SUBTRACTION STRATEGIES

	Strategy	Key concepts
Foundation Stage <u>Aim by end of year:</u> -All can say which number is one more or one less than a given number - Using quantities and objects, all can add and subtract two single-digit numbers and count on or back to find the answer -All can move (count on or back) up to 10 spaces on a number track. -Some can discuss difference mathematically	**Subtraction must be introduced and taught through stories and practical problems in a real or role play context throughout Foundation Stage to give meaning to the concept.**	
	Numicon pegs are introduced straight away through structured and self-initiated activities to allow the pupils to become familiar with them. In preparation for calculations, pupils should be able to recognise, name and order the shapes and be able to use the shape patterns to organise groups of objects.	See EYFS Numicon EOY outcomes for further support and ideas.
	Begin to explore subtraction first through the use of concrete objects, including Numicon pegs, taking away a given amount. Pupils can also explore using the Numicon IWB software to take away objects / pegs, or use the subtraction covers to see how many are left. When ready, pupils will move to also exploring subtraction using the Numicon shapes, by selecting a piece and covering a given amount to see what's left. Following concrete objects, pupils will then be ready to move to pictorial representations, crossing out pictures to find what's left. 	Pupils should begin to organise the objects / pegs in the Numicon shape patterns when ready to help them calculate without counting. Pupils should be taught to create Numicon patterns **2 handed, from the bottom up** (ie. One object in each hand simultaneously). When covering Numicon / removing objects from Numicon pattern, pupils must be taught to **remove / cover from the top down** unless subtracting an even number from an odd number.
	Pupils will begin to read and respond to pictoral number sentences. 	Numicon shapes and flashcards Numicon dice and spinners
	Begin to find own ways of recording for subtraction e.g. cross-outs. 	Children should learn to sing lots of number rhyme songs eg. 5 currant buns, 5 little monkeys etc
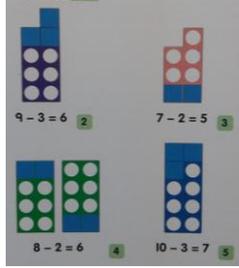
SUBTRACTION STRATEGIES

<table>
<tr>
<td></td>
<td>Adults to model recording. (After practical work, in context and in conjunction with apparatus).
7 – 2 = 5

Children record number sentences related to practical work, when ready.</td>
<td>Key resources:
Practical counting equipment
Horizontal and vertical number tracks / lines
Washing line
Rulers
Board games
Numicon shapes and flashcards
Numicon dice and spinners
Numicon IWB software</td>
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<tr>
<td></td>
<td>Adults model use of number tracks and number lines to support understanding of subtraction and finding one less than. Number tracks / lines should not be used as the only method for addition at this stage.

Adults model use of number tracks and number lines to count back, and forwards to begin to find the difference.

6 – 2 = 4</td>
<td>Number tracks and number lines to be available for children to use in free flow activities.</td>
</tr>
<tr>
<td>Year 1

<u>Aim by end of year:</u>
▪ 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</td>
<td>Pupils build on knowledge gained in EYFS by using Numicon as the primary resource for subtraction, supported by number lines. As pupils become more fluent in the use of Numicon, they become more able use it to calculate without counting.

Subtraction by 'take away', covering the holes with fingers or subtraction covers (Numicon folder 1, Photocopy Master 36). This strategy can also be reinforced using the pegs in the Numicon shape patterns and taking away, or by using pictures of the pegs to cross out.

Subtraction by 'finding the difference' or 'how many more', placing the smaller amount over the larger one.</td>
<td>Numicon shapes, flashcards, dice, spinners, IWB software.

Pupils should begin to organise the objects / pegs in the Numicon shape patterns when ready to help them calculate without counting.

Pupils should be taught to create Numicon patterns 2 handed, from the bottom up (ie. One object in each hand simultaneously).

When covering Numicon / removing objects from Numicon pattern, pupils must be taught to remove / cover from the top down unless subtracting an even number from an odd number.

