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# Blakehill Primary School Written Calculation Procedures and Guidance



In Reception class, although the children are taught the following methods, the majority of them do not record mathematics formally on paper. They are taught the methods in practical contexts, using objects such as toys.

## Reception

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### Vocabulary

Add, addition, total, plus, more than, and, altogether, increase, equals, make, sum etc.

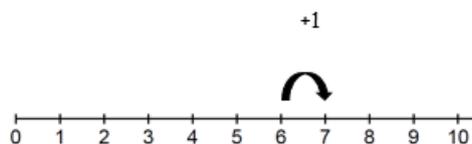
### Adding 2 groups together

Add 2 groups together by counting all of them. Understand that addition means adding 2 groups together.



$$3 + 2 = 5$$

To count **one more** and then several more on a number line. For example  $6 + 1 = 7$



Children are encouraged to make use of fingers as these are a constantly available resource for calculations at this level.

## Reception

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### Vocabulary

Take away, less than, how many left etc.

### Take away one or two objects to find the new total

$$5 - 3 = 2$$

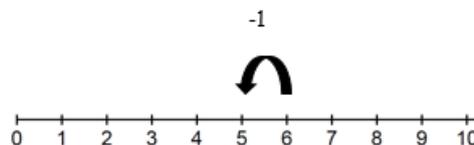


$$5 \text{ take away } 2 \text{ is } 3$$



### One less or several less on a number line

The next step is for children to be able to work out one less or several less on a number line. For example  $6 - 1 = 5$



## Reception

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### Vocabulary

Lots of, groups of

### Count repeated groups of the same size



3 groups of 2 = 6

Counting in 2s, 5s and 10s.

## Reception

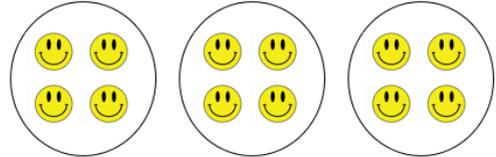
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### Sharing into equal groups

Share objects into equal groups and count how many in each group.



Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.



12 shared between 3.

## Year 1

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### Using place value

Count in 1s e.g.  $45 + 1$

Count in 10s e.g.  $45 + 10$  without counting on in 1s.

34	35	36
44	45	46
54	55	56

Add 10 to any given 2-digit number.

### Counting on

Counting on in 1s e.g.  $8 + 3$  as 8, 9, 10, 11



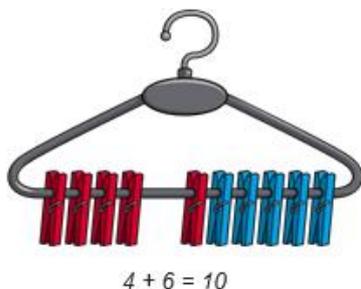
Add, putting the larger number first

Count on in 10s e.g.  $45 + 20$  as 45, 55, 65

### Using number facts

'Story' of 4, 5, 6, 7, 8 and 9 e.g.  $7 = 7 + 0$ ,  $6 + 1$ ,  $5 + 2$ ,  $4 + 3$

Number bonds to 10 e.g.  $5 + 5$ ,  $6 + 2$ ,  $7 + 3$ ,  $8 + 2$ ,  $9 + 1$ ,  $10 + 0$



Use patterns based on known facts when adding e.g.

$4 + 3 = 7$  so we know  $24 + 3$ ,  $44 + 3$ ,  $74 + 3$

## Year 1

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### Using place value

Count back in 1s e.g. know  $53 - 1$

Count back in 10s e.g. know  $53 - 10$  without counting back in 1s.

32	33	34
42	43	44
52	53	54

### Taking away

Counting back in 1s e.g.  $11 - 3$  as 11, 10, 9, 8

e.g.  $14 - 3$  as 14, 13, 12, 11

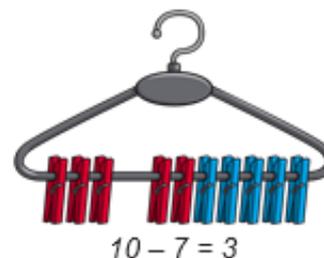


Count back in 10s e.g.  $53 - 20$  as 53, 43, 33

### Using number facts

'Story' of 4, 5, 6, 7, 8 and 9 e.g. 'Story' of 7 is  $7 - 1 = 6$ ,  $7 - 2 = 5$ ,  $7 - 3 = 4$

Number bonds to 10 e.g.  $10 - 1 = 9$ ,  $10 - 2 = 8$ ,  $10 - 3 = 7$



Subtract using patterns of known number facts when e.g.  $7 - 3 = 4$  so we know  $27 - 3 = 24$ ,  $47 - 3 = 44$ ,  $77 - 3 = 74$

Also use Numicon.

