Teaching calculation strategies that lead onto written methods of calculation

Introduction: The aim is for all children to have one written method for each of the four operations which is reliable and efficient

- Each page refers to a different operation, i.e +, -, x and ÷. **Stages refer to the guidance paper on written calculation strategies in the renewed framework.**
- There is progression in calculation from N to Y6.
- In order for progression to run smoothly vocabulary, mental calculation strategies and rapid recall facts should be introduced at the appropriate stage and reinforced.
- Throughout KS1 and KS2 it is assumed that mathematical vocabulary will be introduced and used in context. **Refer to the electronic Renewed framework**
- Numerical examples have been included to illustrate progression from year to year as well as development within the year.
- The different approaches to mental and written calculation should be made explicit.
- It is important to notice consistency between methods of written calculations (+ and – starting with units; when dividing in Y5 and Y6, be consistent with subtraction method needed for children to divide by "chunking", i.e. repeated subtraction), therefore when adding or subtracting in earlier years, begin with the least significant digits.
- Use the Framework for Teaching Mathematics to ensure the appropriate numbers are used for appropriate year groups or levels of attainment.
- Some methods rely heavily on: A firm understanding of place value
  Interpretation of written signs
  Familiarity with a range of vocabulary / Efficient mental calculation

Addition

To add successfully, children need to be able to:

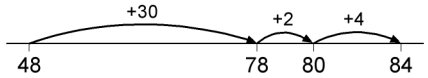
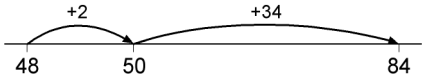
- recall all addition pairs to 9 + 9 and complements in 10;
- add mentally a series of one-digit numbers, such as 5 + 8 + 4;
- add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for addition.

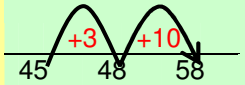
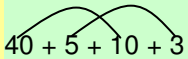
Progression examples:

1. No 'carrying'	23 +42	315 +624
2. Extra digit in answer	94 +73	561 +718
3. Carrying U (units/ones) to T (tens)	47 +25	237 +516
4. Carrying T to H	371 +485	293 +541
5. Carrying U to T and T to H	376 +485	295 +547
6. More than two numbers to be added	463 921 +759	
7. Different numbers of digits	24 375 + 48	4756 20375 + 752
8. Real life problems involving money or measures	£4.21 +£3.87	24.90kg + 7.25kg
9. Numbers with decimals	2.13 +5.62	

Addition

Pre-stage	Stage 1 The Empty Number Line	Stage 2 Partitioning (by the end of year 3)	Stage 3 Expanded method in columns	Stage 4 Column Method (by the end of Year 4)
• Counting on fingers • Count on one digit from a two digit number • Counting forwards and backwards on a number line • Partition into multiples of 10 and 1 and recombine • Derive fact families using addition and subtraction 20 – 7 = 13 20 – 13 = 7 13 + 7 = 20 7 + 13 = 20 Say how a set of objects can be separated into 2 groups 8 is 5 and 3	Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10. 8 + 7 = 15  48 + 36 = 84  or:  Children need to be able to partition numbers in ways other than into tens and ones to help them make multiples of ten by adding in steps.	Record steps in addition using partitioning: 47 + 76 = 47 + 70 + 6 = 117 + 6 = 123 47 + 76 = 40 + 70 + 7 + 6 = 110 + 13 = 123 Partitioned numbers are then written under one another: 47 = 40 + 7 +76 70 + 6 110 + 13 = 123	**Practical apparatus to be used when learning carrying and exchanging** Write the numbers in columns. Adding the tens first: 47 + 76 110 13 123 Adding the ones first: 47 + 76 13 110 123 Discuss how adding the ones first gives the same answer as adding the tens first. Refine over time to adding the ones digits first consistently.	47 + 76 = 123 (1 1) 258 + 87 = 345 (1 1) 366 + 458 = 824 (1 1) Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable. Carry digits are recorded below the line, using the words ‘carry ten’ or ‘carry one hundred’, not ‘carry one’.

