The Welbeck Federation of Schools

Maths Written Calculation Policy
September 2024

Review September 2025

INTRODUCTION:

At The Welbeck Federation, we believe that children should be introduced to the processes of calculation through practical, oral and mental activities.

As children begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved.

Choosing the appropriate strategy, recording in mathematics and in calculation in particular is an important tool both for furthering the understanding of ideas and for communicating those ideas to others.

A useful written method is one that helps children carry out a calculation and can be understood by others. Written methods are complementary to mental methods and should not be seen as separate from them.

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. It is important children acquire secure mental methods of calculation and one efficient written method of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

This document identifies progression in calculation strategies rather than specifying which method should be taught in a particular year group. Children should not be made to go onto the next stage if: 1) they are not ready. 2) they are not confident.

By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

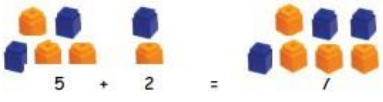
AIMS OF THE POLICY:

To ensure consistency and progression in our approach to calculation
To ensure that children develop an efficient, reliable, formal written method of calculation for all operations
To ensure that children can use these methods accurately with confidence and understanding.

HOW TO USE THIS POLICY

Use the policy as the basis of your planning but ensure you use previous or following years' guidance to allow for personalised learning.
Always use Assessment for Learning to identify suitable next steps in calculation for groups of children.
If, at any time, children are making significant errors, return to the previous stage in calculation.
Always use suitable resources, models and images to support children's understanding of

calculation and place value, as appropriate.
Encourage children to make sensible choices about the methods they use when solving problems.

ADDITION GUIDELINES	
EYFS	
VOCABULARY: add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more…, how many more to make… ?, how many more is… than…?	
Using a range of practical resources and real life contexts, pupils develop their understanding of the concept of addition through counting activities	How many dinosaurs are there?  What about if I give you two more? How many are there now? 
Children are introduced to the addition symbol (+) and use pictures/diagrams to represent the calculation	There are 2 birds. Another bird flies in. How many are there altogether? 
Store the larger number mentally and use fingers to count on	Count on from the larger number. A child will choose the larger number, even when it is not the first and count on from there; (5 in your head) 'six, seven, eight' using their fingers: 3 + 5 = 8 
Children represent an addition number sentence in picture form and are able to solve simple addition number sentences using objects or fingers Children will begin to explain their reasoning	 5 + 2 = 7  5 + 2 = 7
Diagrams like 'Adam the Adder' can be used as an early introduction to a number track This will help children develop their understanding of addition	
MENTAL STRATEGIES: - Develop a mental image of the number system. - Understand the value of a number - Counting forwards and backwards - Recall of number bonds to 10	

ADDITION GUIDELINES

Year One

+ = signs and missing numbers

Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

2 = 1+ 1

2 + 3 = 4 + 1

3 = 3

2 + 2 + 2 = 4 + 2

Missing numbers need to be placed in all possible places.

3 + 4 = □ □ = 3 + 4

3 + □ = 7 7 = □ + 4

□ + 4 = 7 7 = 3 + □

□ + ∇ = 7 7 = □ + ∇

Year Two

+ = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate, larger numbers.

Extend to

14 + 5 = 10 + □

and

32 + □ + □ = 100 35 = 1 + □ + 5

Partition into tens and ones and recombine

12 + 23 = 10 + 2 + 20 + 3

= 30 + 5

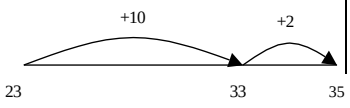
= 35

Count on in tens and ones

23 + 12 = 23 + 10 + 2

= 33 + 2

= 35



Year Three

+ = signs and missing numbers

Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

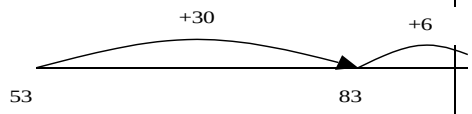
Partition into tens and ones

- Partition both numbers and recombine.
- Count on by partitioning the second number only e.g.

36 + 53 = 53 + 30 + 6

= 83 + 6

= 89



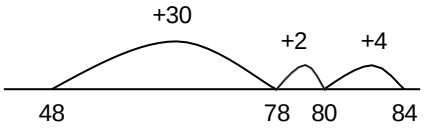
Add a near multiple of 10 to a two-digit number

Secure mental methods by using a number line to model the method. Continue as in Year 2 but with appropriate numbers

e.g. 35 + 19 is the same as 35 + 20 – 1.

