Planning Overview
Year 2 – Addition and Subtraction

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.

2NF–1 Secure fluency in addition and subtraction facts within 10, through continued practice.
2AS–1 Add and subtract across 10
2AS–2 Recognise the subtraction structure of 'difference' and answer questions of the form, "How many more…?".
2AS–3 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number.
2AS–4 Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract any 2 two-digit numbers.

Add and subtract any 2 two-digit numbers using an efficient strategy, explaining their method verbally, in pictures or using apparatus (e.g. 48 + 35; 72 – 17) (TAF ARE)
Recall all number bonds to and within 10 and use these to reason with and calculate bonds to and within 20, recognising other associated additive relationships (e.g. If 7 + 3 = 10, then 17 + 3 = 20; if 7 – 3 = 4, then 17 – 3 = 14; leading to if 14 + 3 = 17, then 3 + 14 = 17, 17 – 14 = 3 and 17 – 3 = 14) (TAF ARE)
Use reasoning about numbers and relationships to solve more complex problems and explain their thinking (e.g. 29 + 17 = 15 + 4 + ☐; 'together Jack and Sam have £14. Jack has £2 more than Sam. How much money does Sam have?' etc.) (TAF GD)
Add and subtract two-digit numbers and ones, and two-digit numbers and tens, where no regrouping is required, explaining their method verbally, in pictures or using apparatus (e.g. 23 + 5; 46 + 20; 16 – 5; 88 – 30) (TAF WT)
Recall at least four of the six number bonds for 10 and reason about associated facts (e.g. 6 + 4 = 10, therefore 4 + 6 = 10 and 10 – 6 = 4) (TAF WT)

	Teaching and Learning

Add and Subtract within 10

Continue to consolidate the 66 addition facts from Year 1 during Fluency Sessions or through Daily Routines

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8		
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7			
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6				
5	5+0	5+1	5+2	5+3	5+4	5+5					
6	6+0	6+1	6+2	6+3	6+4						
7	7+0	7+1	7+2	7+3							
8	8+0	8+1	8+2								
9	9+0	9+1									
10	10+0										

Mathematics guidance: key stages 1 and 2 Non-statutory guidance for the national curriculum in England.

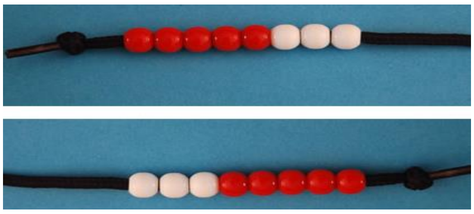
Can children understand that if they know 3 + 5 = 8, they also know 5 + 3 = 8, 8 – 3 = 5 and 8 – 5 = 3?

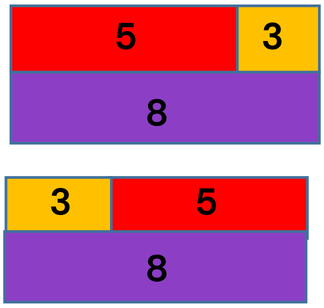
Can they use this to answer missing box questions?
E.g. 5 + ? = 8

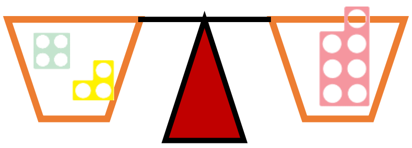
Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.

Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Use a range of models and images to support children with understanding of commutativity.







The above balance image could be 4+3=7 or 3+4=7
Turn it around and we have 7=4+3 or 7=3+4

What would happen if we added 1 to the 7 side? How could we make it balance again? What would our number sentence look like now? Could we use this model to solve missing number problems? Explore other ways of balancing equations e.g. 9+1 = 3+7

Mastery

Insert <, > or = to make these number sentences correct.

