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Fluency Through Instruction

Addition & Subtraction

v1.3

This policy outlines the key mental strategies to be taught in mathematics from year 3 to year 6 (Key Stage 2). It has been written to complement the **NCETM Mastering Number Programme** taught in EYFS, year 1 and year 2, to ensure consistency and progression across the school but also works well as a stand alone policy. For further information about the Mastering Number programme, click here.

During their time at school, children will be encouraged to see mathematics as both a written and spoken language. This policy concentrates on the mental strategies that children will be encouraged to use and acts as a reminder of the importance of making **jottings** to support mental calculations. It also provides a **common language** with which to talk about mental strategies.

Children will always be encouraged to look carefully at a problem and decide which would be the best method to choose. Our aim is for children to be able to **select an efficient method** of their choice, whether this be mental or written. They will do this by asking themselves:

'Can I do this in my head?'
'Can I do this using drawings or jottings to support my mental calculations?'
'Do I need to use a written method?'

What is Fluency?

Fluency is the ability to **use number sense** to **select efficient calculation strategies**. It includes the ability to **estimate** and recognise if an answer 'looks right' and depends on a **deep conceptual understanding** of mathematical structures.

Why is it important?

Fluency is one of the three aims of the national curriculum, alongside reasoning and problem solving. It is often referred to as 'number sense' or a 'rich network of mathematical knowledge' (EEF), which are **strong predictors of retention and success in maths**.

Education Endowment Foundation

Improving Mathematics in Key Stages Two and Three – Recommendations Summary

1 Use assessment to build on pupils' existing knowledge and understanding

- Assessment should be used not only to track pupils' learning but also to provide teachers with information about what pupils do and do not know
- This should inform the planning of future lessons and the focus of targeted support
- Effective feedback will be an important element of teachers' response to assessment
- Feedback should be specific and clear, encourage and support further effort, and be given sparingly.
- Teachers not only have to address misconceptions but also understand why pupils may persist with errors
- Knowledge of common misconceptions can be invaluable in planning lessons to address errors before they arise

2 Use manipulatives and representations

- Manipulatives (physical objects used to teach maths) and representations (such as number lines and graphs) can help pupils engage with mathematical ideas
- However, manipulatives and representations are just tools: how they are used is essential
- They need to be used purposefully and appropriately to have an impact
- There must be a clear rationale for using a particular manipulative or representation to teach a specific mathematical concept
- Manipulatives should be temporary; they should act as a 'scaffold' that can be removed once independence is achieved

3 Teach pupils strategies for solving problems

- If pupils lack a well-rehearsed and readily available method to solve a problem they need to draw on problem-solving strategies to make sense of the unfamiliar situation
- Select problem-solving tasks for which pupils do not have ready-made solutions
- Teach them to use and compare different approaches
- Show them how to interrogate and use their existing knowledge to solve problems
- Use worked examples to enable them to analyse the use of different strategies
- Require pupils to monitor, reflect on, and communicate their problem solving

4 Enable pupils to develop a rich network of mathematical knowledge

- Emphasise the many connections between mathematical facts, procedures, and concepts
- Ensure that pupils develop fluent recall of facts
- Teach pupils to understand procedures
- Teach pupils to consci… choose … mathemati… strategies
- Build on pupils' informal understanding of sharing and proportionality to introduce procedures
- Teach pupils that fractions and decimals extend the number system beyond whole numbers
- Teach pupils to recognise and use mathematical structure

5 Develop pupils' independence and motivation

- Encourage pupils to take responsibility for, and play an a…e role in, their ow… …ning
- This rec… …pils to deve… …gnition … …an,
- …king to th… …others
- Avoid … …much too early
- Positive attitu… …s are important, but t…ere is scant evidence on the most effective ways to foster them
- School leaders should ensure that all staff, including non-teaching staff, encourage enjoyment in maths for all children

be effective

Enable pupils to develop a rich network of mathematical knowledge

- **Emphasise connections** between facts, procedures and concepts.
- Teach pupils to **understand** procedures.
- Teach pupils to **consciously choose between mathematical strategies**.
- Teach pupils to **recognise and use mathematical structure**.

