Year 1

Statutory requirements

Pupils should be taught to:

- read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = 7 9

Notes and guidance (non-statutory)

Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 - 7 = 9; 7 = 16 - 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.

Pupils combine and increase numbers, counting forwards and backwards.

They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.



7

It is important that children learn all the pairs of numbers that total 10 so they can use this knowledge when adding beyond 10.

Additionally, they should learn to partition the numbers up to 10 (e.g. 6 = 1 + 5, 2 + 4, 3 + 3) to enable them to cross boundaries efficiently, avoiding counting in ones.



8 + 6 = 8 + 2 + 4 =







'13...15....18' or '13...18'

7 + 🗌 = 20



Subtraction

Understanding subtraction as 'taking away'

5-3=2 5-2=3







Understanding subtraction as 'finding the difference'



What is the difference between 10 and 7? How many more blue cubes than yellow cubes? How many fewer yellow than blue cubes?



The difference between 7and 10 is 3.



The difference between 8 and 5 is 3.



Crossing the 10s boundary





'Finding the difference'



Understanding patterns i.e. If 20 - 13 = 7, 20 - 7 = 13





Year 2

Statutory requirements

Pupils should be taught to:

- solve problems with addition and subtraction:
- using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Notes and guidance (non-statutory)

Pupils extend their understanding of the language of addition and subtraction to include sum and difference.

Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 - 7 = 3 and 7 = 10 - 3 to calculate 30 + 70 = 100; 100 - 70 = 30 and 70 = 100 - 30. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.

Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Addition/Subtraction

Year 2

Pupils should be taught to:

- solve problems with addition and subtraction:
 - \Rightarrow using concrete objects and pictorial representations, including those involving numbers, quantities and measures
 - \Rightarrow applying their increasing knowledge of mental and written methods

Using the concrete objects and the pictorial representations shown in Year 1 as calculation tools, ensure that children are provided with a range of opportunities to solve problems using a variety of contexts and resources. Additionally, in line with children's growing knowledge of measure, include problems involving **mass, length, capacity, time, money** and **temperature**.



Order the worms by length.

How much longer is the purple worm than the yellow one?

What is the total length of the red and green worm together?



The sack of potatoes weighs 13kg and the sack of sprouts weighs 7kg.

How much heavier is the sack of potatoes?

recall and use addition and subtraction facts to 20 fluently,

Use the concrete equipment suggested in Y1 to develop this understanding and knowledge e.g. Numicon, bead stringers, hangers and pegs, straws, Unifix etc. Children must have regular practice (building on from the addition and subtraction calculations in Year 1) in order to have rapid recall of these facts by the end of Year 2.



Addition and Subtraction Trios	8 + 6 = 14
spreadsheet - see shared drive.	6 + 8 = 14
	14 - 6 = 8
	14 - 8 = 6

and derive and use related facts up to 100

Use concrete equipment to introduce the addition and subtraction of numbers to 100 e.g. coins, bundles of straws, Numicon, Diennes equipment etc



Number Line ITP - see shared drive

0000000000



CONCEPTED CONCEP

0	1 0	20	3 0	***** 40	6 50	60	7 0	80	90	100
								80	- 20	100

 \Rightarrow a two-digit number and ones



17 + 6 =







Moving on to 100 squares and number lines when confident calculating with practical equipment.

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



(s)

(IP











Take away







\Rightarrow two two-digit numbers

Use the models and images indicated previously e.g. bundles of straws, Numicon, 100 square, money etc. to develop pupils' understanding before moving them on to using an unmarked number line. Such practical equipment should continue to be used to consolidate what is happening on the number line.



Use straws, coins, Diennes, Numicon, Number lines etc

Take away



Then move on to calculations which cross a tens boundary

Take away

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E.g. 45 - 17
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Take away a bundle of 10. Then take away the 5 individual straws and finally remove 2 straws from one of the remaining bundles of 10 to leave 28 straws remaining.

Number Line



Find the difference



We should encourage children to become decision makers in relation to 'taking away' or 'finding the difference'. In the main we only 'take away' when the amount being subtracted is relatively small; in most instances we 'find the difference' as children tend to find it easier to count forwards rather than backwards.

<u>Special Case Strategies</u> (These should be taught alongside the methods indicated previously)

Rounding and adjusting e.g. +19, 29,39,,,+11, 21,31,41...



Rounding and adjusting e.g. -19, 29,39,,,-11, 21,31,41...