Addition

N	R	Y1	Y2	Y3 **Stage 2**	Y4 **Stage 4 by the end of year 4**	Y5	Y6
• Through practical activities in meaningful contexts. • Counting on fingers in a consistent way							
	• Partitioning →						
	say how a set of objects can be separated into 2 groups 8 is 5 and 3 • counting on using fingers	Adding multiples of 10. 30 + 20 = 50 Adding multiples of 10 and units. 10 + 5 = 15 • combining sets to make a total • steps along a number line **(counting on)** • record using + and = signs • **Add a one digit number to a one of two digit number** • **Stage 1 – number line**	70 + 30 = 100 42 + 30 = 72 45 + 13 = 45 + 3 + 10 = 58  (units first) • partition into tens and ones (units first) 45 + 13  8 + 50 = 58 **Derive fact families** **Using add / subtract** **eg** **20-7=13** **20-13=7** **13 + 7 = 20** **7 + 13 = 20**	67 + 24  = 11 + 80 = 91 **Stage 3** 67 + 24 11 (7 + 4) 80 (60 +20) 91 (units first) **Extend to 3 digit numbers**	367 + 85 12 add 140 mentally 300 from 452 top to bottom (units first) "carrying" → Relies heavily on firm understanding of place value Real life money problems decimals → £4.21 + £3.87 0.08 1.00 7.00 £8.08 3 numbers less than 1000	7587 + 675 12 150 1100 7000 8262 (units first) 3587 + 675 4262 1 1 1 72.5 km + 54.6 km 127.1 km 1 1 Numbers with any amount of digits, e.g. 72 567 26 +	7648 + 1486 14 120 1000 8000 9134 (units first) 7648 + 1486 9134 1 1 1 124.90 kg + 7.25 kg 132.15 kg 1 1
• Illustrate number stories with number sentences • Model and encourage use of mathematical language - count on - altogether - one more, etc. • Model interpretation of and sign using appropriate language							
Combine numbers of objects – count all the objects							
Deliberately count on the wrong number. Ask the children how to put it right.							

Addition

367
569
826 +
22
140
1600

Leading to ‘carrying’

367
85 +
452
1 1

Units first. Call each digit by its value, e.g. “60 plus 80 is 150”

* links to Y2 partitioning

Subtraction

To subtract successfully, children need to be able to:

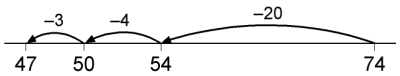
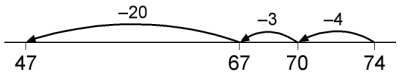
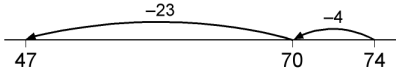
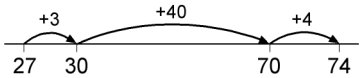
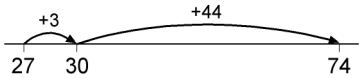
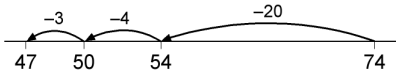
- recall all addition and subtraction facts to 20;
- subtract multiples of 10 (such as 160 – 70) using the related subtraction fact,16 – 7, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways (e.g. partition 74 into 70 + 4 or 60 + 14).

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for subtraction.

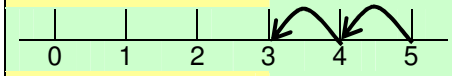
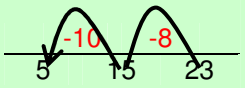
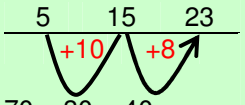
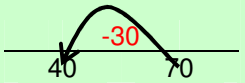
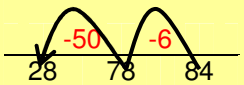
Progression examples:

1. No adjustment		47 -23	864 -621
2. Adjustment T to U		51 -36	432 -217
3. Adjustment H to T		437 -182	618 -217
4. Adjustment H to T and T to U		432 -187	
5. Noughts	470 -142	700 -485	604 -347

