Reordering

Changing the order of the numbers can support children in calculating more efficiently. This will depend upon the calculation and the facts that they are able to recall/derive. It is important that we develop pupils' understanding of number so that they are able to recognise when reordering is an appropriate strategy – and when it is not.

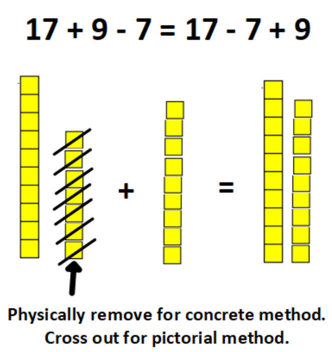
	Example calculations	Possible strategy
Year 1	2 + 7 5 + 13 10 + 2 + 10	7 + 2 **(counting on)** 13 + 5 10 + 10 + 2 **(using number bonds)**
Year 2	5 + 34 5 + 7 + 5	34 +5 5 + 5 + 7 **(using bonds to 10)**
Year 3	23 + 54 12 -7 – 2 13 + 21 + 13	54 + 23 12 – 2 – 7 **(making a multiple of 10)** 13 + 13 + 21 **(using double 13)**
Year 4	6 + 13 + 4 + 3 17 + 9 – 7 28 + 75	6 + 4 + 13 +3 **(using bonds to 10)** 17 – 7 + 9 **(making a multiple of 10)** 75 + 28 **(thinking of 28 as 25 + 3)**
Year 5	12 + 17 + 8 + 3 25 + 36 + 75 58 + 47 -38 200 + 567 1.7 + 2.8 + 0.3	12 + 8 + 17 + 3 **(using bonds to 20)** 25 + 75 + 36 **(using bonds to 100)** 58 – 38 + 47 **(making a multiple of 10)** 567 + 200 **(adding a multiple of 100)** 1.7 + 0.3 + 2.8 **(making an integer)**
Year 6	3 + 8 + 7 + 6 + 2 34 + 27 + 46 180 + 650 1.7 + 2.8 + 0.3 + 1.2 4.7 + 5.6 – 0.7	3 + 7 + 8 + 2 +6 **(using bonds)** 34 + 46 + 27 **(making a multiple of 10)** 650 + 180 **(thinking of 180 as 150 + 30)** 1.7 + 0.3 + 2.8 + 1.2 **(making integers)** 4.7 – 0.7 + 5.6 = 4 + 5.6 **(making an integer)**

Example model
Present children with carefully chosen numbers – ensure that in each group of numbers, there are at least 2 numbers that total a multiple of 10/ integer.
Q – Is there anything about these numbers which would enable me to add them mentally, rather than using the written method?
Model selecting the numbers which form the bond, narrating the reason why they have been chosen.

For example, 17 + 9 – 7.

I know that I can add the 9 and subtract the 7 in any order and the total will stay the same. I know that if I subtract 7 from 17 it will leave me with 10. **What do I know about adding to a multiple of 10?** I know that the ones digit is zero. I know that when I add some ones, the ones digit will change. It will change to match the ones that I have added – if I add 9 ones to a multiple of 10, I will have 9 ones.

Concrete/pictorial materials to support
Ten frame
Number beads
Numicon
PV counters
PV cards
Number line
Diennes concrete or pictorial version available on Activ Primary



Partitioning: counting on or back

Developing a secure understanding of number will enable pupils to know what numbers can be partitioned into. For examples the number 253 is made up of hundreds, tens and ones. This means that 253 = 200 + 50 + 3 and encourages children to see numbers as wholes, rather than a collection of single digits in columns. Partitioning can be a useful way to add or subtract pairs of numbers.

	Example calculations	**Possible strategy**
Year 1		**Autumn – 1 more/less to 20** **Spring 1 more/less to 50** **Summer 1 more/less to 100**
Year 2	30 + 47 78 – 40 17 + 14	30 + 40 + 7 70 + 8 – 40 = 70 – 40 + 8 10 + 7 + 10 + 4 = 10 + 10 + 7 + 4
Year 3	23 + 45 68 – 32	40 + 5 + 20 + 3 = 40 + 20 + 5 + 3 60 + 8 – 30 + 2 = 60 – 30 + 8 - 2
Year 4	55 + 37 365 – 40	55 + 30 + 7 = 85 + 7 300 + 60 + 5 = 300 + 60 – 40 + 5
Year 5	43 + 28 + 51 5.6 + 3 + 0.7 4.7 – 3.5	40 + 3 + 20 + 8 + 50 + 1 =40 + 20 +50 + 3 + 8 + 1 5.6 + 3 + 0.7 = 8.6 + 0.7 4.7 – 3 – 0.5
Year 6	540 + 280 276 – 153	540 + 200 + 80 276 – 100 – 50 - 3

Example model

Share carefully chosen numbers which match the pitch of the year group examples.