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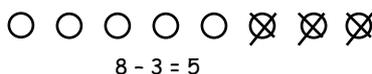</tr>
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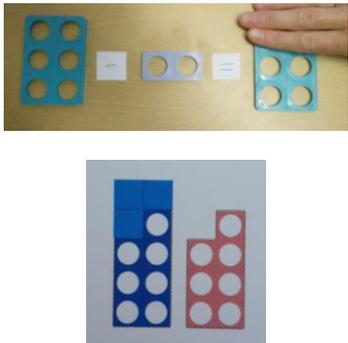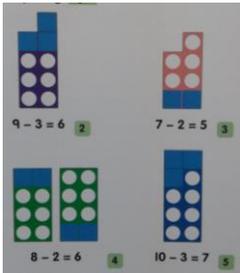
SUBTRACTION STRATEGIES

Reinforcing number bonds and related subtraction facts to 10 and 20 using the Numicon apparatus.

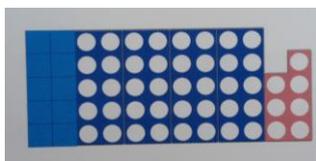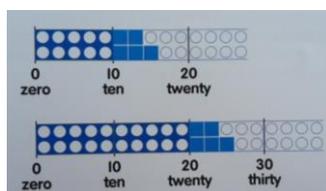|	
Record simple subtraction in a number sentence using the – and = signs e.g. There were 8 cakes on a plate. Mary ate 3 of them. How many were left? ○ ○ ○ ○ ○ ⊗ ⊗ ⊗ 8 – 3 = 5	Children should be exposed to both horizontal and vertical subtraction calculations although they are not expected to record vertically until Year 3.
Pupils develop their subtraction supported by Numicon by beginning to use the subtraction covers to find 'how many left' with larger numbers, initially using the traditional Numicon layout, moving to using the Numicon tens line to support. Moving from… To… Pupils should also learn to 'find the difference' and solve 'how many more' problems, by placing the smaller amount over the larger one, first horizontally then vertically.	Children need to begin to understand when it is sensible to count back and when to count on. Subtraction facts related to number bonds to 10 / 20 are key for supporting subtraction and should be revisited regularly in mental oral starters. **Key resources:** Practical counting equipment Horizontal and vertical number tracks / lines Washing line Rulers Cubes Counting sticks Hundred squares Carpet tiles Numicon shapes Numicon 10s number line Subtraction covers

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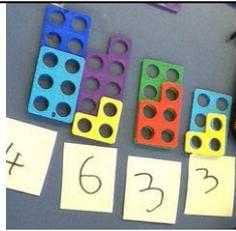
Use a marked or empty number line to count back (take away) or to count on (find the difference)
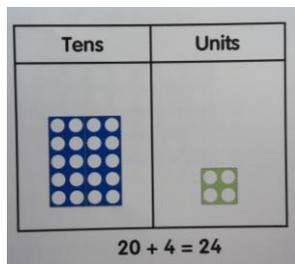e.g.
12 – 7 (counting back) - marked line

1 2 3   4   5   6   7   8   9   10 11 12
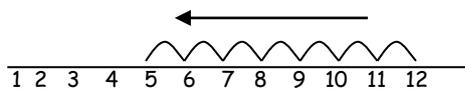
What is the difference between 5 and 12?   (counting on) – marked line

1 2 3 4   5   6   7   8   9 10 11 12
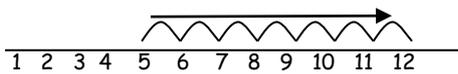
What is the difference between 5 and 12? (counting on) – empty line

5   12

Begin to partition numbers using Numicon shapes, and later place value cards, in preparation for later methods.

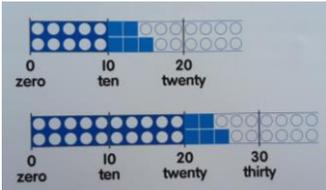| Tens	Units

20 + 4 = 24

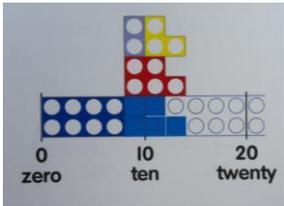| 1 | 7 | | 10 | | 7 |

17   =   10   +   7

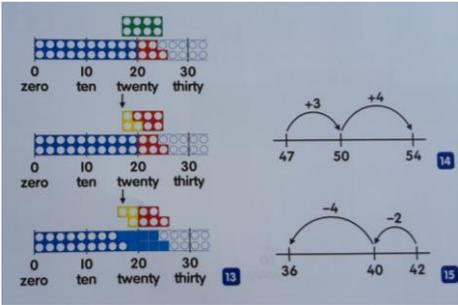**Key resources:**
Numicon shapes
Place value cards / numbers up cards
Base 10 blocks