7 + 8 ◯ 8 + 7

3 + 6 ◯ 2 + 7

3 + 6 ◯ 4 + 7

4 + 7 ◯ 2 + 6

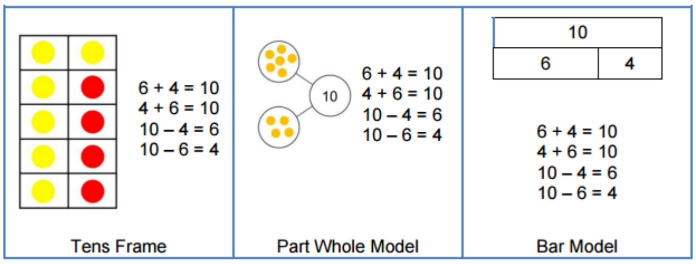
These questions rely on the children being able to spot relationships between each side of the number sentences. Prompt children to think about whether they need to calculate the answer in order to determine which symbol needs to be inserted.

Can the children see that 7+8 and 8+7 will be equal due to their understanding of commutativity?

Can children spot with 3+6 and 2+7, one number is 1 smaller and one is 1 bigger so the answers are going to be the same?

Can they spot with 3+6 and 4+7 that both numbers are bigger on the right-hand side so that answer will be larger?

Generate all four related number facts for a range of models and images. Link aggregation (combining parts) to partitioning as the inverse.



Link augmentation (adding more/counting on) to reduction (Take-away/counting back) and understand how one operation undoes the other.

Ensure that children spend enough time exploring manipulatives and making their own drawings before recording in an abstract way. The manipulatives need to be represented alongside the abstract so that children make the link between the two.

Try swapping the numbers in a subtraction calculation around. What happens? Is it commutative? If you know one subtraction fact, can you use it to work out the other subtraction fact? How? If you know a subtraction fact can you work out an addition fact? And vice versa? How could you use these relationships to check calculations or solve missing number problems?

(Establishing this understanding here with small numbers means they will be able to apply it with larger numbers by the end of the unit)

Recall and use addition and subtraction facts within and to 20

TAF Statement

Recall all number bonds to and **within** 10 and use these to reason with and calculate bonds to and **within** 20, recognising other associated additive relationships

(e.g. If 7 + 3 = 10, then 17 + 3 = 20; if 7 – 3 = 4, then 17 – 3 = 14; leading to if 14 + 3 = 17, then 3 + 14 = 17, 17 – 14 = 3 and 17 – 3 = 14)

Consider which models we can use to show the link between bonds to 10 and bonds to 20
e.g. using numicon or tens frames to show 8 + 2 then 18 + 2, what's the same and different? What are the related subtraction facts? 8 + 12?

Once secure with bonds to 20, look at the bonds **within** 20. e.g. 6 + 3 linked to 16 + 3 and 6 + 13

Give children a fact e.g. 5 + 4 and ask the children to list the other facts that they know.

Extend number bonds to 10 and 20 to other multiples of 10. Ask the children to describe the patterns that they notice?

Can the children list the 4 related facts from a number fact? E.g. 43 + 7 = 50. Can they explain which fact helped them work this calculation out?

Mastery

Fill in the missing numbers and explain what you notice.

23 + $\square$ = 30   33 – $\square$ = 30

43 + $\square$ = 50   53 – 3 = $\square$

Extend to using Place Value to add and subtract to make a multiple of 10.

Mastery

What do I need to add to or subtract from each of these numbers to total 60?

40, 44, 66, 69, 76, 86, 99, 89, 79.

Mastery with Greater Depth

Find different possibilities.

$\square$ + $\square$ = 50

50 – $\square$ = $\square$

Can children work systematically to find 6 possible answers for each of these number sentences. Can they explain what happens to each side of the calculation e.g. one side increases by 1 when the other decreases by 1.

Derive and use addition and subtraction facts to 100

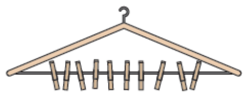
Look at multiple of 10 bonds to 100. Use dienes or tens frames to show the link between number bonds to 10 and number bonds to 100.
1 + 9 = 10
1 ten + 9 tens = 100
10 + 90 = 100

Repeat with other numbers using resources to support.

Ask the children to record the related facts
e.g. 90 + 10 = 100, 100 – 10 = 90 and 100 – 90 = 10

Mastery

If each peg on the coat hanger has a value of 10, find three ways to partition the pegs to make the number sentences complete.



□+□=□
□+□=□
□+□=□

What is the total of each addition sentence?
Will the total always be the same?
Explain your reasoning.

Mastery

What do you notice about each set of calculations?