Q – Is there anything about these numbers which would enable me to add them mentally, rather than using the written method?

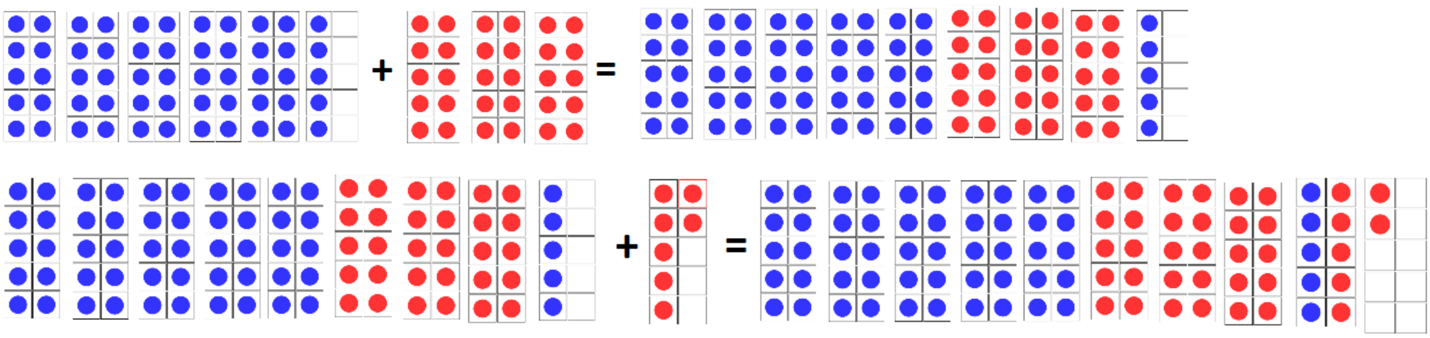
With 55 + 37, I know that 37 can be partitioned into 30 + 7. I know that if I add a multiple of ten to another number, the ones digit does not change – so, if I add 30 to 55 I make 85. This is not my final answer as I have to add 37 and I have only added 30. This means that I still have to add 7. What do I know about 7 that might make it easier to add to 85? I know that 7 can be partitioned into 5 and 2 which means that I can work out 85 + 7 by calculating 85 + 5 + 2.

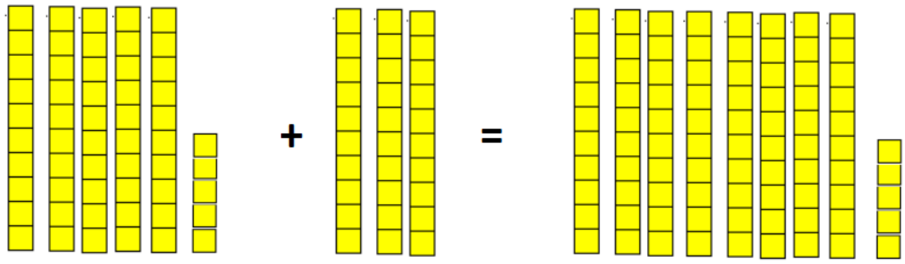
Concrete/pictorial materials to support
Ten frame
Number beads
PV counters
Number line
Bar model

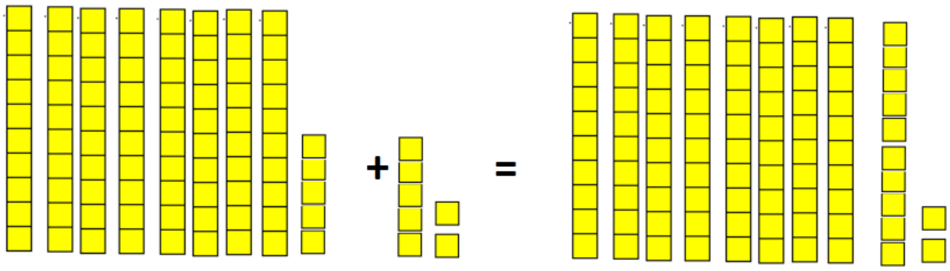
55 + 37 =

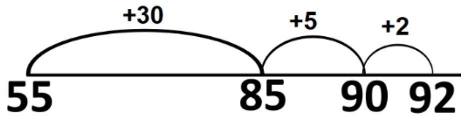
55 + 30 = 85

85 + 7= 85 + 5 + 2









?			
55	37		
55	30	7	
55	30	5	2

Partitioning: bridging through multiples of 10

When numbers are close together, bridging through multiples of 10 is an efficient strategy.