Children need to be secure adding multiples of 10 to any two-digit number including those that are not multiples of 10.

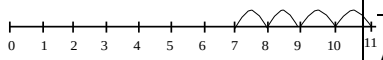
48 + 36 = 84



The Number Line

Children use a numbered line to count on in ones. Children use number lines and practical resources to support calculation and teachers *demonstrate* the use of the number line.

7+ 4



The Empty Number Line:

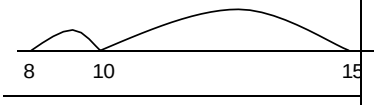
Partitioning and bridging through 10.

The steps in addition often bridge through a multiple of 10

e.g.

Children should be able to partition the 7 to relate adding the 2 and then the 5.

8 + 7 = 15



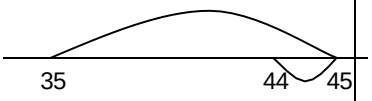
Add 9 or 11 by adding 10 and adjusting by 1

e.g.

Add 9 by adding 10 and adjusting by 1

35 + 9 = 44

+10



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Pencil and paper procedures

83 + 42 = 125

either ***or***

1. Vertical expansion **2. Horizontal expansion**

83 80 + 3

\+ 42 + 40 + 2

5 120 + 5 = 125

120

125

ADDITION GUIDELINES

Year Four

+ = signs and missing numbers

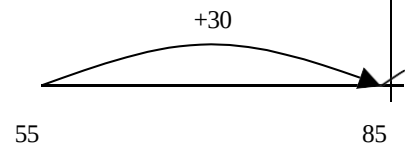
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Partition into tens and ones and recombine
Either partition both numbers and recombine or partition the second number only e.g.

55 + 37 = 55 + 30 + 7

= 85 + 7

= 92



Add the nearest multiple of 10, then adjust

Continue as in Year 2 and 3 but with appropriate numbers e.g. 63 + 29 is the same as 63 + 30 - 1

Pencil and paper procedures

Year Five

+ = signs and missing numbers

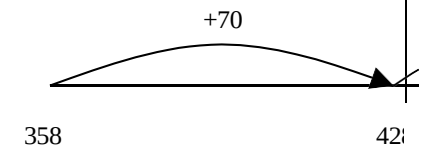
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Partition into hundreds, tens and ones and recombine
Either partition both numbers and recombine or partition the second number only e.g.

358 + 73 = 358 + 70 + 3

= 428 + 3

= 431



Add or subtract the nearest multiple of 10 or 100, then adjust

Continue as in Year 2, 3 and 4 but with appropriate numbers e.g. 458 + 79 = is the same as 458 + 80 – 1

Year Six

+ = signs and missing numbers

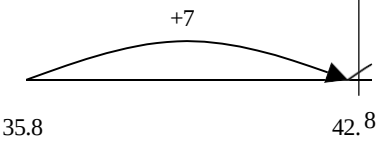
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Partition into hundreds, tens, ones and decimal fractions and recombine
Either partition both numbers and recombine or partition the second number only e.g.

35.8 + 7.3 = 35.8 + 7 + 0.3

= 42.8 + 0.3

= 43.1



Add the nearest multiple of 10, 100 or 1000, then adjust

Continue as in Year 2, 3, 4 and 5 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc

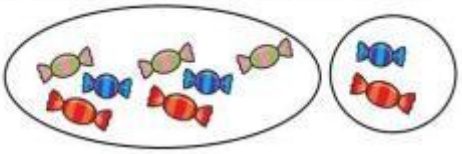
Pencil and paper procedures

367 + 185 = 431 **either** **or** 367 300 + 60 + 7 +185 100 + 80 + 5 12 400 +140+12 = 552 140 400 552 **leading to** 367 +185 552 1 1 Extend to decimals **in the context of money.**	**Pencil and paper procedures** Extend to numbers with at least four digits 3587 + 675 = 4262 3587 + 675 4262 1 1 1 Revert to expanded methods if the children experience any difficulty. Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits). 72.8 +54.6 127.4 1 1	Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places. 13.86 + 9.481 = 23.341 13.86 + 9.481 23.341 1 1 1 Revert to expanded methods if the children experience any difficulty.