What's the same and what's different about the three sets of calculations?

10 – 9 =	20 – 19 =	100 – 90 =
10 – 8 =	20 – 18 =	100 – 80 =
10 – 7 =	20 – 17 =	100 – 70 =
10 – 6 =	20 – 16 =	100 – 60 =
10 – 5 =	20 – 15 =	100 – 50 =
10 – 4 =	20 – 14 =	100 – 40 =
10 – 3 =	20 – 13 =	100 – 30 =
10 – 2 =	20 – 12 =	100 – 20 =

Can the children split 100 into 3 multiples of 10?
What different calculations can they create?

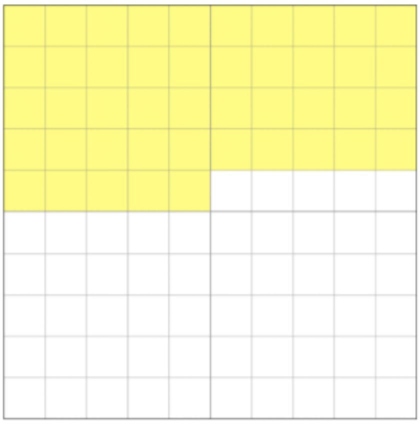
Mastery with Greater Depth

If each peg on the coat hanger has a value of 10, find three ways to partition the pegs to make the number sentences complete.

□+□+□=□
□+□+□=□
□+□+□=□

What is the total of each addition sentence?
Will the total always be the same?
Explain your reasoning.

Move on to looking at bonds to 100 with a value in the ones column. Link to 100 square. If I've shaded 45 what do I need to add to make the next 10, then 100.



Model with a beadstring and then represent on a number line. Show the first step to next ten and then next jump to 100. Discuss how to use bonds to 10 to help calculate bonds to 100.

Ask children to record related facts from one fact.
e.g. 45 + 55 = 100, 55 + 45 = 100, 100 – 55 = 45, 100 – 45 = 55

Apply to missing box calculations 45 + ? = 100

Mastery with Greater Depth

Complete the calculations.

$30 + 40 + \square = 100$

$40 + \square + 20 = 100$

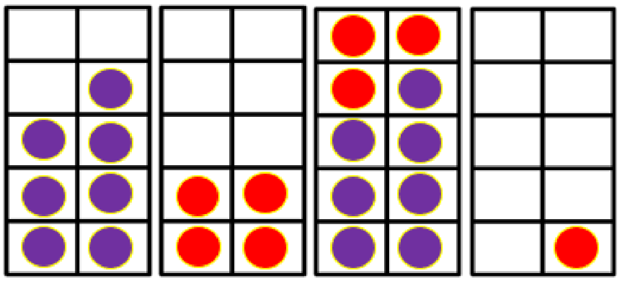
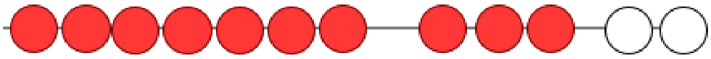
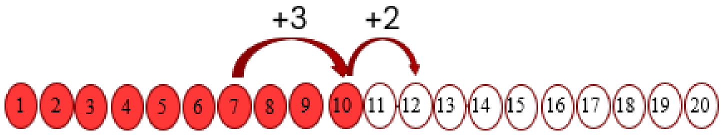
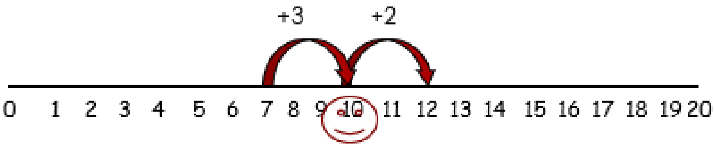
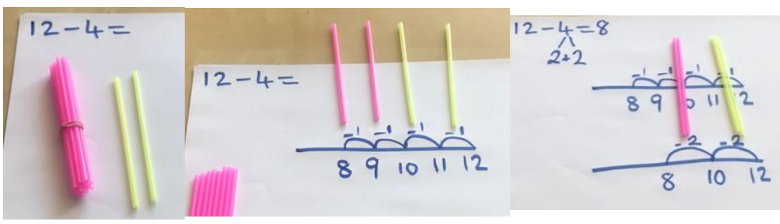
$36 + 44 + \square = 100$