\Rightarrow adding three one-digit numbers

7 + 8 + 3

Children should be taught that numbers can be reordered to make calculations more efficient e.g. looking for pairs of numbers that total 10. 7 + 3 + 8

- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot Using the models and images from page 1 demonstrate that addition can be done in any order.
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.



3 + 7 = 10 10 - 7 = 3



Addition and Subtraction Trios spreadsheet - see shared drive.



Year 3

Statutory requirements

Pupils should be taught to:

- add and subtract numbers mentally, including:
- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds
- add and subtract numbers with up to three 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.

Notes and guidance (non-statutory)

Pupils practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.

Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent (see Mathematics Appendix 1).

Year 3

Pupils should be taught to:

- add and subtract numbers mentally, including:
 - \Rightarrow a three-digit number and ones
 - \Rightarrow a three-digit number and tens
 - \Rightarrow three-digit number and hundreds

Use models and images previously demonstrated such as Diennes, money, straw bundles and number lines to teach **mental** calculations of the above. Remember to encourage children to decide whether to **' take away'** or **'find the difference'** in relation to subtraction.

add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
 *Use straw bundles initially to demonstrate the need to swap ones for tens and tens for hundreds etc. where necessary.

Add the least significant digits first in preparation for 'carrying'



Use the models and images above to carry out addition calculations which require exchanges:

- \Rightarrow Tens to hundreds e.g. 163 + 275
- \Rightarrow Units to tens **and** tens to hundreds e.g. 378 + 457

(Remember to include calculations involving zeros.)

No exchanges e.g. 374 - 123 =





Use the models and images above to carry out subtraction calculations which require exchanges:

 \Rightarrow hundreds to tens e.g. 339 - 154

	Н	Т	0	
	²	¹ 3	9	
_	1	5	4	
	1	8	5	

I can't take 5 tens away from 3 tens so I must swap one of my hundreds for 10 tens.

Now I've got 13 tens and can take 5 away.

(Remember to include calculations involving zeros e.g.307 - 125)

Use the models and images above to carry out subtraction calculations which require exchanges:

Year 4

Statutory requirements

Pupils should be taught to:

- 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.

Notes and guidance (non-statutory)

Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency (see <u>Mathematics Appendix 1</u>).

Year 4

Pupils should be taught to:

 add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Children should always be taught to consider "Can I do it in my head? Do I need to make a jotting to help me work it out? If not, I can use a written method."

When children are sound in relation to carrying out exchanges within addition and subtraction calculations, they can record the compact method without the use of equipment. However, when required ,use the models and images demonstrated in Year 3 to confirm understanding.

625	683	367	378	£3.78
+ _ 4 8	+ 1 4 2	+ 85	+ 457	£4.57
673	825	452	835	£8.35
1	1	11	11	1 1

	3378	£ 35.78
+	2457	£ 40.57
	5835	£ 76.35
	1 1	1 1

 \Rightarrow Subtraction - Tens to ones **and** hundreds to tens e.g. 382 - 197

² ¹⁷ ⁸ ¹ 2	⁶ / ¹ ³ / ₄ 5 6	8 ⁵ 8 ¹³ 4 ¹ 2
- 197	_ 1 7 8 4	1.5 5
1 8 5	5 6 7 2	84.87

- 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.

Year 5

Statutory requirements

Pupils should be taught to:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- 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 multi-step problems in contexts, deciding which operations and methods to use and why.

Notes and guidance (non-statutory)

Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see <u>Mathematics Appendix 1</u>).

They practise mental calculations with increasingly large numbers to aid fluency (for example, 12462 - 2300 = 10162).

Addition and Subtraction

Year 6

Statutory requirements

Pupils should be taught to:

- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Notes and guidance (non-statutory)

Pupils practise addition and subtraction for larger numbers, using the formal written methods of columnar addition and subtraction (see <u>Mathematics Appendix 1</u>).

They undertake mental calculations with increasingly large numbers and more complex calculations.

Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.

Pupils explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$.

Year 5

Pupils should be taught to:

• add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)

Use the formal written methods demonstrated in Y4 to carry out these calculations with larger numbers and those including decimals.

17.4 + 46.29	62.5 + 48 + 3.07	60.65 + 153 + 3.8
17.40	62.50	60.65
46.29	48.00	153.00
63.69	3.07	3.80
1 1	113.57	217.45
	1 1	1 1

- 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
 Children must be encouraged to approximate answers through rounding, particularly in relation to the addition and subtraction of decimals
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Year 6

Pupils should be taught to:

- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
 - Pupils explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.