Subtraction

Pre-stage	Stage 1 The Empty Number Line	The Counting Up Method	Stage 2 Partitioning	Stage 3 Expanded method in columns
• Counting back from a larger number • One less, two less • Counting on from a smaller number • Find the difference by counting up – important to use visual images _____ _____	Steps in subtraction can be recorded on a number line. The steps often bridge through a multiple of 10. 15 – 7 = 8  74 – 27 = 47 worked by counting back:  The steps may be recorded in a different order:  or combined:  Children need to be able to partition numbers in ways other than into tens and ones to help them make multiples of ten by adding in steps.	 74 – 27 3 → 30 40 → 70 4 → 74 47 or:  74 – 27 3 → 30 44 → 74 47	Subtraction can be recorded using partitioning: 74 – 27 = 74 – 20 – 7 = 54 – 7 = 47 74 – 27 = 70 + 4 – 20 – 7 = 60 + 14 – 20 – 7 = 40 + 7 This requires children to subtract a single-digit number or a multiple of 10 from a two-digit number mentally. The method of recording links to counting back on the number line.  	**Practical apparatus to be used when learning carrying and exchanging** Partitioned numbers are then written under one another: Example: 74 – 27 70 + 4 – 20 + 7 ~~60~~ 14 ~~70~~ + ~~4~~ – 20 + 7 40 + 7 6 14 ~~7~~ ~~4~~ – 2 7 4 7 Example: 741 – 367 700 + 40 + 1 – 300 + 60 + 7 600 130 11 ~~700~~ + ~~40~~ + ~~1~~ – 300 + 60 + 7 300 + 70 + 4 6 13 11 ~~7~~ ~~4~~ ~~1~~ – 3 6 7 3 7 4 The expanded method leads children to the more compact method so that they understand its structure and efficiency. The amount of time that should be spent teaching and practising the expanded method will depend on how secure the children are in their recall of number facts and in their understanding of place value.

Subtraction

N	R	Y1	Y2	Y3	Y4 **Stage 3 by the end of stage 4**	Y5	Y6
	counting back	counting back by partitioning →			decomposition →		
Through practical activities in meaningful contexts "How many are left?" "Take away" "The difference between	5 – 2 = 3  counting back from the larger number one less, etc.	Taking away and count how many are left. Count back from the larger number. Counting on from smaller number. 14 – 12 = 2 15 – 8 = 7 21 – 10 = 11 multiples of 10 50 – 20 = 30 • Record using – and = signs	(units first) 23 – 18 23 – 8 – 10   70 – 30 = 40  	**Stage 2** (units first) 84 – 56 = 28  **Extend to 3 digit numbers**	**Stage 3** (units first) 81 – 57 = 24 70 11 - 50 7 20 4 754 – 86 600 140 14 - 80 6 754 – 86 600 140 14 - 80 6 600 60 8 = 668	(units first) 754 – 286 700 50 4 - 200 80 6 600 140 14 - 200 80 6 400 60 8 = 468 leading to 6 14 1 7 ~~5~~ 4 - 2 8 6 4 6 8	(units first) 5 13 1 6 ~~4~~ 6 7 - 2 6 8 4 3 7 8 3
• Illustrate number stories with number sentences • Model interpretation of – sign using appropriate language • Comparing numbers of objects • How many are left – count back • How many have been removed – count on • How many more are needed – count on					extend to decimals using chosen method →		
		Using an empty number line ↔			Call each digit by its value. £6.28 - £3.15		
		Find the difference by counting up	**Understand inverse is addition** **20-13 = 7** **13 = 7 = 20** **Fact families**				

Multiplication

To multiply successfully, children need to be able to:

- recall all multiplication facts to 10 × 10;
- partition number into multiples of one hundred, ten and one;
- work out products such as 70 × 5, 70 × 50, 700 × 5 or 700 × 50 using the related fact 7 × 5 and their knowledge of place value;
- add two or more single-digit numbers mentally;
- add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7, and their knowledge of place value;
- add combinations of whole numbers using the column method (see above).

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for multiplication.

Progression examples:

1. No 'carrying'	32	44
	x3	x2
2. Extra digit	32	51
	x4	x4
3. 'Carrying' but keeping in same decade	83	34
	x4	x7
4. 'Carrying' and going into next decade	78	68
	x7	x8
5. Noughts	202	430
	x4	x6
6. Multiplying by multiples of 10	87	416
	x10	x 60
7. 'Long' multiplication	47	832
	x23	x74

Multiplication

Stage 1 — Mental multiplication using partitioning

Informal recording in Year 4 might be:

43

40 + 3 ×6

240 + 18 = 258

Also record mental multiplication using partitioning:

$14 \times 3 = (10 + 4) \times 3$
$= (10 \times 3) + (4 \times 3) = 30 + 12 = 42$

$43 \times 6 = (40 + 3) \times 6$
$= (40 \times 6) + (3 \times 6) = 240 + 18 = 258$

Note: These methods are based on the distributive law. Children should be introduced to the principle of this law (not its name) in Years 2 and 3, for example when they use their knowledge of the 2, 5 and 10 times-tables to work out multiples of 7:

○○○○○○○ ○○○○○…○○
○○○○○○○ ○○○○○…○○
○○○○○○○ ○○○○○…○○

$7 \times 3 = (5 + 2) \times 3 = (5 \times 3) + (2 \times 3) = 15 + 6 = 21$

Stage 2 — The Grid Method (introduced in year 4)

38 × 7 = (30 × 7) + (8 × 7)
= 210 + 56 = 266

x	30	8	
7	210	56	266

	30 + 8
×	7
	210
	56
	266

Derive and recall ALL multiplication facts up to 10 x 10, the corresponding division facts and multiples of numbers to 10 up to the tenth multiple.