Principles for Teaching Fluency

Emphasise connections between facts, procedures & concepts.

Teach pupils to **understand** procedures.

Teach pupils to **consciously choose between mathematical strategies**.

Teach pupils to **recognise and use mathematical structure**.

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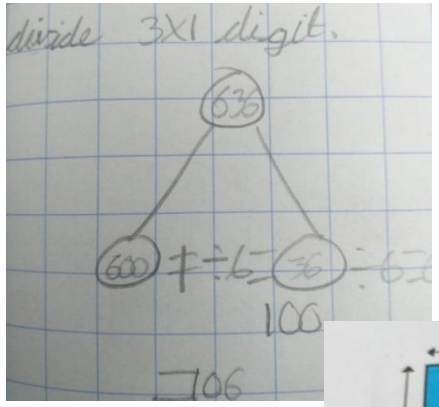
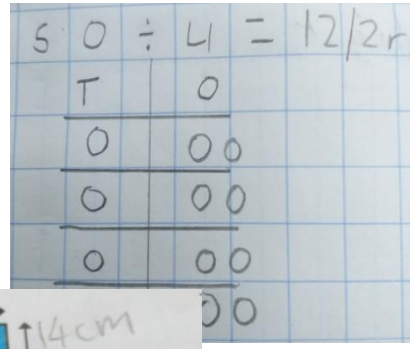
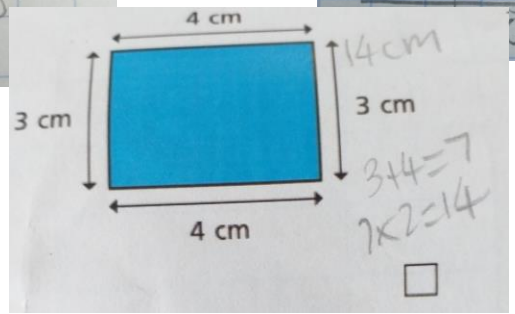
What are jottings?

A jotting is an informal piece of written work that supports the working out of a problem.







Why teach children to use jottings?

Jottings reduce **cognitive load**, allowing **working memory** to focus on each small step. They discourage reliance on formal written methods and provide **scaffolds** to develop mental maths, rooted in **deep conceptual understanding**.

Strategies to support efficient mental calculations:
Addition & Subtraction

Counting on / back	Partitioning	Bridging	Adjusting (Compensation)	Near Doubles	Counting up to find the difference
Use when: Adding or subtracting small numbers or simple multiples	*Use when:* You don't need to exchange	*Use when:* Adding or subtracting across a place value	*Use when:* Adding or subtracting a number ending with 9	*Use when:* Adding numbers close in value	*Use when:* Subtracting numbers close in value
					

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Addition

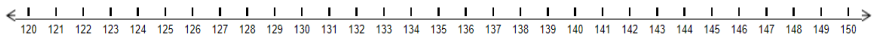
+

Counting on
Use when: *Adding small numbers or simple multiples*
• Start from the largest number. • Count on. 40 + 134 = 134 + 40 = 174      134 174

Counting on

Use when: adding small values or simple multiples, not crossing boundaries.

Appropriate scaffold: Number line or flip cards



Examples:

31 + 6

131 + 60

30 + 131 + 20

13.1 + 3

This strategy also works when counting back to subtract.

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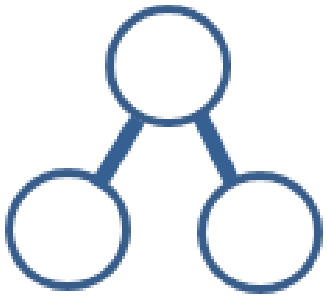
Partitioning



Partitioning
Use when: *You don't need to exchange*

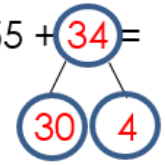
- Start from the largest number.
- Partition the smaller number/s.

As needed:

- Add the ones.
- Add the tens
- Add the hundreds

34 + 155 =

155 + 34 =



155 + 4 = 159

159 + 30 = 189

Use when: adding larger values with no exchanging.