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SUBTRACTION STRATEGIES

| Year 2	Pupils build on prior knowledge by using Numicon as the primary resource for addition alongside number lines.	
Aim by end of year: *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*	Pupils build on their understanding of subtraction supported by Numicon as in Year 1. Understanding subtraction as '<u>take away</u>', placing the larger number along the Numicon tens line and using the subtraction covers. When confident, pupils will begin to subtract by 'exchanging' Numicon pieces (and as such must have a sound knowledge of number bonds for numbers to 10). By recognising that 5 is made up of 2+3, pupils are able to exchange the pieces before jumping back to the nearest multiple of 10, and then beyond. Pupils should also develop knowledge of '<u>find the difference</u>' and solve '<u>how many more</u>' problems, by using the Numicon tens line to count on and use other related strategies. Counting on to the next multiple of 10... Calculating how many more are needed to make a given total...	Children need to begin to relate finding a difference to subtraction. Children need to be able to subtract 1 or 10 from any given number and count on to the nearest 10 to support subtraction. Children should be exposed to both horizontal and vertical subtraction calculations although they are not expected to record vertically until Year 3. **Key resources:** Practical counting equipment Horizontal and vertical number tracks / lines Washing line Rulers Hundred squares Carpet tiles Numicon shapes Numicon tens number lines Numicon IWB software Base 10 Place value counters Numicon 2 Folder Photocopy Masters
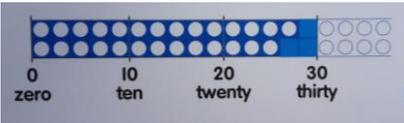
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Recording should be developed using marked, partly marked or empty number lines to **count back** (take away) or to **count on** (find the difference) – as Y1. **Understand** when it is sensible to count back and when to count on. e.g.
93 – 5 (count back)   93 - 88 (count on)

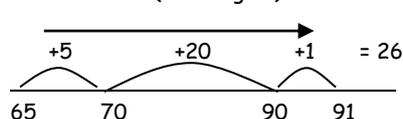88   93
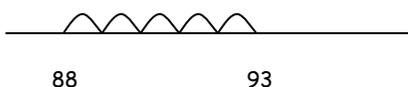
Use number lines or jottings to count back.
76 – 15

-5   -10

61   66   76
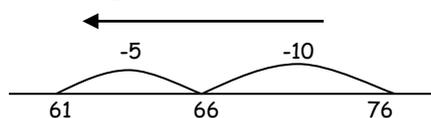
Record in number sentences : 76 – 10 = 66
66 – 5 = 61

Develop into calculations that count on in three jumps.

91 – 65 (counting on)

+5   +20   +1   = 26

65   70   90   91

Pupils can also begin to record vertically, using the Tens and Units frame (in Numicon 2 folder, Photocopy Masters) to support.
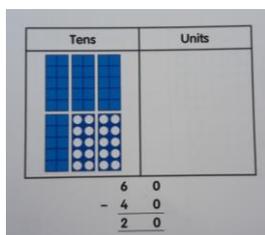
When pupils have sound understanding of the concept of addition and place value, they can be moved on to using 100 squares to support mental subtraction.

Year 3	Use a number line to count on alongside an informal written method (complementary addition)	**Key resources:**
		Prepared and blank number lines
Aim by end of year:	e.g. 216 -187	Hundred squares
Add and subtract	+13 +16 = 29	Base 10 blocks

SUBTRACTION STRATEGIES

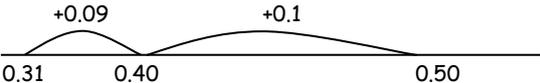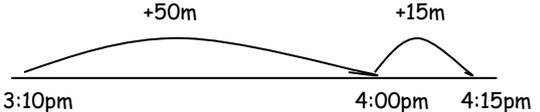|		
numbers mentally, including: - *a three-digit number and ones* - *a three-digit number and tens* - *a three-digit number and hundreds* *Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction*	(number line diagram) 187 200 216 Record workings informally	Place value cards Bead strings Place value counters

	When pupils are ready, teach expanded decomposition leading to compact decomposition.
	
	858 = 800 50 8
	- 132 - 100 30 2
	            700 20 6 = 726
	
	   8 5 8
	   - 1 3 2
	   7 2 6
	
	Base 10 should be used alongside this step to give a visual image to support understanding.
	