## Year 1

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### Counting on in steps (clever counting)

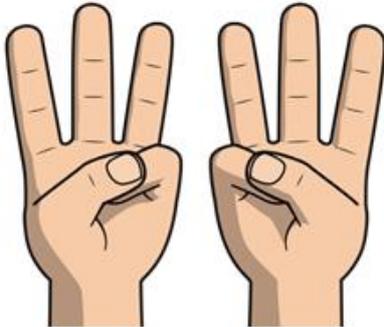
Count in 2s using Numicon.

Count in 10s.

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

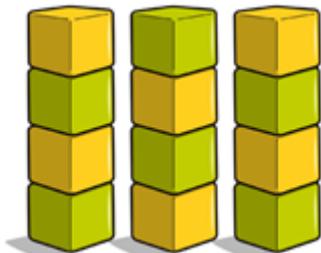
### Doubling and halving

Find doubles to double 5 using fingers e.g. double 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.



Also use Numicon.

## Year 1

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### Counting on in steps (clever counting)

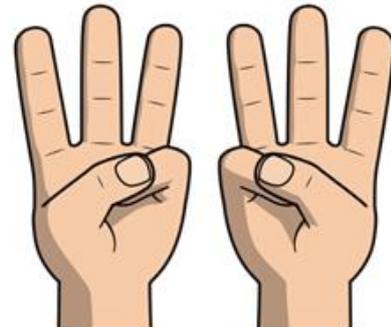
Count in 2s using Numicon, number lines and 100 squares.

Count in 10s.

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

### Doubling and halving

Find half of even numbers up to 12, including realising that it is hard to halve an odd number.



### Grouping

Begin to use visual and concrete arrays and 'sets of' objects to find the answers to questions such as 'How many towers of three can I make with twelve cubes?'

### Sharing

Begin to find half of a quantity using sharing e.g. find half of 16 cubes by giving one each repeatedly to two children.

## Year 2

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Use concrete objects and pictorial representations.

2 digit numbers + units

2 digit numbers + tens

2 digit numbers + 2 digit numbers

Add three 1 digit numbers

### Partition and recombine



$$20 + 10 = 30$$

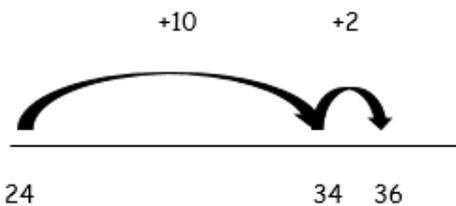
$$6 + 3 = 9$$

$$30 + 9 = 39$$



### Number line

$$24 + 12 = 36$$



### Expanded column addition

See Year 3

## Year 2

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Use concrete objects and pictorial representations.

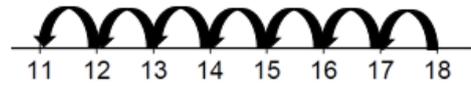
2 digit numbers - units

2 digit numbers - tens

2 digit numbers - 2 digit numbers

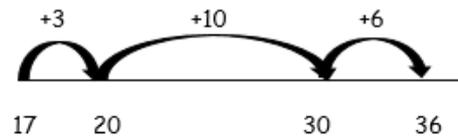
### Numbers up to 10/20 subtract 1 digit

$$18 - 7 = 11$$



### Count on number line (difference)

$$36 - 17 = 19$$



### Partition

$$\begin{array}{r} 53 \\ - 22 \\ \hline 31 \end{array}$$

The number 22 is partitioned into 20 and 2. The subtraction is shown in two steps:

$$\begin{array}{r} 53 \\ - 20 \\ \hline 33 \end{array}$$
$$\begin{array}{r} 33 \\ - 2 \\ \hline 31 \end{array}$$



## Year 3

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### Expanded column addition

$$\begin{aligned} 36 + 17 &= \\ 30 + 10 &= 40 \\ 6 + 7 &= 13 \\ \hline &53 \end{aligned}$$

Or

$$\begin{array}{r} 30 + 6 \\ 10 + 7 \\ \hline 40 + 13 = 53 \end{array}$$



Add two 3 digit numbers.