Appropriate scaffolds:
place value cards & jottings

Examples:

152 + 27 =

2502 + 27

107 + 1342 =

This strategy also works when subtracting without exchanging.

Teach pupils to **recognise and use mathematical structure.**

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Near Doubles
Use when: Adding numbers close in value
• Rewrite as double and adjust. 15 + 16 = 15 + 15 + 1 = Double 15 = 30 30 + 1 = 31

Near Doubles

Use when: Adding near doubles.

Appropriate scaffold: jottings

Examples:

80 + 79 =

1.5 + 1.6 =

8 + 7 =

149 + 150 =

Emphasise connections between facts, procedures & concepts.

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Year 2:
exploring near doubles on the rekenrek

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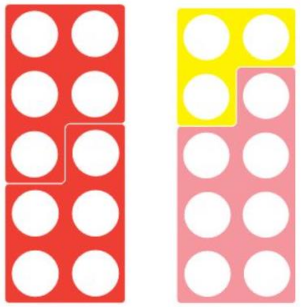
Bridging



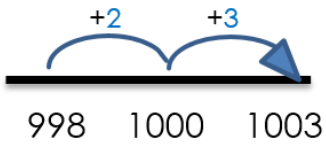
Bridging
Use when: Adding across a multiple of ten, hundred or thousand

- Start from the largest number
- Partition the smaller number/s to 'make the next multiple and then'

998 + 5= 241

2 3

'make the next multiple' 'and then'



Use when: crossing a *place value* boundary.
N.B. Use only when confident with partitioning.

'Make the next ten and then…'

Appropriate scaffold: numicon, part-part-whole diagram

Examples:

155 + 7 =

1407 + 6 =

8 + 4079 =

This strategy also works when subtracting across a boundary.

Teach pupils to **recognise and use mathematical structure.**

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Year 2:
make the next 10 and then...

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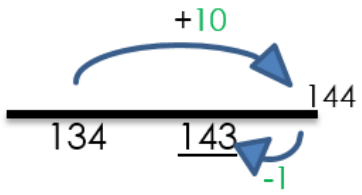
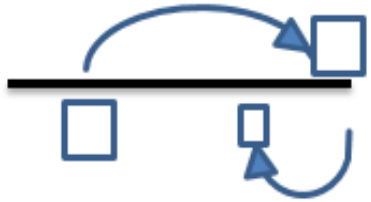
Adjusting (Compensation)
Use when: *Adding a number that ends with 9*
• Round to the nearest multiple of ten. • Adjust your answer 134 + 9 = 134 + 10 - 1 = 143   

Adjusting (compensation)



Use when: adding a number ending with 9

Appropriate scaffold: jottings, a number line

Examples:

156 + 29 =

2999 + 56 =

99 + 56 =

2.9 + 5.6 =

This strategy also works when **subtracting** a number ending with 9.

This strategy can **progress** to working with a **number ending in 8 or 7**.

Teach pupils to **recognise and use mathematical structure.**

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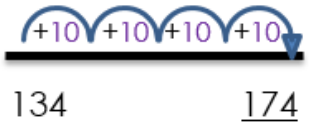
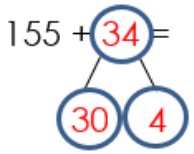
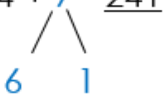
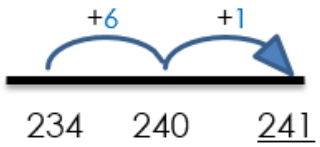
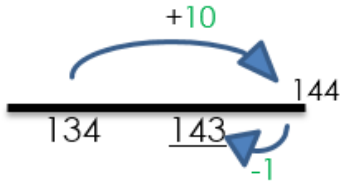
Year 3 Addition