	Example calculations	Possible strategy
Year 1		**5 and a bit**
Year 2	5 + 8 12 – 7 65 + 7 43 – 6 24 - 19	5 + 5 + 3 **(using bonds to 10/multiple of 10)** 12 – 2 – 5 65 + 5 + 2 43- 3 – 3 19 + 1 + 4
Year 3	49 + 32 90 – 67	49 + 1 + 31 **(first number has 9 ones)** 67 + 3 + 20 **(first number a multiple of 10)**
Year 4	57 + 34 92 – 25 84 – 65	57 + 3 +31 **(first number does not have 9 ones)** 92 – 2 – 20 – 3 **(first number is not a multiple of 10)** 65 + 5 + 10 + 4 **(3 jumps – nearest 10, closest 10, then total)**
Year 5	607 – 588 6007 – 5988 8.3 – 7.8	588 + 12 + 7 **(2 jumps – to multiple of 100, then total)** 5988 + 12 + 7 **(2 jumps – to multiple of 1000, then total)** 7.8 + 0.2 + 0.3 **(2 jumps – to integer, then total)**
Year 6	1.4 + 1.7 0.8 + 0.35 8.3 - 6.8	1.4 + 0.6 + 1.1 **(2 jumps – to integer, then total)** 0.8 + 0.2 + 0.15 **(2 jumps – partitioning 2dp to cross boundary)** 6.8 + 0.2 +1.3 **(2 jumps – nearest integer, then total)**

Example model

Share carefully chosen numbers which match the pitch of the year group examples.

Q – is there anything about these numbers which would enable me to add them mentally, rather than using the written method?

607 - 588

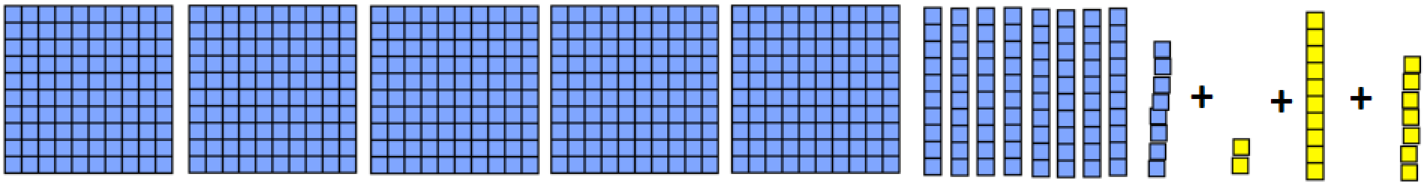
What can I see? I can see that I will need to do several regroups to exchange which makes it tricky to calculate mentally. Is there anything else that I can see? I can see that they are quite close together which means that there will be a small difference between the two numbers. This means that I could count on or back to find the difference.

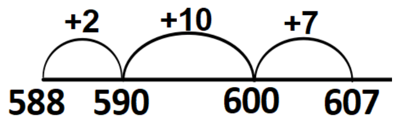
Are there any boundaries that I need to cross? I can see that I need to cross a hundreds boundary – one number has 5 hundreds and the other has 6 hundreds. How could I jump to the next 100? I could add 2 to 588 to make 590, then 10 to get to 600, or I could just add 12 (this will depend on the confidence of individual children). How many more do I need to count on from 600 to get to 607? I can see that the ones digit has changed from a placeholder to 7, which means that I need to add 7 more. 607 is 19 more than 588 and 588 is 19 less.

Concrete/pictorial materials to support

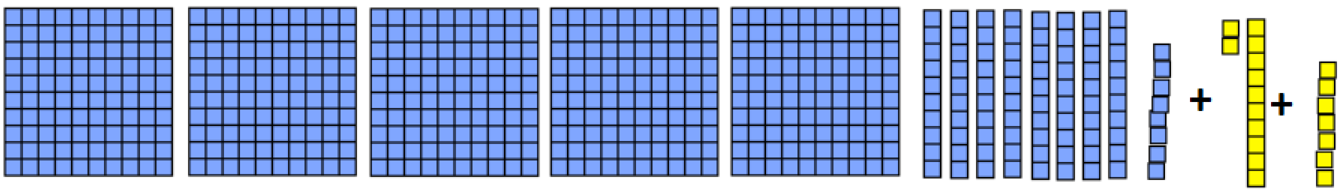
Ten frame
Number beads
PV counters
Number line
Bar model

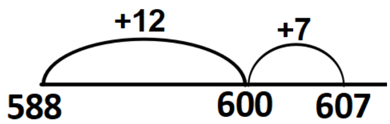
588 + 2 + 10 + 7 = 607





588 + 12 + 7 = 607





Partitioning: compensating

This is a useful strategy for adding and subtracting numbers which are close to a multiple of 10, such as numbers that end with a 1 or 2, or 8 or 9. The number to be added or subtracted is rounded to a multiple of 10, then a small number is added or subtracted. A similar strategy can be used when adding or subtracting fractions and decimals.

