	FS2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition and Subtraction	Use quantities and objects to add and subtract two single digit numbers and count on or back to find the answer. • Use concrete objects to add & subtract • Counting on using pre-drawn numbered number lines • Subitise numbers 1-10 in different forms and assign digit to objects • Begin to write simple number sentences understanding symbols + - & = •	Read, write and interpret maths statements including +, -, =. Represent and use number facts within 20. Add and subtract one and two-digit numbers to 20 including 0. Solve one step problems that involve addition and subtraction using concrete objects and pictorial representations, and missing number problems. • Continue to use concrete objects to add & subtract • Consolidate Subitising of numbers 1-10 & extend in different forms and assign digit to objects • Consolidate understanding of symbols + - & = when writing number sentences • Using a number square to add & subtract • Introduce place value counters as a means of supporting addition and subtraction • Use numbered number lines for addition & subtraction (however in case of blank number line & subtraction use them to find the difference)	Solve problems with addition and subtraction using concrete objects, pictorial representations, including those involving numbers, quantities and measures Recall and use addition and subtraction facts to 20 fluently and derive and use related facts to 100. Add and subtract numbers using .... And mentally including: 2 digit number and ones 2 digit number and tens Two 2 digit numbers Adding three 1 digit numbers. Show addition can be done in any order but subtraction cannot Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. • Use numbered number lines for addition & subtraction (however in case of subtraction use them to find the difference) • Use of place value counters & grids to support both addition & subtraction & reinforce place value (in first instance use grids to calculate but record number sentence as 24 + 23 = 47) • Introduce Step 1 columnar method when not crossing tens barrier • Ie 20 3 + 30 2 50 5 • 40 8 20 6 20 2	Add and subtract numbers mentally, including: A 3 digit number and ones A 3 digit number and tens A 3 digit number and 100s Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction. Estimate the answer to a calculation and use inverse operations to check answers Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. • Continue to use place value counters & grids with increasingly large numbers to support both addition & subtraction & reinforce place value • Consolidate use of Step 1 columnar method when not crossing tens barrier • Ie 20 3 + 30 2 50 5 • 40 8 20 6 20 2 • Move on to crossing the tens barrier with continued use of place value counters & grids to support	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate. Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two step problems in contexts, deciding which operations and methods to use and why • Move from step 1 column addition to Step 3 (use step 2 below if children unable to make transition or place value understanding is not secure) with increasingly larger numbers Ie 357 + 156 13 100 400 513 • Introduce decimals to 1 d.p into both addition & subtraction initially not crossing tens barrier & relating to fractions • Continue to use step 1 partitioned subtraction with both increasingly larger numbers & decimals to 1 d.p • Continue to use place value counters & grids where necessary to support, especially to ensure understanding of 0 as a place holder in subtraction)	Add and subtract numbers with more than 4 digits using formal written methods. Add and subtract numbers mentally with increasingly large numbers. Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Solve addition and subtraction multistep problems in contexts, deciding which operations and methods to use and why. • Introduce & move towards contracted column addition & subtraction for all, ensuring understanding of exchange where 0 is a place holder ie 3204 - 1769) • Continue to use place value counters & grids where necessary to support,	Solve addition and subtraction multistep problems in contexts, deciding which operations and methods to use and why. Solve problems involving addition and subtraction. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • Use of contracted column addition & subtraction by all

KNOWLEDGE & UNDERSTANDING OF PLACE VALUE UNDERPINS ALL CALCULATION STRATEGIES

Addition and Subtraction

WHAT SHOULD WE SEE IN BOOKS

FS

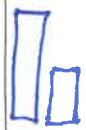
All done practically using language of + & −

❀❀ + ❀

= ❀❀❀

2 + 1 = 3 (spoken) ⇐ not written

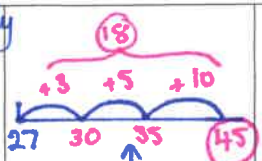
5 − 2 = 3



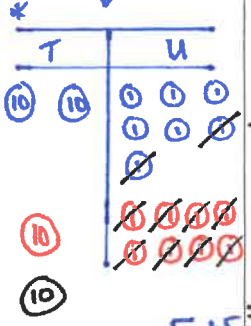
10 + 5 = 15

15

Yr 1

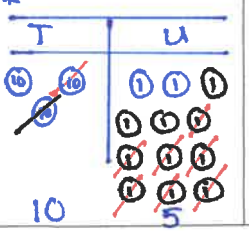


27 + 18 = ANS



40 + 5 = 45

32 − 17 ANS



(17 = 10 7)

32 − 17 = 15

* same principle with diennes

Yr 2

STEP 1

Need to use practical resources to support written calculations. Must be secure in concrete apparatus before move onto written.