Counting on	Partitioning	Near Doubles	Bridging	Adjusting (Compensation)
Use when: *Adding small values or simple multiples*	*Use when:* *You don't need to exchange*	*Use when:* *Crossing a place value boundary*	*Use when:* *Adding across a multiple of ten*	*Use when:* *Adding a number that ends with 9*
• Start from the largest number. • Count on. 40 + 134 = 134 + 40 = 174  	• Start from the largest number. • Partition the smaller number/s. As needed: • Add the ones. • Add the tens • Add the hundreds 34 + 155 =  155 + 4 = 159 159 + 30 = 189	• Rewrite as double and adjust. 15 + 16 = 15 + 15 + 1 = Double 15 = 30 30 + 1 = 31 	• Start from the largest number. • Partition the smaller number/s to 'make the next ten and then' 234 + 7 = 241  'make the next ten' 'and then'  	• Round to the nearest multiple of ten. • Adjust your answer 134 + 9 = 134 + 10 - 1 = 143 

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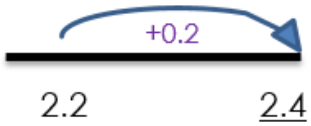
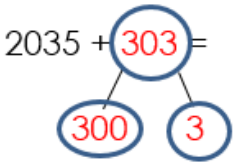
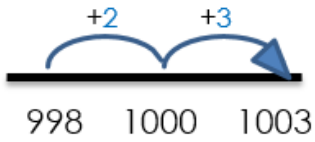
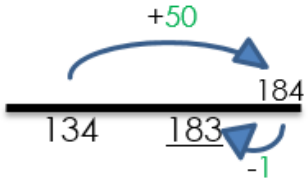
Year 4 Addition

Counting on	Partitioning	Near Doubles	Bridging	Adjusting (Compensation)
Use when: Adding small values or simple multiples	*Use when: You don't need to exchange*	*Use when: Adding numbers close in value*	*Use when: Adding across a multiple of ten, hundred or thousand*	*Use when: Adding a number that ends with 9*
• Start from the largest number. • Count on. 0.2 + 2.2 = 2.2 + 0.2 = 2.4  	• Start from the largest number. • Partition the smaller number/s. As needed: • Add the ones. • Add the tens. • Add the hundreds. • Add the thousands. 303 + 2035 =  2035 + 3 = 2038 2038 + 300 = 2338	• Rewrite as double and adjust. 150 + 151 = 150 + 150 + 1 = Double 150 = 300 300 + 1 = 301 	• Start from the largest number • Partition the smaller number/s to 'make the next multiple and then' 998 + 5= 241  'make the next multiple' 'and then'  	• Round to the nearest multiple of ten. • Adjust your answer 134 + 49 = 134 + 50 - 1 = 183 

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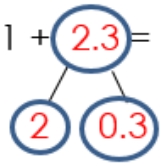
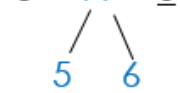
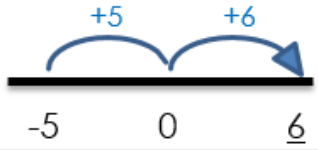
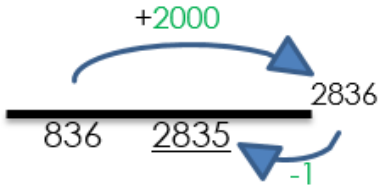
Year 5/6 Addition

Counting on	Partitioning	Near Doubles	Bridging	Adjusting (Compensation)
Use when: Adding small values or simple multiples	*Use when: You don't need to exchange*	*Use when: Adding numbers close in value*	*Use when: Adding across a place value*	*Use when: Adding a number that ends with 9*
• Start from the largest number. • Count on. 300 + 12,450 = 12,450 + 300 = 12,750  12,450 12,750	• Start from the largest number. • Partition the smaller number/s. • Add each place value. 2.3 + 7.21 = 7.21 +  7.21 + 0.3 = 7.24 7.22 + 2 = 9.22	• Rewrite as double and adjust. 1.5 + 1.6 = 1.5 + 1.5 + 0.1 = Double 1.5 = 3 3 + 0.1 = 3.1 	See year 4 for positive integer examples. When working with negative numbers: • Start from the **lowest** number. • Partition the other number (addend) to 'make the next multiple and then' -5 + 11 = 6   	• Round to the nearest multiple of ten/hundred/thousand. • Adjust your answer 836 + 1999 = 836 + 2000 – 1= 2835 