### Column Addition

$$\begin{array}{r} 1 \\ 37 \\ + 25 \\ \hline 62 \end{array}$$



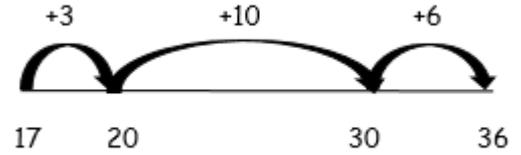
Add three 3 digit numbers.

## Year 3

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### Number line

$$36 - 17 = 19$$



Subtract from 3 digit numbers



### Expanded column subtraction

$$88 - 32 =$$

$$80 + 8$$

$$- 30 + 2$$

$$\hline 50 + 6 = 56$$



$$82 - 38 =$$

$$70 + 1$$

$$\cancel{80} + 2$$

$$- 30 + 8$$

$$\hline 40 + 4 = 44$$



More able move onto compact column method  
See Year 5 and Year 6.

### Year 3

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#### Grid method

Multiply any 2 digit by one digit number.

$$9 \times 26 = 234$$

x	20	6
9	180	54

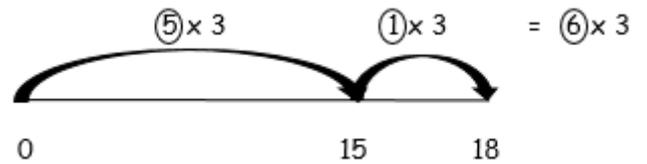
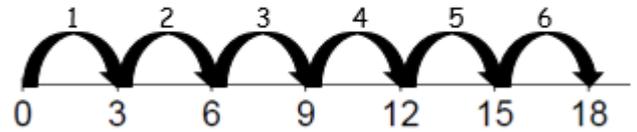
$$\begin{array}{r} 1 \\ 180 \\ + 54 \\ \hline 234 \end{array}$$

### Year 3

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#### Grouping and sharing using a number line

$$18 \div 3 = 6$$



Chunking with no remainder.

$$87 \div 3 = 29$$

$$\begin{array}{r} 3 \overline{)87} \\ - 30 \\ \hline 57 \\ - 30 \\ \hline 27 \\ - 27 \\ \hline 0 \end{array} \quad \begin{array}{l} (10) \times 3 \\ (10) \times 3 \\ (9) \times 3 \end{array}$$



Chunking with remainder as whole number.

$$89 \div 3 = 29 \text{ r}2$$

$$\begin{array}{r} 3 \overline{)89} \\ - 60 \\ \hline 29 \\ - 27 \\ \hline \text{r} 2 \end{array} \quad \begin{array}{l} (20) \times 3 \\ (9) \times 3 \end{array}$$

Year 4

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Column method

Add two 3 digit numbers.



Add two 4 digit numbers. Answers to be over 10,000.

$$\begin{array}{r}
 11 \\
 7382 \\
 + 6943 \\
 \hline
 14,325
 \end{array}$$

Year 4

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Expanded column subtraction

i) 3 digit - 3 digit

$$\begin{array}{r}
 137 \quad - \quad 115 \\
 100 + 30 + 7 \\
 - 100 + 10 + 5 \\
 \hline
 0 + 20 + 2 = 22
 \end{array}$$

ii) Include one exchange

$$\begin{array}{r}
 245 \quad - \quad 174 \\
 100 \quad 1 \\
 \cancel{200} + 40 + 5 \\
 - 100 + 70 + 4 \\
 \hline
 0 + 70 + 1 = 71
 \end{array}$$



Compact column subtraction

With one 'carry'.

$$\begin{array}{r}
 41 \\
 \cancel{5}2 \\
 - 36 \\
 \hline
 16
 \end{array}$$



4 digit - 3 or 4 digit

$$\begin{array}{r}
 81 \\
 4\cancel{3}6 \\
 - 2791 \\
 \hline
 2145
 \end{array}$$

## Year 4

x

### Grid method

3 digit x 1 digit.

$9 \times 257$

x	200	50	7
9	1800	450	63



### Ladder method

$637 \times 8$

$$\begin{array}{r} 637 \\ \times 8 \\ \hline 1 \\ 4800 \\ 240 \\ + 56 \\ \hline 5096 \end{array}$$



Begin to introduce short and long multiplication.

## Year 4

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### Chunking (no remainder) See Year 3



### Chunking (with remainder)

$87 \div 4 = 21 \text{ r}3$

$$\begin{array}{r} 4 \overline{)87} \\ - 80 \\ \hline 7 \\ - 4 \\ \hline \text{r} 3 \end{array} \quad \begin{array}{l} (20) \times 4 \\ (1) \times 4 \end{array}$$



2 digit divided by 1 digit.



