

Unit Overview and Guidance

- The exemplification has been taken from the NCETM online 'Resource Toolkit', with additions in order to ensure full coverage.
- Links to the White Rose Maths hubs schemes of work (with questions categorised into the three aims of the national curriculum i.e. fluency, problem solving and reasoning) are hyperlinked to each of the objectives. Many thanks go to the White Rose Maths hub for permission to include their resources.
- The NCETM reasoning questions have also been incorporated into each unit and are identified in pale purple boxes underneath the group of the most relevant objectives.
- The 'big Ideas' sections from the NCETM 'Teaching for Mastery' documents have been included at the start of each unit. Hyperlinks to the full NCETM 'Teaching for Mastery' documents have also been included for easy reference.
- Hyperlinks to NRich activities have also been added to this version. These are found by clicking on the blue buttons like this one 1 at the bottom of relevant objective.
- Some additional content has been added in order to support mixed-aged planning. Any additional content is in *italics*. Occasionally ~~strikethrough~~ has been used to identify when an objective has been altered and this is primarily where an objective has been split between two units.
- Each unit is sub-divided into sections for ease of planning. Sub-categories in this unit are;
 1. Addition and Subtraction
 2. Solve Problems
 3. Checking

	Yr 2	Yr 3	Yr 4
NCETM Teaching for Mastery Questions, tasks and activities to support assessment	<p>The Big Ideas</p> <p>Understanding that addition of two or more numbers can be done in any order is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first. For example, given $3 + 8$ it is easier to calculate $8 + 3$.</p> <p>When adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given $5 + 8 + 2$ it is easier to add $8 + 2$ first than to begin with $5 + 8$.</p> <p>Understanding the importance of the equals sign meaning 'equivalent to' (i.e. that $6 + 4 = 10$, $10 = 6 + 4$ and $5 + 5 = 6 + 4$ are all valid uses of the equals sign) is crucial for later work in algebra. Empty box problems can support the development of this key idea. Correct use of the equals sign should be reinforced at all times. Altering where the equals sign is placed develops fluency and flexibility.</p>	<p>The Big Ideas</p> <p>Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given $8 + 7$, thinking of 7 as $2 + 5$, and adding the 2 and 8 to make 10, then the $5 + 15$. This should then be applied when calculating with larger numbers.</p> <p>Subtraction bonds can be thought of in terms of addition: for example, in answering $15 - 8$, thinking what needs to be added to 8 to make 15. Counting on for subtraction is a useful strategy that can also be applied to larger numbers.</p>	<p>The Big Ideas</p> <p>It helps to round numbers before carrying out a calculation to get a sense of the size of the answer. For example, $4786 - 2135$ is close to $5000 - 2000$, so the answer will be around 3000. Looking at the numbers in a calculation and their relationship to each other can help make calculating easier. For example, $3012 - 2996$. Noticing that the numbers are close to each other might mean this is more easily calculated by thinking about subtraction as difference.</p>
	Teaching for Mastery Year 2	Teaching for Mastery Year 3	Teaching for Mastery Year 4

NUMBER: Addition and Subtraction (NAS - 4 weeks)