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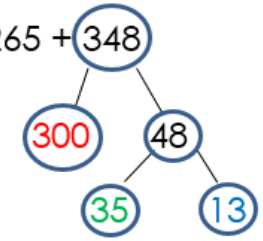
Developing and Combining Addition Strategies

Once embedded, some pupils may move onto developing and combining strategies:

Partitioning with Bridging

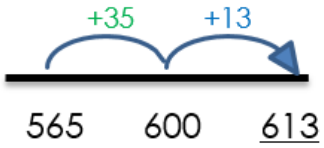
265 + 348



265 + 300 = 565

565 + 35 = 600

600 + 13 = 613



Near Doubles with (more) Adjusting

This strategy can be developed to include numbers further away in value or applied to both numbers in a calculation:

257 + 249 =

250 + 7 + 250 – 1 =

Double 250 = 500

500 + 7 – 1 = 506

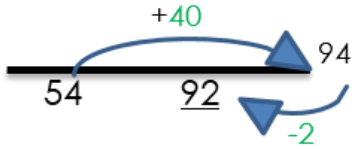
Adjusting (Compensation)

This strategy can be developed to include numbers ending with 8 or 7:

- Round to the nearest multiple of ten/hundred/thousand.
- Adjust your answer

54 + 38 =

54 + 40 – 2 = 2835



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More Addition Examples

	Counting on	Partitioning	Near Doubles	Bridging	Adjusting (Compensation)
Efficient when	Adding small numbers or multiples (not crossing boundaries)	No exchanging needed	Adding numbers close in value	Adding across a single boundary	Adding a near rounded number (often ends with 9)
Year 1	6 + 3 2 + 5		5 + 4 6 + 5		
Year 2	45 + 2 6 + 63	45 + 10 63 + 20	7 + 8 9 + 8	8 + 5 7 + 4	
Year 3	305 + 3 6 + 732	57 + 20 204 + 93 409 + 100 178 + 501	12 + 13 41 + 42 15 + 16 35 + 36 150 + 151	36 + 7 96 + 10 598 + 7 294 + 10	56 + 9 342 + 9 294 + 99 537 + 99
Year 4	3451 + 5 2.2 + 0.2 0.3 + 5.4	6721 + 2000 2035 + 300 9043 + 50 6721 + 2010 2035 + 303 9043 + 54		998 + 5 2497 + 8 1295 + 10 ☐ - 10 = 298	2984 + 999 843 + 49 4.56 + 2.9
Year 5	7 + 9732 7.82 + 0.03 0.004 + 2.984	5.6 + 1.27 7.21 + 2.1 5.87 + 3.123	3500 + 3510 1.5 + 1.6 0.25 + 0.26 10,069 + 10,070	1.5 + 0.6 3.08 + 0.04	736 + 199 1999 + 836 2998 + 28
Year 6	Embed, consolidate and combine strategies.				501 + 649

Subtraction

-

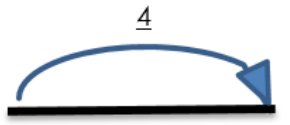
Counting up to find the difference

Use when:
The minuend and subtrahend are close in value

- Count up from smallest to largest number

186 – 182 =

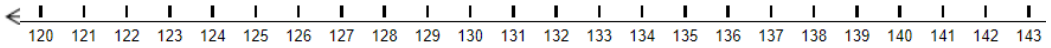
186 – 182 = 4



Counting up to find the difference

Use when: The numbers are close together in value

Appropriate scaffold: number line



Examples:

239 – 231 =

1129 - 1121 =

2089 – 2085 =

This strategy works well alongside bridging for numbers that are slightly further apart.