Stage 3 — Expanded short multiplication (by end of year 4)

30 + 8
× 7
210
56
266

$30 \times 7 = 210$
$8 \times 7 = 56$

38
× 7
210
56
266

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.

Stage 4 — Short Multiplication

38
× 7
266
5

The step here involves adding 210 and 50 mentally with only the 5 in the 50 recorded. This highlights the need for children to be able to add a multiple of 10 to a two-digit or three-digit number mentally before they reach this stage.

If, after practice, children cannot use the compact method without making errors, they should return to the expanded format of stage 3.

Stage 5 — Two-digit by Two-digit products (by end of year 5)

56 × 27 is approximately
60 × 30 = 1800.

×	20	7	
50	1000	350	1350
6	120	42	162
			1512

1

	50	6	
×	20	7	
	1000	350	1350
	120	42	162
			1512

1

56 × 27 is approximately
60 × 30 = 1800.

56
× 27
1000
120
350
42
1512
1

$50 \times 20 = 1000$
$6 \times 20 = 120$
$50 \times 7 = 350$
$6 \times 7 = 42$

56 × 27 is approximately
60 × 30 = 1800.

56
× 27
1120
392
1512
1

56×20
56×7

Multiplication

N	R	Y1	Y2	Y3	Y4 **Stage 4 by the end of stage 4**	Y5	Y6 **Stage 5**
Through practical activities in meaningful contexts Grouping objects in twos or threes, then adding groups of the same number	counting in 2s, 10s Doubles up to 5 + 5	Doubles up to 10 + 10 Counting in 2s,**5's** 10s	double by partitioning and recombining →				
			Doubles to 20+20 Multiples of 5 to 50 Doubles of multiples of 10 to 100 Counting in 2s, 10s + 5s. Reading 4 x 2 = 8 Δ Δ Δ Δ Δ Δ Δ Δ or 2 x 4 = 8 Δ Δ Δ Δ Δ Δ Δ Δ • Record using x and = signs • Understand 3x2 as 2+2+2 - **Repeated addition** • Understand 15x3 is (10x3) + (5x3)	understand multiplication as repeated addition 15 x 3 15 added together 3 times 15 + 15 + 15 32 x 3 30 x 3 = 90 2 x 3 = 6 90 + 6 = 96 • Record + as x and vice versa. **Multiply 1 or 2 digit nos by 10 or 100** **Family facts for x / ÷**	143 x 2 (100 x 2 40 x 2 3 x 2) **Stage 1** 200 + 80 + 6 = 286	487 x 2 (400 x 2 80 x 2 7 x 2) 800 + 160 + 14 = 974	3620 x 2 (3000 x 2 600 x 2 20 x 2) 6000+1200+40 = 7240
					Stage 2 grid method →		
					23 x 8 x | 20 3 8 | 160 24 160 + 24 = 184	**Stage 5 grid method 2 digit by 2 digit** 72 x 38 x | 70 2 30 | 2100 60 □ 8 | 560 16 □ 2100+560+60+16= 2736	372 x 24 X | 300 70 2 20 | 6000 1400 40 □ 4 | 1200 280 8 □ 6000+1400+1200+2 80+40+8 = 8928
					Decimals →		
					346 x 9 x | 300 40 6 9 | **Multiply by 10 and 100 numbers to a 1000**	4.9 x 3 x | 4 0.9 3 | 12 2.7 12 + 2.7 = 14.7	4.92 x 3 x | 4 0.9 0.02 3 | 12 2.7 0.06 12 + 2.7 + 0.06 = 14.76
					Stage 3 expanded Short multiplication vertically	346 9 x 54 (6x9)	4346 8 x 48 (6x8)

Multiplication

23 **20 + 3** 7 x **7** 21 (3x7) 140 (20x7) 161 leading to: 23 7 x 161 2	360 (40x9) 2700 (300x9) 3114 leading to: 72 38 x 576 (72x8) 2160 (72x30) 2736	320 (40x8) 2400 (300x8) 32000 (4000x8) 34768 leading to: 352 27 x 2464 7040 9504
←	→	
Units first (relies on mental calculation strategies		