$36 + 54 + \square = 100$

$47 + \square + 20 = 100$

$47 + \square + 30 = 100$

Can children insert missing numbers and symbols into calculations involving addition and subtraction
e.g. 6? + ?4 = 100

Adding two 1-digit numbers crossing the tens boundary – ensure secure from Year 1 **Subtracting a 1-digit number from a teen number crossing the tens boundary – ensure secure from year 1**	Ensure that children are secure with adding two 1-digit numbers when crossing then tens boundary. Do children understand how numbers can be partitioned to bridge through 10?  7 + 4 7 + 3 + 1 Can children transfer this to a bead string and eventually a number line? 7 + 5 = 7 + 3 + 2 = 12   7 + 5 = 12 3 2  7 + 5 = 7 + 3 + 2 = 12 Repeat for Subtraction - bridging back through 10 e.g. 12 – 4 by partitioning 4 into 2+2. Straws are a useful resource to model this. 

<table>
<tr>
<td></td>
<td>

Ready to Progress Assessment questions

2AS–1 Example assessment questions

1. Amisha spends £5 on a book and £8 on a T-shirt. How much does she spend altogether?
2. I have a 15cm length of ribbon. I cut off 6cm. How much ribbon is left?
3. I have 17 pencils. 9 have been sharpened. How many have not been sharpened?
4. A garden fence was 8m long. Then the gardener added 7 more metres of fencing. How long is the garden fence now?

Mastery with Greater Depth

Insert numbers to make these number sentences correct.

$13 - \_\_\_ < 6$

$13 - \_\_\_ < 6$ $13 - \_\_\_ < 6$ $13 - \_\_\_ < 6$

$13 - \_\_\_ < 6$ $13 - \_\_\_ < 6$ $13 - \_\_\_ < 6$

</td>
</tr>
<tr>
<td>

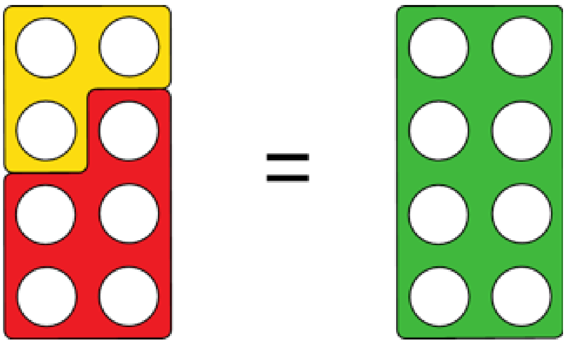
Adding three 1-digit numbers

Odd and even numbers

</td>
<td>

Look at adding two consecutive numbers together. E.g. 5 + 4. What types of numbers are they? Odd + even. What type of answer do you get? Odd. Does this always work for two consecutive numbers?

What about two odd numbers and two even numbers. Use Numicon to show why it is odd or even. Describe the numbers as even or even plus 1. Discuss how when two odd numbers are added together, we get even because the two +1 parts add together to make even.



Captain Conjecture says,
'An odd number + an odd number = an even number'.
Is this sometimes, always or never true?

Explain your reasoning.

Concrete resources might help pupils to explain their reasoning.

</td>
</tr>
</table>

What happens when adding three consecutive numbers?

Captain Conjecture says,
'An odd number + an odd number + an odd number = an even number'.
Is this sometimes, always or never true?

Explain your reasoning.

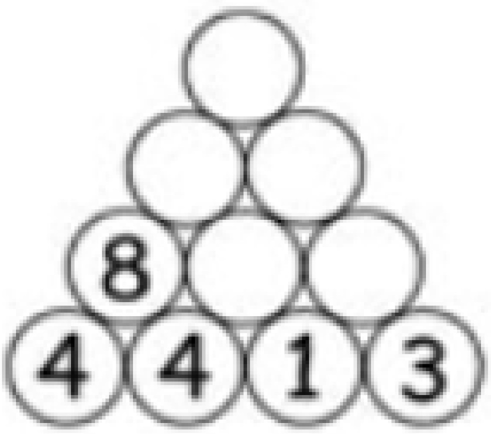
Concrete resources might help pupils to explain their reasoning.