a) T U
60 1
+ 10 4
70 5 = 75

b) 10
40 7
+ 20 9
70 6 = 76

a) T U
40 3
− 10 2
30 1
= 31

b) 50
~~60~~ 14
− 20 6
30 8
= 38

Yr 3

a) 300 50 2
+ 100 30 6
400 80 8
= 488

b) 100 10
400 80 5
+ 300 70 6
800 60 1
= 861

a) 200 70 9
100 60 1
100 10 8
= 118

b 10
300 ~~20~~ 11
− 100 10 9
200 0 2
= 202

100 90
c) ~~500~~ ~~10~~ 11
− 300 20 7
100 70 4
= 174

Yr 4

+

Use step 1 for less able once secure move onto step 3. However some children may find this transition too difficult in which cause use step 2.

STEP 2 +

3 5 7
+ 4 2 5
12
70
700
782.

−

For subtraction transition to step 3 using concrete resources (p.v. counters) to support.

Yr 5

STEP 3

1 1 1
36,198
+ 7,226
43,424

1 1 3 10 1
21,410
− 17,315
4,095

1
12.2
+ 6.8
19.0

1 4
~~15~~ .2
− 7.5
7.7

Yr 6

12.3 + 14.06.

12.30
+ 14.06
26.36

10.02 − 3.9

9
~~10~~ .02
− 3.90
6.12

- Always support where needed with practical resources
- There's always a place for number lines
- NUMBER LINES NEED TO BE USED FOR TIME

Multiplication and Division	Solve problems including doubling, halving and sharing. • Expose children to a range of vocabulary meaning to multiply (lots of) & divide (sharing, groups of) • Use of concrete objects & scenarios (ie how could we share the pizza fairly between us) to solve multiplication & division problems	Solve one step problems involving multiplication and division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. • Continued use of concrete objects & scenarios (ie how could we share the pizza fairly between us) to solve multiplication & division problems • Introduce array grids & counters to solve multiplication number sentences (introduce symbol x) & to show that if ie 3 x 5 = 15 then 5 x 3 = 15 • Use of repeated addition • Use of pictorial representations (including arrays) to understand division. Emphasis on grouping although still important to use sharing too	Recall and use x and ÷ facts for 2, 5 and 10 tables including recognising odd and even numbers. Calculate mathematical statements for x and ÷ within the multiplication tables and write them using the x, ÷ and = signs. Show multiplication can be done in any order (commutative) and division cannot. Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and x and ÷ facts including problems in context. • Continued use of array grids & counters to solve both multiplication & division number sentences & to show that if ie 3 x 5 = 15 then 5 x 3 = 15 • Use of mental recall of multiplication tables to reinforce division as inverse of division • Use of sliding grids to demonstrate multiplication & division by 10 (&100)	Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables. Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, 4 × 12 × 5 = 4 × 5 × 12 = 20 × 12 = 240) and multiplication and division facts (for example, using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (for example, 30 × 2 = 60, 60 ÷ 3 = 20 and 20 = 60 ÷ 3). Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division. Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects. • Introduce use of place value counters to multiply increasingly larger numbers & to support grid multiplication • Consolidate use of grids to demonstrate multiplication & division by 10, 100 & 1000 including decimals • Use of place value counters to divide by grouping initially where no exchange is necessary • Link this to division using inverse of multiplication facts	Recall multiplication and division facts for multiplication tables up to 12 × 12. Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers. Recognise and use factor pairs and commutativity in mental calculations. Multiply 2 digit and 3 digit numbers by a 1 digit number using formal written layout. Solve problems involving multiplying and adding, using the distributive law to multiply 2 digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects. • Consolidate use of grid multiplication (including decimals) • Use of long division/division by chunking to divide numbers of increasing size	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19. Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers. Multiply and divide numbers mentally drawing upon known facts. Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. • Introduce long multiplication ie 24 X 12 48 240 288 • ie 24 X 16 200 (10 x 20) 120 (6 x 20) 40 (10 x 4) 24 (6 x 4) 384 • Secure use of long division / division by chunking including decimals	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. Perform mental calculations, including with mixed operations and large numbers Identify common factors, common multiples and prime numbers. Solve problems involving multiplication and division. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy • Use of long multiplication & division (short division where appropriate)

KNOWLEDGE & UNDERSTANDING OF PLACE VALUE UNDERPINS ALL CALCULATION STRATEGIES

Multiplication and Division

WHAT SHOULD WE SEE IN BOOKS

FS

All done practically using language of × and ÷

A
B
C

2 × 3 = 6.

SHARING.

A B

GROUPING

How many groups of 2.