Division

(the strategy recommend partitioning (of multiples eg 72 ÷ 3 = 60 + 12 ÷ 3)- stage 1 and 2 for short division. This policy uses repeated subtraction moving on to chunking)

To divide successfully in their heads, children need to be able to:

- understand and use the vocabulary of division – for example in 18 ÷ 3 = 6, the 18 is the dividend, the 3 is the divisor and the 6 is the quotient;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways;
- recall multiplication and division facts to 10 × 10, recognise multiples of one-digit numbers and divide multiples of 10 or 100 by a single-digit number using their knowledge of division facts and place value;
- know how to find a remainder working mentally – for example, find the remainder when 48 is divided by 5;
- understand and use multiplication and division as inverse operations.

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for division.

To carry out written methods of division successful, children also need to be able to:

- understand division as repeated subtraction;
- estimate how many times one number divides into another – for example, how many sixes there are in 47, or how many 23s there are in 92;
- multiply a two-digit number by a single-digit number mentally;
- subtract numbers using the column method.

Examples:

Single-digit division

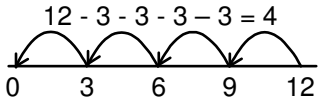
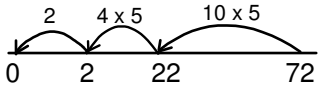
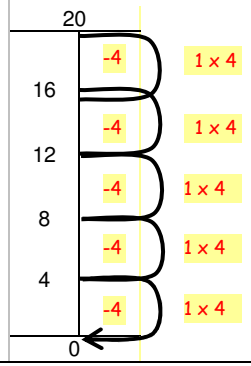
1. No remainder, no carrying — $3\overline{)69}$ $3\overline{)264}$
2. Remainder, no carrying — $3\overline{)68}$
3. No remainder, carrying — $3\overline{)45}$
4. Remainder, carrying — $3\overline{)47}$
5. Placing of the quotient — $7\overline{)287}$
6. Noughts in quotient — $4\overline{)816}$ $8\overline{)5608}$
7. No remainder — $32\overline{)64}$ $31\overline{)93}$
8. Similar but remainder — $13\overline{)29}$ $31\overline{)97}$

Two digit division

9. Quotient not so apparent — $22\overline{)56}$ $41\overline{)92}$
10. Placing the quotient — $21\overline{)126}$ $32\overline{)224}$
11. No remainder — $21\overline{)483}$ $32\overline{)224}$
12. Remainder — $33\overline{)718}$
13. Noughts in quotient — $17\overline{)6834}$
14. Divisors like 29, 39, 48
15. Divisors like 45, 37, 24, 56

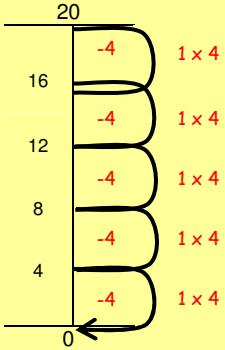
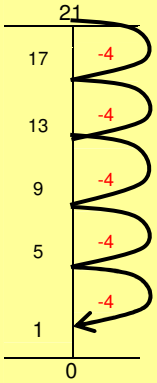
Division

(the strategy recommend partitioning (of multiples eg 72 ÷ 3 = 60 + 12 ÷ 3)- stage 1 and 2 for short division. This policy uses repeated subtraction moving on to chunking)