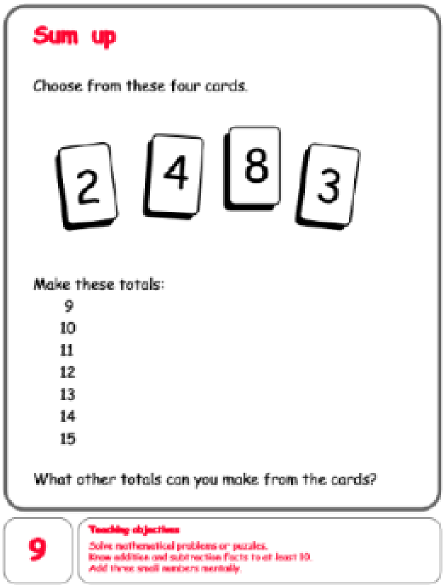
Move on to looking at any 3 numbers. Does it matter what order we add them in? Give children the following numbers to add.

3 + 2 + 4
3 + 4 + 2
4 + 2 + 3
4 + 3 + 2
2 + 3 + 4
2 + 4 + 3

What do you notice? Why is this?
Encourage children to use number facts to solve calculations e.g.
7 + 3 + 8 =
6 + 2 + 4 =
6 + 2 + 4 + 3 + 8 =
14 + 5 + 6 =

Once children are secure with adding these numbers, give them a range of problems to tackle where they can consolidate adding crossing the boundary of 10 and adding a range of numbers.
e.g.
Complete the pyramid below



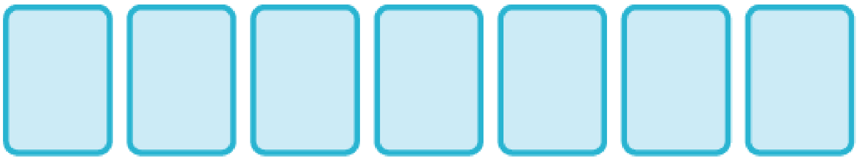
<table>
<tr>
<td></td>
<td>Children try to make a target number between 1 and 20 by adding a line or part line, vertically, horizontally or diagonally. Record the operation. Cross out the numbers when used. Aim to cross out all numbers in a line or all numbers on grid.
<table>
<tr><td>3</td><td>5</td><td>6</td><td>8</td></tr>
<tr><td>7</td><td>1</td><td>5</td><td>4</td></tr>
<tr><td>5</td><td>4</td><td>5</td><td>3</td></tr>
<tr><td>4</td><td>2</td><td>7</td><td>6</td></tr>
</table>
Sum up – Taken from ‘Maths challenges for more able pupils’


</td>
</tr>
<tr>
<td>Add a 2-digit number and ones</td>
<td>Start with a calculation such as 5 + 3 = where the boundary of 10 is not crossed. Show what this looks like on a number line as a known fact.

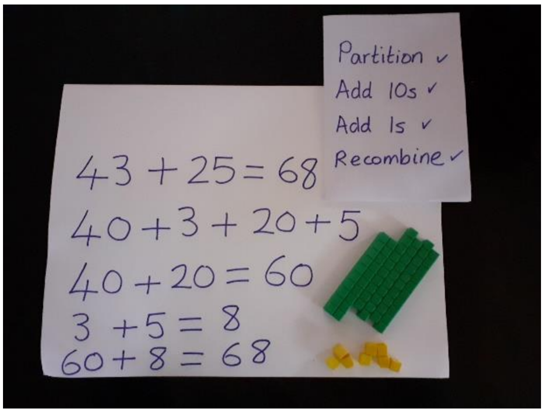
What would 15 + 3 look like? 25 + 3? 35 + 3? Using resources such as Dienes, numicon or bundles of straws to show what is staying the same and what is changing.
What do you notice?

Can the children write down the key related facts from the calculation and if confident relate this to missing box questions?