Strand	Yr2	Yr3	Yr4						
<p style="writing-mode: vertical-rl; transform: rotate(180deg); text-align: center;">Addition and Subtraction</p>	<p>recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>Within 20: Fact families</p> <p>Within 20: Compare number sentences</p> <p>Related facts</p> <p>Bonds to 100 (tens)</p> <p>Bonds to 100 (tens and ones)</p> <p>Extend their knowledge and use of number facts, and use partitioning and number bonds to add and subtract numbers mentally to answer questions such as</p> <p>$60 - \square = 52$ or $35 = 20 + \square$.</p> <p>They make jottings where appropriate to support their thinking.</p> <p>Answer problems such as:</p> <p>Look at this number sentence: $\square + \square = 20$. What could the two missing numbers be? What else? Can you tell me all the pairs of numbers that make 20?</p> <p>show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot</p> <p>Understand that addition can be done in any order and use this to solve an addition by rearranging the numbers to simplify the operation. They need to understand that two numbers can be taken away from each other but that the answers will not be the same.</p> <div style="text-align: right;"> 1 2 3 </div>	<p>add and subtract numbers mentally, including a three-digit number and ones, a three-digit number and tens, three-digit number and hundreds</p> <p>Add and subtract multiples of 100</p> <p>Add and subtract three-digit number and ones – not crossing 10</p> <p>Subtract a 1-digit number from a 3-digit number – crossing 10</p> <p>Add a 3-digit number and tens – crossing 100</p> <p>Subtract tens from a 3-digit number – crossing 100</p> <p>Add and subtract 100s</p> <p>What number is 27 more than 145? What number is 19 more than 145? Explain how you worked out these two calculations.</p> <p>Work out the missing digits:</p> <p>$3\square + \square 2 = 85$</p> <p>Work out these subtraction calculations:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 0 10px;">$72 - 5$</td> <td style="padding: 0 10px;">$372 - 68$</td> <td style="padding: 0 10px;">$270 - 3$</td> </tr> <tr> <td style="padding: 0 10px;">$82 - 15$</td> <td style="padding: 0 10px;">$132 - 28$</td> <td style="padding: 0 10px;">$70 - 66$</td> </tr> </table> <p>Did you use the same method for each calculation? If not, why not? Explain your methods to a friend and compare your methods with theirs.</p> <p>What number is 199 more than 428?</p> <p>What is the difference between 1999 and 4003?</p>	$72 - 5$	$372 - 68$	$270 - 3$	$82 - 15$	$132 - 28$	$70 - 66$	<p><i>(Year 3 objective) add and subtract numbers mentally, including a three-digit number and ones, a three-digit number and tens, three-digit number and hundreds</i></p> <p>Year 4 1s, 10s, 100s, 1000s</p> <p>What is 27 more than 185?</p> <p>What is 19 less than 208?</p> <p>$3\square 5 + \square 48 = 473$</p> <p>What's the difference between 2996 and 5008?</p>
	$72 - 5$	$372 - 68$	$270 - 3$						
$82 - 15$	$132 - 28$	$70 - 66$							

NUMBER: Addition and Subtraction (NAS - 4 weeks)

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Addition and Subtraction</p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Towards Written Calculations</p> <p>add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <p>Add and subtract ones</p> <p>10 more and 10 less</p> <p>Add and subtract 10s</p> <p>Add a 2-digit and 1-digit number – crossing ten</p> <p>Subtract a 1-digit number from a 2-digit number – crossing ten</p> <p>Add two 2-digit numbers – not crossing ten – add ones and add tens</p> <p>Add two 2-digit numbers – crossing ten – add ones and add tens</p> <p>Subtract a 2-digit number from a 2-digit number – not crossing ten</p> <p>Subtract a 2-digit number from a 2-digit number – crossing ten – subtract ones and tens</p> <p>Adding three one-digit numbers</p> <p>Use partitioning, counting strategies and knowledge of number bonds to add or subtract a one-digit number or a multiple of 10 to any two-digit number. To work out $86 - 50$, for example, they might partition and calculate:</p> $86 - 50 = 80 + 6 - 50 = 80 - 50 + 6 = 30 + 6 = 36$ <p>Similarly, to find the total number of people on a bus with 14 people on the top deck and 8 below, they might use:</p> $14 + 8 = 14 + 6 + 2 = 20 + 2 = 22$ <p>Children add or subtract two-digit numbers using practical and informal methods and their knowledge of the relationships between operations. For example, they count back along a number line to find $64 - 25$ or count up from 67 to find the answer to $94 - 67$. They represent such calculations as number sentences. They calculate the value of an unknown in a number sentence such as</p> $\square \div 2 = 6 \text{ or } 85 - \square = 29.$ <p>They recognise, for example, that to answer $85 - \square = 29$ they could use the related addition $29 + \square = 85$</p>	<p>digits, using formal written methods of columnar addition and subtraction</p> <p>Add 3-digit and 1-digit – crossing 10</p> <p>Add and subtract 3-digit numbers and tens – not crossing 100</p> <p>Spot the pattern – making it explicit</p> <p>Add and subtract a 2-digit and 3-digit number – not crossing 10 or 100</p> <p>Add a 2-digit and 3-digit number – crossing 10 or 100</p> <p>Subtract a 2-digit number from a 3-digit number – cross the 10 or 100</p> <p>Add two 3-digit numbers – not crossing 10 or 100</p> <p>Add two 3-digit numbers – crossing 10 or 100</p> <p>Subtract a 3-digit number from a 3-digit number – no exchange</p> <p>Subtract a 3-digit number from a 3-digit number – exchange</p> <p>Would you use a mental, written or calculator method to solve each of these? Explain your choice.</p> $23.05 + \square = 176.25$ <p>What is the total cost if I buy food costing £3.86 and £8.57?</p> <p>These are the start and finish times of a film.</p> <p>START 14:05 FINISH 16:25</p> <p>How long was the film?</p> <p>A packet of crisps costs 32p. Josh buys two packets. How much change does he get from £1?</p>	<p>add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate</p> <p>Addition – no exchange</p> <p>Addition – one exchange</p> <p>Addition – more than one exchange</p> <p>Subtraction – no exchange</p> <p>Subtraction – one exchange</p> <p>Subtraction – more than one exchange</p> <p>Subtraction – efficient subtraction</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> $\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \small{1 \quad 1} \end{array}$ <p>Answer: 1431</p> $\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$ <p>Answer: 351</p> </div> <div style="text-align: center;"> $\begin{array}{r} 8 \quad 12 \quad 1 \\ 932 \\ - 457 \\ \hline 475 \end{array}$ <p>Answer: 475</p> $\begin{array}{r} 1 \quad 1 \\ 932 \\ - 457 \\ \hline 475 \\ \small{5 \quad 6} \end{array}$ <p>Answer: 475</p> </div> </div>
	<div style="display: flex; justify-content: center; gap: 5px;"> 1 2 3 4 5 </div>		