Stage 1 Grouping and sharing	Stage 2 Repeated subtraction	Stage 3 Expanded short division leading to compact short division (by end of year 4)	Stage 4 Long Division (by end of year 5)
Division as Grouping A bag of 6 sweets, how many children can have 2 sweets each. The division sign (÷) 'divided into groups of' Division as Sharing Share equally Share a bag of 6 sweets between 2 children – one for you, one for me…	Counting in multiples Use hands: How many groups of 5 in 15? How many 5s have been counted? How many more 5s do we need to reach 25? Use number square to demonstrate counting in multiples. Using a number line: 12 ÷ 3 = 4 12 - 3 - 3 - 3 – 3 = 4  72 ÷ 5 Can we subtract 10 lots of 5? How many other lots of 5 can we subtract?  Turn number line around  	97 ÷ 9 9⟌97 − 90 9×10 7 Answer: 10 R 7 6⟌196 − 60 6×10 136 − 60 6×10 76 − 60 6×10 16 − 12 6× 2 4 32 Answer: 32 R 4 To find 196 ÷ 6, we start by multiplying 6 by 10, 20, 30, … to find that 6 × 30 = 180 and 6 × 40 = 240. The multiples of 180 and 240 trap the number 196. This tells us that the answer to 196 ÷ 6 is between 30 and 40. Start the division by first subtracting 180, leaving 16, and then subtracting the largest possible multiple of 6, which is 12, leaving 4. 6⟌196 − 180 6×30 16 − 12 6× 2 4 32 Answer: 32 R 4 The quotient 32 (with a remainder of 4) lies between 30 and 40, as predicted.	How many packs of 24 can we make from 560 biscuits? Start by multiplying 24 by multiples of 10 to get an estimate. As 24 × 20 = 480 and 24 × 30 = 720, we know the answer lies between 20 and 30 packs. We start by subtracting 480 from 560. 24⟌560 20 − 480 24×20 80 3 72 24×3 8 Answer: 23 R 8 In effect, the recording above is the long division method, though conventionally the digits of the answer are recorded above the line as shown below. 23 24⟌560 −480 80 −72 8 Answer: 23 R 8

Division

(the strategy recommend partitioning (of multiples eg 72 ÷ 3 = 60 + 12 ÷ 3)- stage 1 and 2 for short division. This policy uses repeated subtraction moving on to chunking)

N	R	Y1	Y2	Y3	Y4	Y5	Y6
		Halving up to 10	Halving by partitioning and recombining →				
		understanding 8 ÷ 2 as half of 8	Understand division as grouping (repeated subtraction) Interpret 8 ÷ 2 as how many 2s make 8? Δ Δ / Δ Δ / Δ Δ / Δ Δ and '8 put into groups of 2'		72 ÷ 2 70 ÷ 2 = 35 2 ÷ 2 = 1	358 ÷ 2 300 ÷ 2 = 150 50 ÷ 2 = 25 8 ÷ 2 = 4	3476 ÷ 2 3000 ÷ 2 400 ÷ 2 70 ÷ 2 6 ÷ 2
Through practical activities in meaningful contexts Grouping objects equally 10 grouped into 2s *How many groups?*			Halving of numbers up to 20 Halves of multiples of 10 to 100 Record using ÷ and = signs Know related division facts for 2 x 5 x 10 x tables Recognise relationship between x and ÷ Include calculations with remainders	Use multiplication facts and count up/back 20 ÷ 4 = 5 count up/back in 4s  remainders i.e. 21 ÷ 4 = 5 r 1  Inverse of x	35 + 1 = 36 Concrete 'acting out' of repeated subtraction	150 + 25 + 4 = 179	1500+200+35+3 = 1738
		Grouping 2,5,10 Represent number stories using ÷ sign.			repeated subtraction (chunking) →		
					72 ÷ 5 14r2 5) 72 - 20 (4x5) 52 - 20 (4x5) 32 - 20 (4x5) 12 - 10 (2x5) 2	256 ÷ 7 36r4 7) 256 - 210 (30x7) 46 - 42 (6x7) 4	977 ÷ 36 27r5 36) 977 - 720 (20x36) 257 - 180 (5x36) 77 - 72 (2x36) 5
					bracketed numbers represent how many groups	Decimals →	
						Express remainder as fraction.	7) 87.5
				Remainders rounded depending on context			

Vocabulary

	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition and subtraction	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…? 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	+, plus, near double, how much more is…? - , subtract, minus how much less is…? half, halve =, equals, sign Tens, ones **Count up** **Number sentence** **digit**	addition, one hundred more, subtraction, one hundred less, tens boundary ones, units, tens	hundreds boundary **partition** **1 digit** **2 digit** **3 digit** **inverse**	Increase, decrease, ***inverse*** **Thousands** **4 digits** **decimal point** **decimal place** **tenths/hundredths** **negative**	units boundary, tenths boundary **ten thousands** **million**	i**nteger**
Multiplication and division		double, halve share, left, left over **half** **near double** **count in 2s,5s,10s** **groups of**	***lots of, groups of*** x, times, multiply, multiplied by multiple of once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column share equally one each, two each, three each… group in pairs, threes… tens equal groups of ÷, divide, divided by, divided into **multiplication**	***multiplication,*** product **left** **left over** **remainder** **round up/down** **grid** **row** **column**	factor, quotient, divisible by **inverse** **divisor**		**dividend**