Yr 1

As in FS.

Moving on when secure.

to arrays + repeated addition →

Yr 2

FACT FAMILIES

5 × 3

(5 + 5 + 5)

00000
00000
00000
= 15

= 3 × 5

(3 + 3 + 3 + 3 + 3)

000
000
000
000
000
= 15

GROUPING.

15 ÷ 5 = 3

= 15 ÷ 3 = 5

5 jumps

0 3 6 9 12 15

Numbered number line

↓

Blank number line

Yr 3

35 × 4.

T	U
000	00000
000	00000
000	00000
000	00000

120 + 20
= 140.

When secure transition to grid × ion using pv counters

×ing + ÷ing by 10 + 100 *

52 × 10

H	T	U
5	2	0

1700 ÷ 100

Th	H	T	U	t	h
1	7	0	0		
	1	7	.	0	0

264 ÷ 4

0
200
240
264

4 × 50
4 × 10
4 × 6
= 66.

4 | 264
− 200 4 × 50
64
− 40 4 × 10
24
− 24 4 × 6
0

Yr 4

362 × 24

×	300	60	2
	BIGGEST		
20	6000	1200	40
4	1200	240	8
			SMALL-EST

7200
1440
48.
8688

×ing + ÷ing by 10, 100, 1000 etc into decimals eg.

527 × 100

Th	H	T	U
5	2	7	
5	2	7	0 0

527 ÷ 100

H	T	U	t	h
5	2	7		
5	.	2	7	

327

5 | 1635
− 1000 5 × 200
635
− 500 5 × 100
135
− 100 5 × 20
35
− 35 5 × 7
0

Yr 5

27.3 × 9.

×	20	7	0.3
9	180	63	2.7

180.0
63.0
2.7
245.7

27.26 × 4.

×	20	7	0.2	0.06
4	80	28	0.8	0.24

108.00
0.80
0.24.
109.04

3 | 98.7
− 90.0 3 × 30
8.7
− 6.0 3 × 2
2.7
− 2.7 3 × 0.9
0
= 32.9

Yr 6

352
× 5
1760

3.9 × 5 = 19.5

421
× 28
3368
8420
11,788

57
6 | 342

19.8
5 | 99.0

* DO NOT SAY ADD 1/2/3 ZERO'S BUT ZERO'S TELL YOU HOW MANY PLACES TO SLIDE

	FS2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
RESOURCES TO SUPPORT ADDITION & SUBTRACTION: IN ADDITION TO ABOVE FOR MULTIPLICATION AND DIVISION:	• Numicon • STERN • Diennes • Range of concrete objects • Egg boxes • Number tracks	• Numicon • Diennes • Range of concrete objects • Tens frames • Place value counters • Multilink • Centicubes • Dice • Bead strings • Number fans • 100 squares • Cuisenaire rods • Digit cards • Abacuses	• Numicon • Diennes • Range of concrete objects • Place value counters & grids • Tens frames • Place value counters • Multilink • Centicubes • Dice • Bead strings • Number fans • 100 squares • Cuisenaire rods • Digit cards • Abacuses	• Place value counters & grids • Diennes • Digit cards • Dice • Coins • Number lines • Number tracks • Abacuses • 100 square • Cuisenaire rods • Sliding grids (place value grids) • Multiplication grids	• Place value counters & grids • Diennes • Digit cards • Dice • Number lines • 100 square • Cuisenaire rods • Sliding grids (place value grids) • Multiplication grids	• Place value counters & grids • Diennes • Digit cards • Dice • Number lines • 100 square • Cuisenaire rods • Sliding grids (place value grids) • Multiplication grids	• Place value counters & grids • Diennes • Digit cards • Dice • Number lines • 100 square • Cuisenaire rods • Sliding grids (place value grids) • Multiplication grids

NOTES ON WRITTEN CALCULATION.

- Progression overlaps year groups. LA may be using an earlier step, whilst HA may be using a later step. However ensure that their knowledge of place value matches the strategy which they are using.
- All children must be exposed to the age appropriate strategy even if using a different strategy.
- Reinforce use of estimation & approximation before carrying out a calculation so children are able to validate their answer.
- Reinforce inverse operation as a means of checking their work.
- When introducing new method children should use their secure method in order to check
- When using methods like partitioning/column addition ensure reinforcement of place value

  Eg: H TU
  96
  + 12
  108

  Say 6+2 = 8 units

  90 + 10 = 100 100 is 10 tens, so I carry my 1 hundred To the hundreds column and the number 100 has no Tens so I put a 0 in the tens column etc.
- 'Exchanged' digits go at the top beneath HTU
- A range of strategies should be evident