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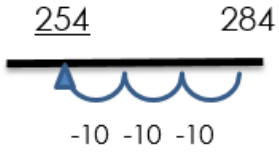
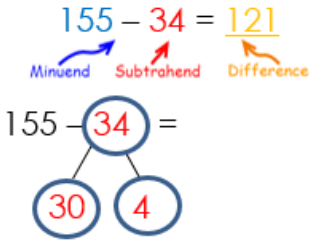
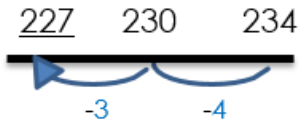
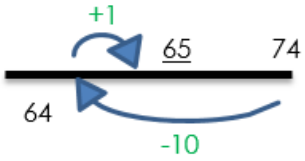
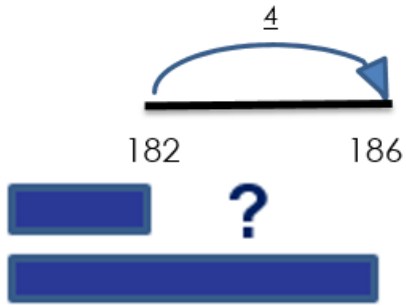
Teach pupils to **recognise and use mathematical structure.**

Year 3 Subtraction

Counting back	Partitioning	Bridging	Compensation / Adjusting	Counting up to find the difference
Use when: *Subtracting small values or simple multiples*	*Use when:* *You don't need to exchange*	*Use when:* *Subtracting across a multiple of ten.*	*Use when:* *Subtracting a number ending with 9*	*Use when:* The minuend and subtrahend are close in value
• Count back from the minuend (first number). 284 – 30 = 254  	• Partition the subtrahend. As needed: • Subtract the ones. • Subtract the tens. • Subtract the hundreds.  155 – 4 = 151 151 – 30 = 121	• Partition the subtrahend to jump 'back to the last ten and then' 234 - 7= 227 4 3  'back to the last ten' 'and then'	• Round to the nearest multiple of ten. • Adjust your answer. 74 - 9 = 74 – 10 + 1 = 74 - 10 = 64 64 + 1 = 65  	• Count up from smallest to largest number 186 – 182 = 186 – 182 = 4 

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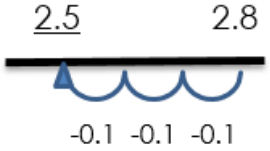
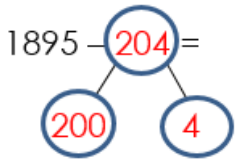
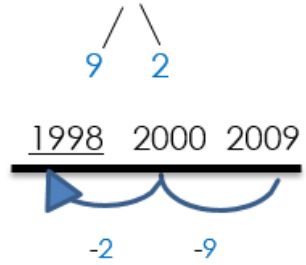
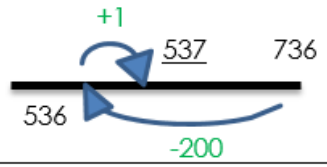
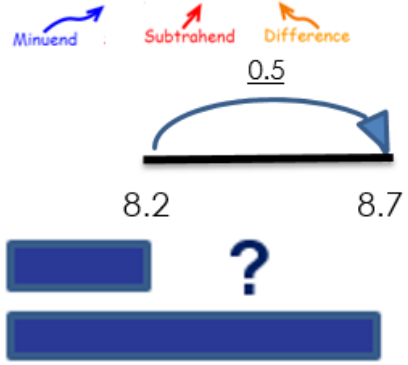
Year 4 Subtraction

Counting back	Partitioning	Bridging	Compensation / Adjusting	Counting up to find the difference
Use when: *Subtracting small values or simple multiples*	*Use when:* *You don't need to exchange*	*Use when:* *Subtracting across a multiple of ten, hundred or thousand*	*Use when:* *Subtracting a number ending with 9*	*Use when:* The minuend and subtrahend are close in value
• Count back from the minuend (first number). 2.8 – 0.3 = 2.5 	• Partition the subtrahend. As needed: • Subtract each place value.  1895 – 200 = 1695 1695 – 4 = 1691	• Partition the subtrahend to jump 'back to the last multiple and then' 2009 - 11 = 1998  'back to the last multiple' 'and then'	• Round the number ending with 9. • Adjust your answer. 736 - 199 = 736 – 200 + 1 = 736 – 200 = 536 536 + 1 = 537 	• Count up from smallest to largest number 8.7 – 8.2 = 0.5 