NUMBER: Addition and Subtraction (NAS - 4 weeks)

Addition and Subtraction	NCETM Reasoning	<p>Convince me What digits could go in the boxes? Try to find all of the possible answers. How do you know you have got them all? Convince me</p> $7 \square - 2 \square = 46$	<p>True or false?</p> <p>Are these number sentences true or false?</p> $597 + 7 = 614$ $804 - 70 = 744$ $768 + 140 = 908$ <p>Give your reasons.</p>	<p>True or false?</p> <p>Are these number sentences true or false?</p> $6.7 + 0.4 = 6.11$ $8.1 - 0.9 = 7.2$ <p>Give your reasons.</p>
		<p>Fact families Which four number sentences link these numbers? 100, 67, 33</p> <p>What else do you know? If you know; $87 = 100 - 13$ what other facts do you know?</p> <p>Missing symbols Write the missing symbols (+ - =) in these number sentences:</p> $80 \square 20 \square 100$ $100 \square 70 \square 30$ $87 \square 13 \square 100$ <p>True or false? Are these number sentences true or false? Give your reasons.</p> $73 + 40 = 113$ $98 - 18 = 70$ $46 + 77 = 123$ $92 - 67 = 35$ <p>Hard and easy questions</p> <p>Which questions are easy / hard? Explain why you think the hard questions are hard?</p> $23 + 10 =$ $93 + 10 =$ $54 + 9 =$ $54 + 1 =$ <p>Other possibilities</p> $\square + \square + \square = 14$ <p>What single digit numbers could go in the boxes? How many different ways can you do this?</p> <p>Continue the pattern</p> $90 = 100 - 10$ $80 = 100 - 20$ <p>Can you make up a similar pattern starting with the numbers 74, 26 and 100?</p> <p>Missing numbers What number goes in the missing box?</p> $91 + \square = 100$ $100 - \square = 89$	<p>Hard and easy questions</p> <p>Which questions are easy / hard?</p> $323 + 10 =$ $393 + 10 =$ $454 - 100 =$ $954 - 120 =$ <p>Explain why you think the hard questions are hard?</p> <p>Convince me</p> $\square \square \square \square \square \square$ <p>The total is 201</p> <p>Each missing digit is either a 9 or a 1. Write in the missing digits.</p> <p>Is there only one way of doing this or lots of ways?</p> <p>Convince me</p> <p>Possibilities</p> <p>I bought a book which cost between £9 and £10 and I paid with a ten pound note.</p> <p>My change was between 50p and £1 and was all in silver coins.</p> <p>What price could I have paid?</p>	<p>Hard and easy questions</p> <p>Which questions are easy / hard?</p> $13323 - 70 =$ $12893 + 300 =$ $19354 - 500 =$ $19954 + 100 =$ <p>Explain why you think the hard questions are hard?</p> <p>Convince me</p> $\square - 666 = 8 \square 5$ <p>What is the largest possible number that will go in the rectangular box?</p> <p>What is the smallest?</p> <p>Convince me</p> <p>Possibilities</p> <p>Adult tickets cost £8 and Children's tickets cost £4. How many adult and children's tickets could I buy for £100 exactly?</p> <p>Can you find more than one way of doing this?</p>