SUBTRACTION GUIDELINES

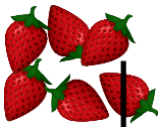
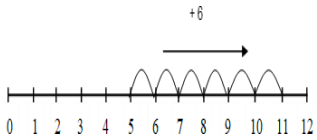
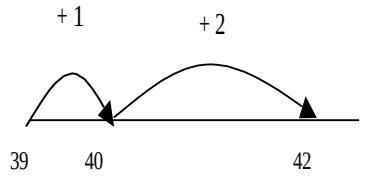
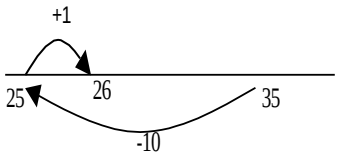
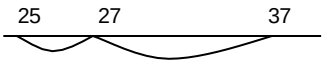
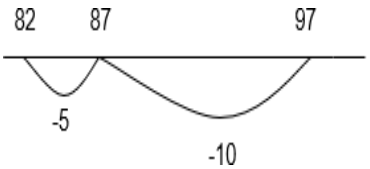
EYFS

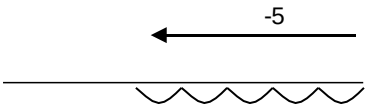
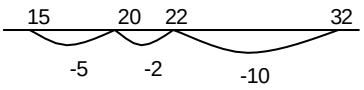
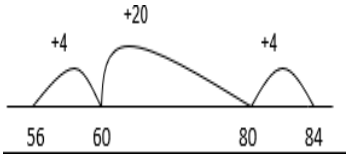
VOCABULARY: take (away), leave, how many are left/left over?, how many have gone?, one less, two less… ten less…,how many fewer is… than…?, difference between, is the same as

Using a range of practical resources and real life contexts, pupils develop their understanding of the concept of subtraction as taking away through counting activities	I had 9 sweets and I ate 2. How many have I got left? 
Children will use counting objects, toys or their fingers to answer simple subtraction number sentences	(e.g. 6-3= 3)
Children will listen to a subtraction story and draw a set of objects (jottings) on whiteboards and cross some off - drawing a picture helps children to visualise the subtraction	
Children will use their fingers to help with subtraction, e.g. 5 – 2 = 3. A child will start with the biggest number in their head '5' and hold 5 fingers up They will count back saying '5' (touching their head) '4, 3' (curling one finger down at a time), then count how many fingers are left	
Children can use characters like 'Suzie the Subtractor' to help develop their understanding of subtraction	

MENTAL STRATEGIES: - Develop a mental image of the number system - Children count backwards using familiar number rhymes (e.g '10 Green Bottles', '5 Fat Sausages') - Count backwards from different starting points

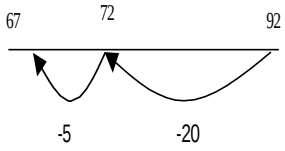
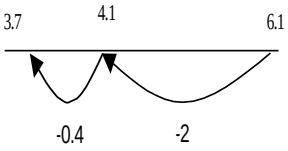
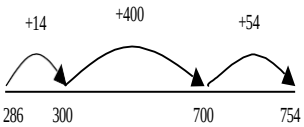
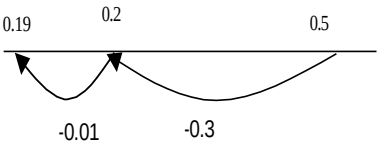
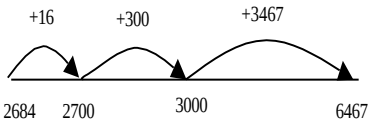
SUBTRACTION GUIDELINES

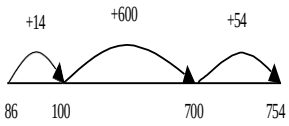
Year One	Year Two	Year Three
- = signs and missing numbers 7 - 3 = □ □ = 7 - 3 7 - □ = 4 4 = □ - 3 □ - 3 = 4 4 = 7 - □ □ - ∇ = 4 4 = □ - ∇ • Understand subtraction as 'take away'  • Find a 'difference' by counting up; I have saved 5p. The socks that I want to buy cost 11p. How much more do I need in order to buy the socks?  • Use practical and	**- = signs and missing numbers** Continue using a range of equations as in Year 1 but with appropriate numbers. Extend to 14 + 5 = 20 - □ Find a small difference by counting up 42 – 39 = 3  **Subtract 9 or 11. Begin to add/subtract 19 or 21** 35 – 9 = 26  **Use known number facts and place value to subtract** (partition second number only) 37 – 12 = 37 – 10 – 2 = 27 – 2 = 25  **Bridge through 10 where necessary**	**- = signs and missing numbers** Continue using a range of equations as in Year 1 and 2 but with appropriate numbers. **Find a small difference by counting up** Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5 **Subtract mentally a 'near multiple of 10' to or from a two-digit number** Continue as in Year 2 but with appropriate numbers e.g. 78 – 49 is the same as 78 – 50 + 1 **Use known number facts and place value to subtract** Continue as in Year 2 but with appropriate numbers e.g.**97 – 15 = 72** With practice, children will need to record less information and decide whether to count back or forward. It is useful to ask children whether counting up or back is the more efficient for calculations such as 57 – 12, 86 – 77 or 43 – 28.  **Pencil and paper procedures** Complementary addition

informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number. I have 11 toy cars. There are 5 cars too many to fit in the garage. How many cars fit in the garage?  Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences Recording by - drawing jumps on prepared lines - constructing own lines	32 - 17  	84 – 56 = 28 

SUBTRACTION GUIDELINES

(- = signs and missing numbers: Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.)

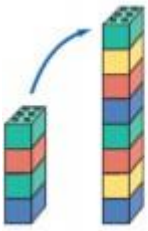
Year Four	Year Five	Year Six
Find a small difference by counting up e.g. 5003 – 4996 = 7 This can be modelled on an empty number line (see complementary addition below). Children should be encouraged to use known number facts to reduce the number of steps. **Subtract the nearest multiple of 10, then adjust.** Continue as in Year 2 and 3 but with appropriate numbers. **Use known number facts and place value to subtract** 92 – 25 = 67  **Pencil and paper procedures** Complementary addition	**Find a difference by counting up** e.g. 8006 – 2993 = 5013 This can be modelled on an empty number line (see complementary addition below). **Subtract the nearest multiple of 10 or 100, then adjust.** Continue as in Year 2, 3 and 4 but with appropriate numbers. **Use known number facts and place value to subtract** 6.1 – 2.4 = 3.7  **Pencil and paper procedures** Complementary addition 754 – 286 = 468  OR	**Find a difference by counting up** e.g. 8000 – 2785 = 5215 To make this method more efficient, the number of steps should be reduced to a minimum through children knowing: ▪ Complements to 1, involving decimals to two decimal places (0.16 + 0.84) ▪ Complements to 10, 100 and 100 **Subtract the nearest multiple of 10, 100 or 1000,** **then adjust** Continue as in Year 2, 3, 4 and 5 but with appropriate numbers. **Use known number facts and place value to subtract** 0.5 – 0.31 = 0.19  **Pencil and paper procedures** Complementary addition 6467 – 2684 = 3783  **OR**

754 – 86 = 668  For those children with a secure mental image of the number line they could record the jumps only: 754 – 86 = 668 14 (100) 600 (700) 54 (754) 668	754 - 286 = 468 14 (300) 400 (700) 54 (754) 468 can be refined to 14 (300) 454 (754) 468 Reduce the number of steps to make the calculation more efficient. *Extend to 2 places of decimals*	6467 – 2684 = 3783 16 (2700) 300 (3000) 3467 (6467) 3783 can be refined to 316 (3000) 3467 (6467) 3783 Reduce the number of steps to make the calculation more efficient. *Extend to 2 places of decimals*

MULTIPLICATION GUIDELINES

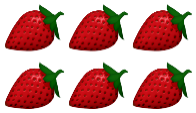
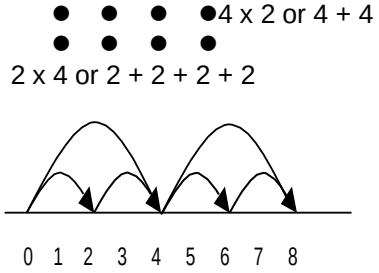
EYFS

VOCABULARY: group, lots of, double

Children will count groups of the same number of objects and add them together The children learn about grouping in practical contexts and through pictorial representations	Count groups of 2 and then count all objects to add them together. 
Children will solve simple problems involving doubling	 Double 4 is 8.

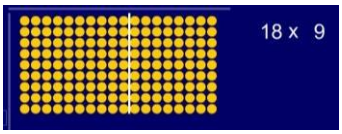
MENTAL STRATEGIES: - Develop a mental image of the number system. - Understand the value of a number - Counting in 2s, 5s and 10s. - Number patterns on a number line and on a hundred square – 2's, 5's and 10's.