Recap on adding two 1-digit numbers, crossing the tens boundary from earlier in the unit and represent this on a number line.
e.g. 8 + 5
Extend to 18 + 5, 28 + 5, 38 + 5.
What do we split 5 up into in each case?
Why is this?</td>
</tr>
</table>

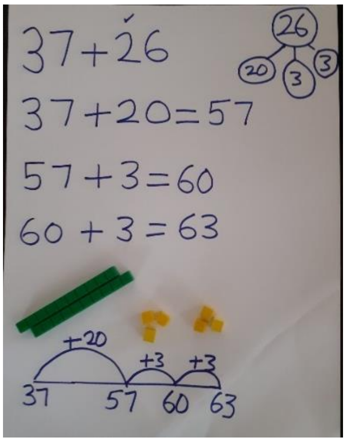
	Repeat with additional examples and ensure that children can identify related facts. NRICH – 15 cards I have fifteen cards numbered $1 - 15$. I put down seven of them on the table in a row.  The numbers on the first two cards add to 15. The numbers on the second and third cards add to 20. The numbers on the third and fourth cards add to 23. The numbers on the fourth and fifth cards add to 16. The numbers on the fifth and sixth cards add to 18. The numbers on the sixth and seventh cards add to 21. What are my cards? Can you find any other solutions? How do you know you've found *all* the different solutions?
Add a 2-digit number and tens	Moving on from what was taught in the Number and Place Value unit, begin by adding tens to a 2-digit number with resources. Represent a 2-digit number with numicon/ dienes/ straws and repeatedly add ten while recording the numbers that are created each time. Children should notice that it is the tens column that is affected, and that the tens digit increases by one each time. Move to representing this on a number line. e.g. 45 + 30 by completing 3 jumps of 10. How much bigger is the answer? What digit has changed? By how much? Could we do this jump on the number line more efficiently by using what we know 4 + 3 = 7 so 4 tens and 3 tens is 7 tens. Give children chance to become confident with this method on a number line. Give simple word problems to consolidate and apply understanding. Include money problems adding an amount of 10p pieces to an amount.

<table>
<tr>
<td>Add two 2-digit numbers
*no bridging
*bridging
*adjusting & compensating</td>
<td>
Use a variety of models to show the value of the numbers. How can the numbers be partitioned to help calculate? Use dienes/numicon/straws to show the value of the tens so that the children can see the relative value of the tens and ones.



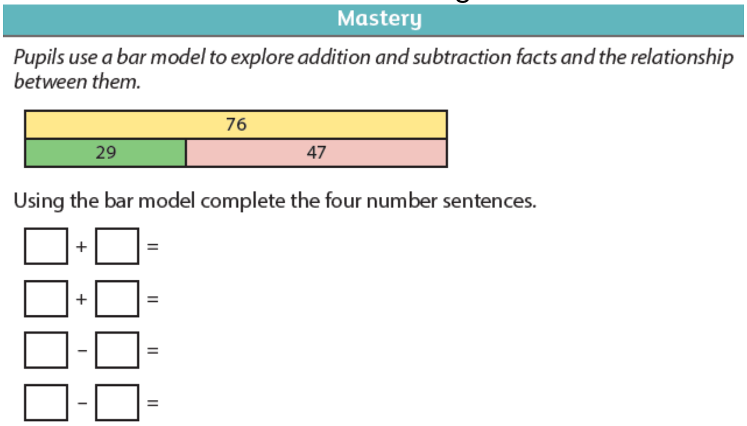
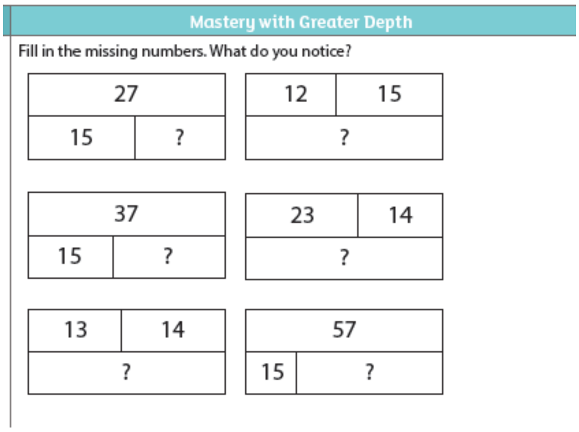
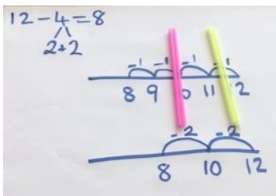
Use numbers where no exchange before moving to exchange in the ones to the tens column.