NUMBER: Addition and Subtraction (NAS - 4 weeks)

Solving Problems

Solving Problems

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

solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

- Layla has 45p in her money bank and 28p in her purse. How much more money does she need to buy a comic that costs £1?
- Ben and Jess are answering this problem:
- Mary has collected 61 key rings, Jo has 45. How many more key rings does Mary have than Jo?
- Ben does the calculation $61 + 45$. Jess does the calculation $61 - 45$. Who is correct? Explain how you know.
- I pay for a coach trip costing £7.80 with a £10 note. How much change should I get?
- A film starts at 6:30 pm and ends at 8:10 pm. How many minutes does the film last?
- Josh buys one coconut and half a kilogram of bananas. What does he pay?



Coconut
78p



Bananas
£1.50 per kg

Show your working. Explain your method to a friend.

- Holly has these coins.



She wants to buy a notebook costing £1.50.

How much more money does she need?

- I travel on a journey lasting 1 hour 25 minutes. The train leaves the station at 7:45 am. What time does the train arrive?

1	2	3	4	5	6	7	8	9
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solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Children should be able to carry out practical tasks such as to run the class market stall.

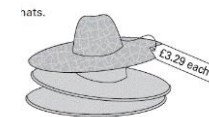
- I have read 134 of the 512 pages of my book. How many more pages must I read to reach the middle?
- There are 8 shelves of books. 6 of the shelves hold 25 books each. 2 of the shelves have 35 books each. How many books altogether are on the shelves?
- I think of a number, subtract 17, and divide by 6. The answer is 20. What was my number?
- You start to read a book on Thursday. On Friday you read 10 more pages than on Thursday. You reach page 60. How many pages did you read on Thursday?

A shop sells sunglasses



What is the difference between the cheapest and most expensive?

Ryan buys sunglasses at £4.69 and a sun hat



He pays with £10 note.

How much change will he get?

1	2	3	4	5
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NUMBER: Addition and Subtraction (NAS - 4 weeks)

Checking	Estimating, inverses & rounding		<p>use inverse operations to check answers</p> <p>Estimate answers</p> <p>Check answers</p> <p>Paul says $172 - 15 = 163$.</p> <p>Write down an addition calculation that you could do to check this.</p> <p>Paul's working is: $170 - 10 = 160$ and $5 - 2 = 3$ so $172 - 15 = 163$</p> <p>Can you identify where Paul has gone wrong?</p>	<p>estimate and use inverse operations to check answers to a calculation</p> <p>Estimate answers</p> <p>Checking strategies</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Tina has read the first 85 pages in a book that is 150 pages long. Which number sentence could Tina use to find the number of pages she must read to finish the book?</p> <p>A $150 + 85 = \square$</p> <p>B $\square - 85 = 150$</p> <p>C $150 + 85 = \square$</p> <p>D $150 - 85 = \square$</p> </div>
	NCETM Reasoning	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 50 and 60</p> <p>$74 - 13$ $55 + 17$ $87 - 34$</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that if you add three numbers less than 10 the answer will be an odd number</p>	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 50 and 60</p> <p>$174 - 119$; $333 - 276$; $932 - 871$</p> <p>Always, sometimes, never</p> <p>Is it always, sometimes or never true that if you subtract a multiple of 10 from any number the units digit of that number stays the same?</p> <p>Is it always, sometimes or never true that when you add two numbers together you will get an even number?</p>	<p>Making an estimate</p> <p>Which of these number sentences have the answer that is between 550 and 600</p> <p>$1174 - 611$</p> <p>$3330 - 2779$</p> <p>$9326 - 8777$</p> <p>Always, sometimes, never</p> <p>Is it always sometimes or never true that the difference between two odd numbers is odd?</p>