MULTIPLICATION GUIDELINES

Year One	Year Two	Year Three
Multiplication is related to doubling and counting groups of the same size.  Looking at columns Looking at rows 2 + 2 + 2 3 + 3 3 groups of 2 2 groups of 3 <u>Counting using a variety of practical resources</u> Counting in 2s e.g. counting socks, shoes, animal's legs… Counting in 5s e.g. counting fingers, fingers in gloves, toes… Counting in 10s e.g. fingers, toes… **Pictures / marks**	**<u>x = signs and missing numbers</u>** 7 x 2 = □ □ = 2 x 7 7 x □ = 14 14 = □ x 7 □ x 2 = 14 14 = 2 x □ □ x ∇ = 14 14 = □ x ∇ <u>Arrays and repeated addition</u>  <u>Doubling multiples of 5 up to 50</u> 15 x 2 = 30 Partition Children need to be secure with partitioning numbers into	**<u>x = signs and missing numbers</u>** Continue using a range of equations as in Year 2 but with appropriate numbers. **<u>Arrays and repeated addition</u>** Continue to understand multiplication as repeated addition and continue to use arrays (as in Year 2). **<u>Doubling multiples of 5 up to 50</u>** 35 x 2 = 70 Partition X | 30 | 5 2 | 60 | 10 =70 Use known facts and place value to carry out simple multiplications

There are 3 sweets in one bag. How many sweets are there in 5 bags? 	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 OR X | 10 5 2 | 20 10 = 30	**Use the same method as above** **(partitioning), e.g.** **32 x 3 = 96** x | 30 | 2 3 | 90 | 6 = 96

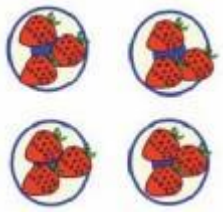
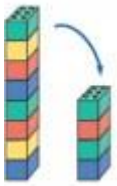
MULTIPLICATION GUIDELINES

Year Four	Year Five	Year Six
x = signs and missing numbers Continue using a range of equations as in Year 2 but with appropriate numbers Partition Continue to use arrays:  18 x 9 = 162 18 x 9 = (10 x 9) + (8 x 9) = 162 **OR**	Partition 47 x 6 = 282 47 x 6 = (40 x 6) + (7 x 6) = 282 OR Use the grid method of multiplication (as below) **Pencil and paper procedures** Grid method 72 x 38 is approximately 70 x 40 = 2800 x | 70 | 2 30 | 2100 | 60 8 | 560 | 16	Partition 87 x 6 = 522 87 x 6 = (80 x 6) + (7 x 6) = 522 **OR** Use the grid method of multiplication (as below) **Pencil and paper procedures** Grid method 372 x 24 is approximately 400 x 20 = 8000

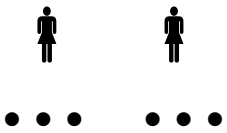
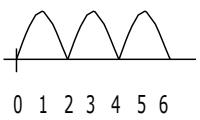
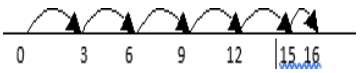
Use the grid method of multiplication (as below) **Pencil and paper procedures**	2100 + 60 = 2160 560 + 16 = 576 2160 560 + 2736 **Expanded Column Multiplication**	Extend to decimals with up to two decimal places. **Short Column Multiplication**

Grid method 23 x 7 is approximately 20 x 10 = 200 x | 20 | 3 7 | 140 | 21 = 161	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 'thirty multiplied by seven', not 'three times seven', although the relationship 3 × 7 should be stressed. 30 + 8 x 7 56 (8 x 7 = 56) 210 (30 x 7 = 210) 266 38 x 7 56 210 266	The recording is reduced further, with carry digits recorded below the line. 38 x 7 266 5 Children who are already secure with multiplication for TU × U and TU × TU should have little difficulty in using the same method for HTU × TU or applying decimals. 286 x 29 2574 (9 x 286 = 2574) 5720 (20 x 286 = 5720) 8294 1

DIVISION GUIDELINES

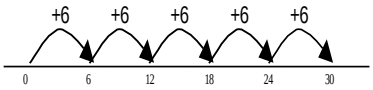
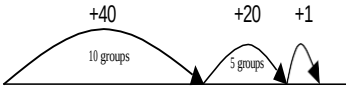
EYFS
VOCABULARY: halve, half, share, share equally, groups
Children experience early division by sharing objects and counting how many in each group 
Children will solve problems including halving and sharing  What is half of 8? Half of 8 is 4.
MENTAL STRATEGIES: - Develop a mental image of the number system. - Understand the value of a number