	Example calculations	Possible strategy
Year 1	3+10=13 10+3 =13 13 + 10 = 23 10+13=23 54+10=64 10+54=64 64-10=54	Spring 10 more Summer 10 more/less
Year 2	34 + 9 34 + 19 34 + 29 and so on 34 + 11 34 + 21 34 + 31 and so on 70 – 9	34 + 10 – 1 34 + 20 – 1 34 + 30 – 1 34 + 10 + 1 34 + 20 + 1 34 + 30 + 1 70 – 10 + 1
Year 3	53 + 12 53 – 12 53 + 18 84 – 18	53 + 10 +2 53 – 10 – 2 53 + 20 – 2 84 – 20 +2
Year 4	38 + 68 95 – 78 58 + 32 64 – 32	38 + 70 -2 95 – 80 +2 58 + 30 + 2 64 – 30 – 2
Year 5	138 + 69 405 – 399	138 + 70 – 1 405 – 400 + 1
Year 6	2 ½ + 1 ¾ 5.7 + 3.9 6.8 – 4.9	2 ½ + 2 – ¼ 5.7 + 4 – 0.1 6.8 – 5 + 0.1

Example model

Share carefully chosen numbers which match the pitch of the year group examples.

Q – is there anything about these numbers which would enable me to add them mentally, rather than using the written method?

Partitioning: near doubles

Developing pupils' understanding of doubles, so that that they have instant recall, enables them to calculate efficiently when adding two numbers which are very close together. For examples, knowing that 6 + 6 = 12 will support children in identifying that 7 + 6 must be one more than double six – and enable them to avoid counting on or bridging through 10.

	Example calculations	Possible strategy
Year 1	6 + 7	is double 6 then +1
Year 2	13 + 14 39 + 40	is double 13 then + 1 or double 14 then -1 is double 40 then -1
Year 3	18 + 16 60 + 70	Is double 18 then -2 Is double 60 + 10 Or double 70 - 10
Year 4	76 + 75	Is double 76 then subtract 1 Or double 75 then +1
Year 5	160 + 170	Is double 150 then + 10 then + 20 Or double 160 then + 10 Or double 170 then - 10
Year 6	2.5 + 2.6	Is double 2.5 then + 0.1 Or double 2.6 then – 0.1s

Example model

Share carefully chosen numbers which match the pitch of the year group examples.

Q – is there anything about these numbers which would enable me to add them mentally, rather than using the written method?

Doubling and halving

	Example calculations	Examples
Year 1	Double all numbers to 10	e.g. double 9
Year 2	Double all numbers to 20 and find corresponding halves Double multiples of 10 to 50 and find corresponding halves Double multiples of 5 to 50 and find corresponding halves	e.g. double 7, half of 14 e.g. double 40, half of 80 e.g. double 35, half of 70
Year 3	Double multiples of 10 to 100 and corresponding halves Double multiples of 5 to 100 and find corresponding halves	E.g. double 90 or half of 180 Double 85, half of 170
Year 4	Double any 2 digit number and find corresponding halves Double multiples of 10 and 100 and find the corresponding halves	Double 47, half of 94 Double 800, half of 1600 Double 340, Half of 680
Year 5	Form equivalent calculations and use doubling and halving - Multiply by 4 by doubling twice - Multiply by 8 by doubling 3 times - Divide by 4 by halving twice - Divide by 8 by halving 3 times - Multiply by 5 by multiplying by 10, then halving - Multiply by 20 by doubling then multiplying by 10 Multiply by 50 by multiplying by 100 and halving Multiply by 25 by multiplying by 100 and halving twice	 16 x 4= 32 x 2=64 12x8=24x4=48x2=96 104 ÷4=52÷2=26 104 ÷8=52÷4=26÷2=13 18x5=180÷2 53 x 20 = 106 x 10 =1060 24 x 50 = 12 x100 =1200 24x25=12x50=6x100=600
Year 6	Double decimals with units and tenths Form equivalent calculations and use doubling and halving -divide by 25 by dividing by 100 then multiplying by 4 -divide by 50 by dividing by 100 then doubling	double 7.6, half of 15.2 460÷25=4.6x4 =18.4 270÷50=2.7x2=5.4

Example model

Share carefully chosen numbers which match the pitch of the year group examples.

Q – is there anything about these numbers which would enable me to add them mentally, rather than using the written method?