3 digit divided by 1 digit.

## Year 5

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### Column method

Add up to 4 digit numbers.



Add numbers with decimals up to 1 decimal place.



Add numbers with decimals up to 2 decimal places.

$$\begin{array}{r} 1111 \\ + 4397.15 \\ + 2954.26 \\ \hline 7351.41 \end{array}$$

## Year 5

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### Column method

Subtract from 5 digit numbers.



Subtract numbers with decimals up to 1 decimal place.



Subtraction with borrowing crossing tens and more than one borrow.

$$\begin{array}{r} 591 \\ - 603 \\ \hline 358 \end{array}$$

## Year 5

X

### Multiplication up to 4 digit x 2 digit (teens)

i) Grid method.



ii) Short multiplication method (when one number is a single digit)

$$\begin{array}{r} 21 \\ 342 \\ \times \quad 7 \\ \hline 2394 \end{array}$$



iii) Long multiplication

$$\begin{array}{r} 21 \\ 59 \\ \times 37 \\ \hline 1413 \\ 1770 \\ \hline 2183 \end{array}$$

In this example:

Step 1:- Multiply units first, then tens... of top row by the unit digit on the 2<sup>nd</sup> row.

Step 2:- Multiply the tens digit of the 2<sup>nd</sup> row. To do this first place a zero as place holder in units column of 2<sup>nd</sup> row answer. Then multiply the units, tens... of top row by tens digit on 2<sup>nd</sup> row.

## Year 5

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### Chunking



### Short division



Progress to dividing 4 digit numbers 1 digit number. Give answers with remainders as either whole numbers or fractions.

$$\begin{array}{r} 865r4 \\ 5 \overline{) 4329} \\ \underline{4329} \\ 0 \end{array}$$

or

$$865\frac{4}{5}$$

Year 6

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Column method



Larger numbers with 5 digits.



Add numbers with decimals up to 3 decimal places including money.

$$\begin{array}{r} 1111 \\ 27395 \\ 19628 \\ + \underline{47023} \end{array}$$

$$\begin{array}{r} 11 \\ 2.395 \\ + \underline{2.188} \\ \underline{4.583} \end{array}$$

Year 6

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Column method



Large numbers with 6 digits.



Subtraction with borrowing crossing hundreds, including decimals up to 3 decimal places.

$$\begin{array}{r} 6991 \\ \del{7001} \\ - 3985 \\ \hline 3016 \end{array}$$

$$\begin{array}{r} 491213101 \\ \del{503412} \\ - 216,974 \\ \hline 286,438 \end{array}$$

$$\begin{array}{r} 3121 \\ \del{4.036} \\ - 1.728 \\ \hline 2.308 \end{array}$$

## Year 6

x

Develop extended use of grid method, short and long multiplication up to 4 digits x 2 digit numbers e.g. 4279 x 36.



Extend to multiplying two numbers with one decimal place e.g. 2.7 x 3.9 (first use grid method and then long multiplication).

$$\begin{array}{r} 1 \\ \cancel{3} \\ 3.9 \\ \times \underline{2.7} \\ \hline 1 \\ 273 \\ + \underline{780} \\ 10.53 \end{array}$$

Step 1:- First ignore the decimal places and calculate as before.

Step 2:- Count the number of decimal places in numbers being multiplied (3.9 has one, 2.7 has one, equals a total of two decimal places).

Step 3:- From right to left in answer count the decimal places and insert the decimal point, in this case two decimal places.

## Year 6

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Develop and extended use of chunking and short division. Introduce long division.



Divide 4 digit numbers by 2 digit numbers e.g. 3293 ÷ 12.



Progress from answers with remainders as whole numbers and fractions to also give decimal answers (more able).

### Short division

$$\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{) 432} \end{array}$$

or

$$865 \frac{2}{5}$$

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$$\begin{array}{r} 86.4 \\ 5 \overline{) 432.0} \end{array}$$

### Chunking involving decimal answers

$$432 \div 15 = 28.8$$

$$\begin{array}{r} 15 \overline{) 432} \\ - 300 \\ \hline 132 \\ - 120 \\ \hline 12 \\ - 12 \\ \hline 0 \end{array} \quad \begin{array}{l} 20 \times 15 \\ 8 \times 15 \\ 0.8 \times 15 \end{array}$$

### Long division

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \downarrow \\ 132 \\ \underline{120} \downarrow \\ 120 \\ \underline{120} \end{array}$$