{array} $
		11	
Continue to build on the understanding of Year 2 strategies and vocabulary Year 3	Partition to multiply using Numicon, base 10 or Cuisenaire rods 4×15		Children to be encouraged to show the steps they have taken $4 \times 15$ 10 5 $10 \times 4 = 40$ $5 \times 4 = 20$
Vocabulary: scaling		6 ~ 0	40 + 20 = 60

Yr Grp & Vocabulary	Concrete	crete Pictorial Abstract	
Year 3 continued	Grid method using place value counters or base 10 18 x 3 0 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1	3 3 2 4 3 2 4	10 8 3 30 24
	Being to use expanded column method (long multiplication) using place value counters or base 10 23x2	×2 ↓ ×2     ···	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
	Begin to use formal column method (short multiplication) with place value counters or base 10 3x23 105 15 000 000 000 000 000 000 000 000	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Record what is being done to show understanding $3 \times 23$ $3 \times 20 = 60$ $3 \times 3 = 9$ 20 $3$ $60 + 9 = 6923\times 369$

Yr Grp & Vocabulary	Concrete	Pictorial		Ab	ostract
Continue to build on the understanding of Year 3 strategies and vocabulary	Formal column method (short multiplication) with place value counters or base 10	100: 10: 11:	Forr	mal written met 6 x	<sup>thod</sup> =
Year 4 Vocabulary: associative law, distributive law	0X23 100s 10s 1s 000 000 000 000 00000000		00000	<u>×</u> 	23 <u>     6</u> <u> 138</u> <sup>1 1</sup>
Year 5 and Year 6 – continue to build on and deepen the understanding of strategies and vocabulary in previous years. When children start to multiply 3 digit x 3 digit and 4 digit x 2 digit (including decimals) they should be confident with the abstract (formal written methods). Vocabulary: multiple, factor, prime number, prime factor, composite number, square number, cubed number, equivalence, powers			1000     300       10000     3000       8000     2400	40     2       400     20       320     16	$\begin{array}{r}2 & 3 & 1 \\1 & 3 & 4 & 2 \\x & 1 & 8 \\1 & 0 & 7 & 3 & 6 \\1 & 3 & 4 & 2 & 0 \\2 & 4 & 1 & 5 & 6 \\1 & 1 & 1 & 1 \\\end{array}$

## Division

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 1 Vocabulary: share, share equally, one each, two each, group, groups of, lots of, array	Sharing using a range of objects 6 ÷ 2	Represent the sharing pictorially.	6 ÷ 2 = 3 3 Children should also be encouraged to use their 2 times table facts.
	Group AND share small quantities- understanding the difference between the two concepts. Sharing Develops importance of one-to-one correspondence. 15 + 5 = 3 15 shared between 5 000000000000000000000000000000000000	Children to draw grouping and sharing small quantities. 15 ÷ 5 = 3 Sharing Grouping	

## Division

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 1/2	Count how many groups go in to the dividend. $6 \div 2$ 2 2 2 2 2 2 3 groups of 2	Children to represent counting how many groups go in to the dividend 3  groups 1 2 3 0 0 10 0 6	Abstract number line to represent that equal groups that have been counted. 3  groups 1 2 3 1 2 4 6
<b>Year 2</b> Vocabulary:	Use of cubes to illustrate the whole- and parts of division.	Use the bar model to show grouping.	
group in pairs, 3s 10s etc equal groups of divide, ÷, divided by, divided into, remainder		<b>5 5</b> 15	

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 3 Vocabulary: Inverse group, groups of, lots of, array, group in pairs, 3s 10s etc equal groups of divide, ÷, divided by, divided into, remainder	TO ÷ O with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used . 13 ÷ 4 = Use of lollipops sticks to form wholes- squares are made because we are dividing by 4. There are 3 whole squares, with 1 left over. Using grouping to become more efficient at dividing larger numbers.	Children to represent the lollipop sticks pictorially. Use grouping on a bar model. Use grouping on a bar model. 48 40 8 (10  groups) $48 \div 4 = 12$	13 ÷ 4 = 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over' $\frac{1}{4+4+4+4+4+4+4+4+4+4+4+4+4+4+4+4+4+4+4+$

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
Year 4 Vocabulary: divide, divided by, divisible by, divided into share between, groups of factor, factor pair, multiple times as (big, long, wide etc) equals, remainder, quotient, divisor inverse	Sharing using place value counters. $42 \div 3 = 14$	Children to represent the place value counters pictorially.	Children to be able to make sense of the place value counters and write calculations to show the process. $42 \div 3$ 40 = 30 + 12 $30 \div 3 = 10$ $12 \div 3 = 4$ 10 + 4 = 14
Year 5 Vocabulary: divide, divided by, divisible by, divided into share between, groups of factor, factor pair, multiple times as (big, long, wide etc) equals, remainder, quotient, divisor inverse	<ul> <li>Short division using place value counters to group. 615 ÷ 5</li> <li>1005 105 15</li> <li>105 105</li></ul>	Represent the place value counters pictorially.	<sup>Short division</sup> 122 7 8 <sup>1</sup> 5 <sup>1</sup> 4

Yr Grp & Vocabulary	Concrete	Pictorial	Abstract
<b>Year 6</b> Vocabulary:	1000s         100s         10s         1s           • •         • •         • • • •         • • • • • • • • • • • • • • • • • • •	We can't group 2 thousands into groups of 12 so exchange them.	Children should write a list of key facts before calculating. 24 48
divide, divided by, divisible by, divided into share between, groups of factor, factor pair, multiple	1000s 100s 10s 1s	We can group 24 hundreds into groups of 12 which leaves 1 hundred.	$\begin{array}{c}             0 & 2 \\             12 & 2 & 5^{1} 4 & 4                                 $
times as (big, long, wide etc) equals, remainder, quotient, divisor inverse	1000s 100s 10s 1s	After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
	1000s 100s 10s 1s	After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 groups of 12, which leaves no remainder.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

Yr Grp & Vocabulary	Abstract	
Year 6 continued	Chunking for long division: Children write a list of key facts before calculating. 97 $\begin{bmatrix} 91\\ 8^{7}8^{1}2 \ 7\\ -7760 \ (80x)\\ 190167 \ -970 \ (10x)\\ 97 \ (10x)\\ -97 \ (1x)\\ 0 \ (1x)$	97 194 (2x) 291 (3x) 388 (4x) 485 (5x) 970 (10x) 1940 (20x) 3880 (40x) 7760 (80x)