DIVISION GUIDELINES

Year One	Year Two	Year Three
Sharing Requires secure counting skills -see counting and understanding number strand Develops importance of one-to-one correspondence See appendix for additional information on x and ÷ and aspects of number Sharing – 6 sweets are shared between 2 people. How many do they have each?  Practical activities involving sharing, distributing cards when playing a game, putting objects onto plates, into cups, hoops etc. **Grouping** Sorting objects into 2s / 3s/ 4s etc How many pairs of socks are	**÷ = signs and missing numbers** 6 ÷ 2 = □ □ = 6 ÷ 2 6 ÷ □ = 3 3 = 6 ÷ □ □ ÷ 2 = 3 3 = □ ÷ 2 □ ÷ ∇ = 3 3 = □ ÷ ∇ **Grouping** Link to counting and understanding number strand Count up to 100 objects by grouping them and counting in tens, fives or twos;… Find one half, one quarter and three quarters of shapes and sets of objects 6 ÷ 2 can be modelled as: There are 6 strawberries. How many people can have 2 each? How many 2s make 6? 6 ÷ 2 can be modelled as:  In the context of money count forwards and backwards using 2p, 5p and 10p coins	**÷ = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers. Understand division as sharing and grouping 18 ÷ 3 can be modelled as: Sharing – 18 shared between 3 (see Year 1 diagram) OR Grouping - How many 3's make 18? 

there?  There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there? Jo has 12 Lego wheels. How many cars can she make?	Practical grouping e.g. in PE 12 children get into teams of 4 to play a game. How many teams are there? 	

DIVISION GUIDELINES

Year Four	Year Five	Year Six
÷ = signs and missing numbers Continue using a range of equations as in Year 2 but with appropriate numbers. Sharing and grouping 30 ÷ 6 can be modelled as: grouping – groups of 6 placed on no. line and the number of groups counted e.g.  41 = (10 x 4) + 1 Pencil and paper procedures- Chunking. 72 ÷ 5 lies between 50 ÷ 5 = 10 and 100 ÷ 5 = 20 * Partition the dividend into multiples of the divisor: e.g 72 = 50 + 22 50 ÷ 5 = 10 22 ÷ 5 = 4r2 → 10 + 4r2 = 14 r 2 OR 72	Sharing and grouping Continue to understand division as both sharing and grouping (repeated subtraction). Remainders Quotients expressed as fractions or decimal fractions 61 ÷ 4 = 15 ¼ or 15.25  Pencil and paper procedures- Chunking 256 ÷ 7 lies between 210 ÷ 7 = 30 and 280 ÷ 7 = 40 * Partition the dividend into multiples of the divisor: e.g. 256 = 210 + 46 210 ÷ 7 = 30 46 ÷ 7 = 6r4 → 30 + 6r4 = 36r4 OR	Sharing, grouping and remainders as Year Five Pencil and paper procedures- Chunking 977 ÷ 36 is approximately 1000 ÷ 40 = 25 * Partition the dividend into multiples of the divisor: e.g. 977 = 720 + 180 + 77 720 ÷ 36 = 20 180 ÷ 36 = 5 77 ÷ 36 = 2r5 → 20 + 5 + 2r5 = 27r5 OR 977 - 720 (20 groups) 257 - 180 (5 groups) 77 - 72 (2 groups) 5 Answer: $27\ ^{5}/_{36}$ **Pencil and Paper procedures- Short Division Method**

- <u>50</u> (10 groups) 22 - <u>20</u> (4 groups) 2 Answer : 14 remainder 2	256 - <u>210</u> (30 groups) 46 - <u>42</u> (6 groups) 4 Answer: 36 remainder 4 **<u>Also, Short Division for More Able Children</u>** 16 5 | 8³47	quotient divisor 5 | 847 dividend **Write down how many times your divisor goes into the first number of the dividend. If there is a remainder, that's okay.** **Write down your remainder to the left of the next digit in the dividend.** **Continue. Repeat steps 1-3 until you are done.** 169r 2 5 | 8³4⁴7 Both methods above are necessary at this stage, to deal with the wide range of problems experienced at Year Six. Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division