	          700 50 8
	       - 80 6
	          600 60 2
	
	Leading to:
	
	              6ᴑᴑ 1
	   758 = 700 50 8
	   - 86 - 80 6
	               600 60 2 = 662
	
	   7̸ '5 8
	   - 8 6
	     6 6 2
		Children must be taught to always start by **subtracting the least significant digits first** in preparation for later methods.
		
		When recording formally, children should understand the **importance of lining up** units digits under units digits, tens under tens etc (squared paper, whiteboards and IWB backgrounds should be used to reinforce this).
		
		Key resources:
		Place value cards
		Base 10 blocks
		Grid whiteboards
		Place value counters

Year 4 *Aim by end of year:*	Continue to use counting on (complimentary addition) method, with informal notes or jottings e.g. 5003 – 4996 =7. (can be modelled using an empty number	**Key resources:** Blank number lines

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▪ ˙ *add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate*	line or jottings) e.g. 754 – 86 = + 14 + 600 + 54 = 668 +14 +600 +54 ⌒⌒ ⌒⌒ ⌒⌒ 86 100 700 754	Hundred squares Base 10 blocks Place value cards Bead strings Place value counters
	Continue to develop compact decomposition, using Base 10 as a visual image to support (see Year 3 notes). ⁷/'5 8 5 - 8 6 2 6 6 2 3 Extend to decimals as appropriate e.g. money knowing that the decimal points should line up under each other.	Children must be taught to always start by **subtracting the least significant digits first** in preparation for later methods. When recording formally, children should understand the **importance of lining up** units digits under units digits, tens under tens etc (squared paper, whiteboards and IWB backgrounds should be used to reinforce this). **Key resources:** Place value cards Base 10 blocks Grid whiteboards Place value counters
Year 5 **Aim by end of year:** ▪ *add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)*	Continue to use counting on (complimentary addition) method, with empty number lines, when appropriate e.g. When subtracting from multiples of 100 or 1000 Finding a small difference by counting up, or when bridging across a boundary by a small amount. e.g. 8006 – 2993 = 5013. (can be modelled using an empty number line or jottings) +7 +5000 +6 ⌒⌒ ⌒⌒ ⌒⌒ 2993 3000 8000 8006 Using known number facts and place value to subtract e.g. 4.1 – 1.8 = 2.3 +0.2 +2.0 +0.1 ⌒⌒ ⌒⌒ ⌒⌒ 2.0 4.0 4.1	**Key resources:** Grid whiteboards Laminated blank number lines Place value counters
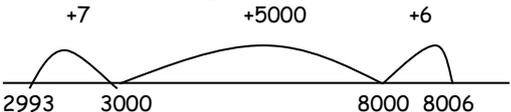
	Continue to develop compact decomposition with different numbers of digits and decimals.
	   4 3
	5 '7 6 4 . '0
	- 8 2 1 . 6
	    4 9 4 2 . 4
	
	Children may need to return to expanded method when first carrying out subtraction involving decimal numbers. This reinforces understanding of place value, particularly with decimals.
		Children should understand the **importance of lining up** units digits under units digits, tens under tens etc (squared paper, whiteboards and IWB backgrounds should be used to reinforce this) and starting with least significant digit first.
		
		Key resources:
		Place value cards / numbers up cards

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		Base 10 blocks Grid whiteboards Place value counters
Year 6 _Aim by the end of Year 6:_ ▪ _add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) (as Year 5)_	Continue to use complimentary addition, using an empty number line, informal notes or jottings when appropriate with appropriate numbers e.g. 0.5 – 0.31 = 0.09 + 0.1 = 0.19 +0.09 +0.1 0.31 0.40 0.50 Subtracting the nearest multiple of 10,100, 1000 Subtracting from any multiple of 1000, 10,000 etc i.e. where using decomposition would be very complicated. Children should also be taught to use number lines when counting on and back periods of time. +50m +15m 3:10pm 4:00pm 4:15pm	**Key resources:** Grid whiteboards Laminated blank number lines Money Place value counters
	Continue to develop compact decomposition with different numbers of digits and decimals. 2 1 4 1 3̶6̶ . 5̶ 8 3 - 2 8 . 4 9 1 0 8 . 0 9 2	Children should understand the **importance of lining up digits** (squared paper, whiteboards and IWB backgrounds should be used to reinforce this) and starting with least significant digit first. **Key resources:** Place value cards / numbers up cards Base 10 blocks Grid whiteboards Place value counters

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