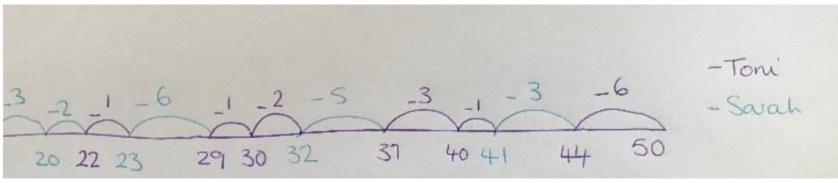
When the children are confident with adding using partitioning of both numbers, explore addition by only partitioning one number and counting on to find the total.

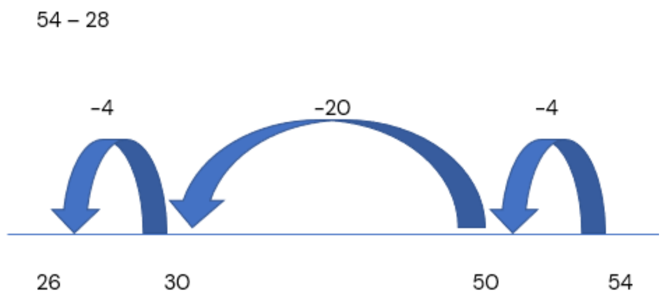
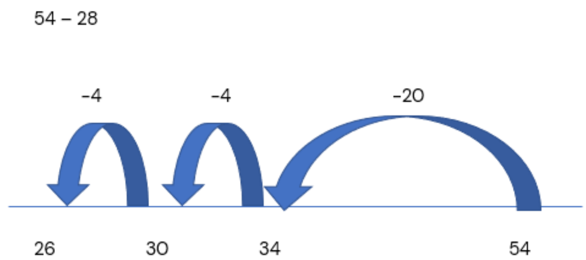
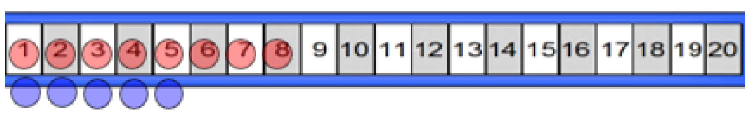
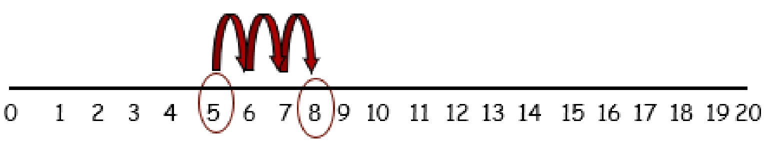


Encourage children to show you how they know the total amount added so far and what is left to add. How do they know when they have added the whole number? How did they partition the number to add?
Ensure children are confident with bridging through multiples of ten.

Consider calculations where partitioning is not the most efficient strategy e.g. 34 + 29 =
In this type of question it is better to think of the numbers holistically and compensate or adjust because 29 is almost 30.
34 + 30 = 64 “but I have added 1 too many now so I need to take 1 away”
64-1=63
“I could adjust the calculation by moving 1 from the 34 over to the 29”
33+30=63
</td>
</tr>
</table>

	Can children reason about which is the most efficient strategy for different calculations? Give children opportunity to solve word problems linked to addition and link word problems to the bar model. Look at the relationships on the bar model. Can the children list the 4 or 8 related facts? How would it change it different numbers were shown?   **Problem Solving** Choose 4 digits from 0-9 cards and make two 2-digit numbers. How many different answers can you make? Can you make them reach a given target?
Subtract a one-digit number from a 2-digit number	Recap the work completed on subtracting a 1-digit number from a teen number earlier in the unit of work. Discuss how far away the number is from the nearest 10. How would you split the number to help you calculate?  Link to larger numbers on a number line. E.g. 22 – 4, 32 – 4, 42 – 4. What do you notice? What would we partition 4 into if we were subtracting from a number ending in 3? 1?