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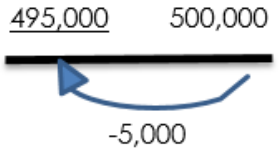
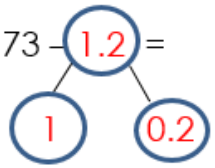
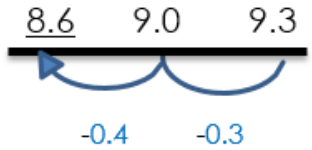
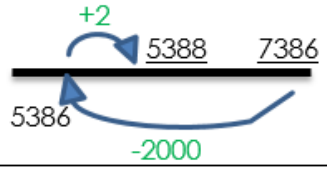
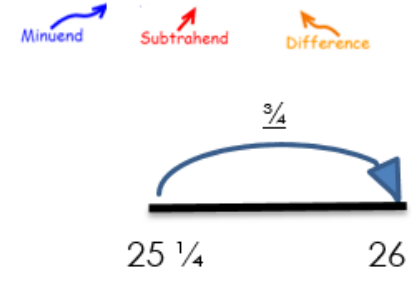
Year 5/6 Subtraction

Counting back	Partitioning	Bridging	Compensation / Adjusting	Counting up to find the difference
Use when: Subtracting small numbers or counting back in simple multiples	*Use when: You don't need to exchange*	*Use when: Subtracting across a place value*	*Use when: Subtracting a number ending with 9*	*Use when: The minuend and subtrahend are close in value*
• Count back from the minuend (first number). 500,000 – 5,000 	• Partition the subtrahend. As needed: • Subtract each place value. 5.73 – 1.2 =  5.73 – 0.2 =5.71 5.71 – 1 = 4.71	• Partition the subtrahend to jump 'back to the last multiple and then' 9.3 – 0.7 = 8.6 0.3 0.4 	• Round the number ending with 9. • Adjust your answer. 7386 - 1998 = 7386 – 2000 + 2 = 7386 – 2000 = 5386 5386 + 2 = 5388 	• Count up from smallest to largest number 26 – 25 ¼ = ¾ 