	Try taking away other 1-digit numbers and reinforce the part/whole model and how the number will be partitioned to bridge though 10. Play **Exchange Game** with a partner. Children start with 50p/5x10 dienes sticks/5xbundles of 10 straws. Roll a dice and take that many away. E.g. roll a 6, take 6p away. Continue until there is nothing left in the centre and add up who has the most money at the end. Once they are confident with the game, ask the children to keep a record of their moves on a number line.  **Mastery with Greater Depth** I am thinking of a number: I think of a number and I add 2. The answer is 12. What was my number? I think of a number and I subtract 5. The answer is 24. What was my number?
Subtract tens from a 2-digit number	Begin by subtracting tens from a 2-digit number. Represent a 2-digit number with numicon/dienes/ straws and repeatedly subtract ten while recording the numbers that are created each time. Children should notice that it is the tens column that is affected, and that the tens digit decreases by one each time. Record these steps on a number line. What would happen if we took 20 away? 30? Which column changes? By how much? Which number fact helps us to do this? Reinforce the relationship on a 100 square if appropriate. I think of a number and subtract 30 my answer is 46, what was my number? I think of a number and add 40 my answer is 85, what was my number?
Subtracting two two-digit numbers ***no bridging** ***bridging** ***adjusting & compensating**	Begin by subtracting two two-digit numbers using resources and then onto a number line. Start with simple subtractions without exchanging. It may be best to stick to subtracting by partitioning the smaller number. The method where you partition both numbers only works if you also have more ones in the bigger number. A common misconception is to just swap the numbers around if the subtraction of the ones digit doesn't work. Move onto combining subtracting tens and bridging ten. If they start off with 54 represented with numicon/straws/dienes, ask them how would they take away 28 from those resources? Would they take both tens away together or ten at a time? What would this look like on a number line? How will you bridge back through the multiples of ten? How will you know when you have taken away 28? Where is this information on the number line?

	Ask children to compare these two methods of counting back?   Which do they prefer and why? Do you prefer to get to a multiple of ten as quickly as possible? For some children who are ready, look at specific calculations where it is more efficient to treat the numbers holistically e.g. to subtract calculate 57-29= you could subtract 30 and then add 1 back (compensating method) or you could adjust the calculation one place along the number line to give 58-30 which is easy to calculate mentally. Give children opportunity to solve word problems linked to subtraction.
Use finding the difference to solve comparative addition and subtraction problems	Children need to be able to recognise problems about difference and relate them to missing number problems where they count on and subtraction. Find the difference between 5 and 8  5 + $\boxed{}$ = 8 

Problems may be phrased as:

- find the difference between
- how many more or how many fewer
- comparative terms such as how much taller is…than… how much longer must I ….

Can they place two sets of counters on a number track and count the bit that is different?

Can they circle the two numbers on a number line and count the difference between?

Can they use a beadstring to investigate how much quicker it is to count on than count back when numbers are relatively big and close together.

E.g. Tom has 90p and Edith has 85p. How much more money does Tom have.

Transfer the counting on method to a number line for these bigger numbers ensuring that the difference between the two amounts is small to enable children to see this as a more efficient method.

Apply counting on to solve problems such as these

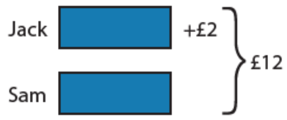
Missing number questions
28 + ? = 35

Change problems
I had £1 and spent 85p, how much change did I get? Use the beadstring to show the 85p that was spent and the 15p that was given in change.

Comparative Problems
Sam has 45 points and Tom has 60 Points. How many more points has Tom got?

I need 65 points to reach my next level on a game. I have 52 points so far, how many more do I need?

Together Jack and Sam have £12.
Jack has £2 more than Sam.
How much money does Sam have?
A bar model can be very helpful in solving these types of problems.



£12 – £2 = £10
£10 ÷ 2 = £5
Sam has £5

Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change	At this stage of the unit children should now be secure with the methods for addition and subtraction and have solved problems throughout the unit of work. This objective is within the Measures unit, however, if you have integrated money throughout the Number & Place Value and Addition and Subtraction Units of work you may want to finish off this unit with a range of word problems using contexts with points, sweets, goals etc and then extend to money. At a mastery level, children should be able to tackle single step word problems and then extend to multi-step problems to be able to achieve the Greater Depth TAF statement.