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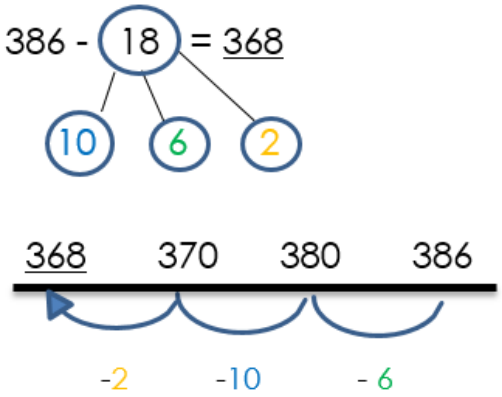
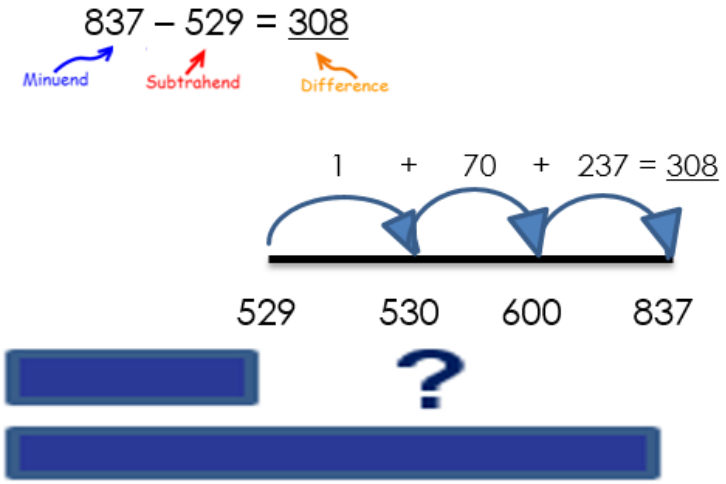
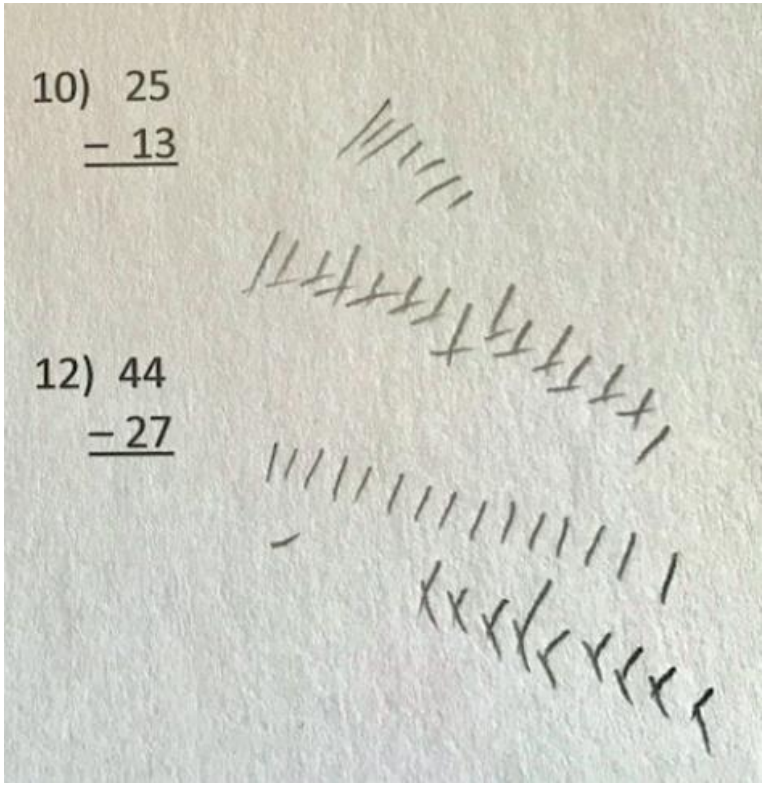
Developing and Combining Subtraction Strategies

Once embedded, some pupils may move onto developing and combining strategies:

Partitioning with bridging	Counting up to find the difference with bridging
	• Count up from smallest to largest number 

More Subtraction Examples

	Counting back	Partitioning	Bridging	Compensation / Adjusting	Counting up to find the difference
Efficient when	Subtracting a small amount or multiple (not crossing boundaries)	No exchanging needed	Subtracting across a single boundary	Subtracting a near rounded number (often ends with 9)	The minuend and subtrahend are close in value
Year 1	6 - 3 8 - 2				20 – 17 20 - 15
Year 2	46 - 3 63 - 2	45 - 10 63 - 20	12 - 5 15 - 7		34 – 29 70 – 65
Year 3	305 - 3 739 - 4	57 – 46 188 – 33 172 – 101 540 – 320	106 – 10 341 – 5 836 - 7	56 - 9 342 - 9 294 - 99 537 - 99	102 - 98 674 – 672 233 – 228
Year 4	2.8 – 0.3 4.6 – 0.5 Counting in multiples: 2000 - 200	1892 – 1040 6728 - 703 5.87 – 3.1	2003 – 6 3210 – 12 10 + ☐ = 302	2984 – 999 736 + 199 4.56 - 2.9 3.54 - 0.09	9 – 8.7 10 – 9.4
Year 5	7.83 – 0.02 2.986 - 0.005 Counting in multiples: 20,000 – 3,000 ☐ + 70 = 485	2467 – 1200 864 - 32 5.6 - 1.2 7.213 - 2.01	4.93 – 0.04 9.3 – 0.7 607 - ☐ = 520	1999 - 836 2998 – 29 9 – 1.9 49,999 – 5,000	10 – 8 ¼ 10 – 5.4 26 – 25.12 600 - ☐ = 594
Year 6	Counting in multiples: 500,000 – 5,000 300,000 – 2,000	Embed, consolidate and combine strategies.			



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