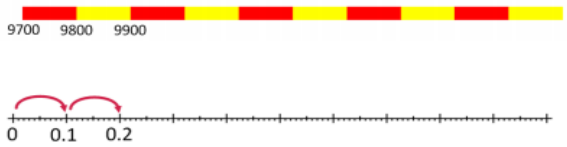
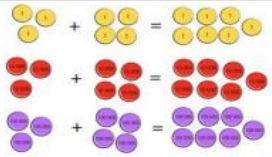
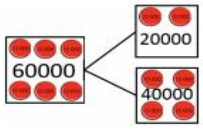
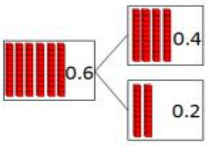
Year 5 & Year 6 Addition and Subtraction

Strategy and Guidance	CPA
Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 Skip counting forwards and backwards in steps of powers of 10 (i.e. 10, 100, 1000, 10 000 and 100 000) should be incorporated into transition activities and practised regularly. In Year 5 pupils work with numbers up to 1 000 000 as well as tenths, hundredths and thousandths. In Year 6 pupils work with numbers up to 10 000 000.	Support with place value counters on a place value chart, repeatedly adding the same counter and regrouping as needed.  Counting sticks and number lines:  Pay particular attention to boundaries where regrouping happens more than once and so more than one digit changes. e.g. 9900 + 100 = 10 000 or 99 000 + 1000 = 100 000
Using known facts and understanding of place value to derive Using the following language makes the logic explicit: I know three ones plus four ones is equal to seven ones. Therefore, three ten thousands plus four ten thousands is equal to seven ten thousands. In Year 5 extend to multiples of 10 000 and 100 000 as well as tenths, hundredths and thousandths. In Year 6 extend to multiples of one million. These derived facts should be used to estimate and check answers to calculations.	 3 + 4 = 7 30 000 + 40 000 = 70 000 300 000 + 400 000 = 700 000 20 000 + 40 000 = 60 000 40 000 + 20 000 = 60 000 60 000 - 40 000 = 20 000 60 000 - 20 000 = 40 000   0.6 = 0.2 + 0.4 0.6 = 0.4 + 0.2 0.2 = 0.6 - 0.4 0.4 = 0.6 - 0.2
Partitioning one number and applying known facts to add. Pupils can use this strategy mentally or with jottings as needed. Pupils should be aware of the range of choices available when deciding how to partition the number that is to be added. They should be encouraged to count on from the number of greater value as this will be more efficient. However, they should have an understanding of the commutative law of addition, that the parts can be added in any order. Pupils have experience with these strategies with smaller numbers from previous years and so the focus should be on developing flexibility and exploring efficiency.	**Partitioning into place value amounts (canonical partitioning):** 4650 + 7326 = 7326 + 4000 + 600 + 50  With place value counters, represent the larger number and then add each place value part of the other number. The image above shows the thousands being added. Represent pictorially with an empty numberline:  **Partitioning in different ways (non-canonical partitioning):** Extend the 'Make ten' strategy (see guidance in Y1 or Y2) to count on to a multiple of 10. 6785 + 2325 = 6785 + 15 + 200 + 2110 

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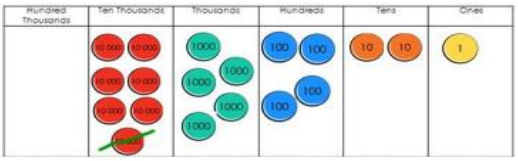
<u>Subtraction by partitioning and applying known facts.</u>

Pupils can use this strategy mentally or with jottings as needed. Pupils should be aware of the range of choices available when deciding how to partition the number that is to be subtracted. Pupils have experience with these strategies with smaller numbers from previous years and so the focus should be on developing flexibility and exploring efficiency.

Partitioning into place value amounts (canonical partitioning):

75 221 – 14 300 = 75 221 – 10 000 – 4000 – 300

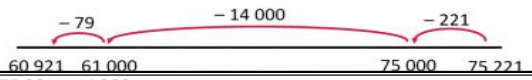


Represent pictorially with a number line, starting on the right and having the arrows jump to the left:

Develop understanding that the parts can be subtracted in any order and the result will be the same:

Partitioning in different ways (non-canonical partitioning):

Extend the 'Make ten' strategy (see guidance in Y1 or Y2) to count back to a multiple of 10.

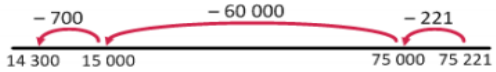


<u>Calculate difference by "counting back"</u>

It is interesting to note that finding the difference is reversible. For example, the difference between 5 and 2 is the same as the difference between 2 and 5. This is not the case for other subtraction concepts.

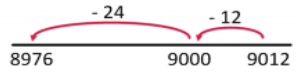
75 221 – 14 300

Place the numbers either end of a numberline and work out the difference between them. Select efficient jumps.



Finding the difference is efficient when the numbers are close to each other:

9012 – 8976



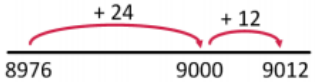
<u>Calculate difference by "counting on"</u>

Addition strategies can be used to find difference.

75 221 – 14 300

Finding the difference is efficient when the numbers are close to each other

9012 – 8976



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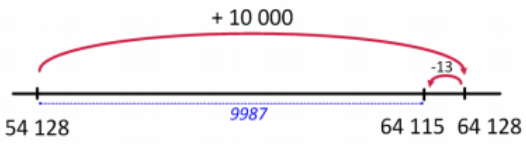
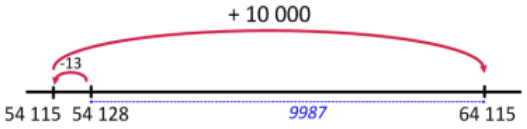
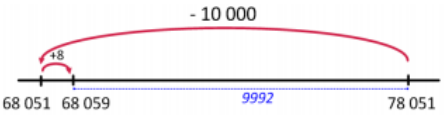
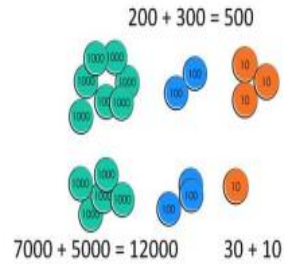
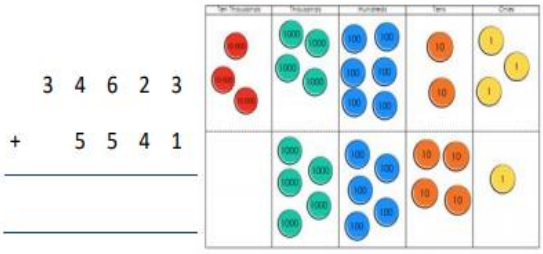
Round and adjust Addition and subtraction using compensation Pupils should recognise that this strategy is useful when adding and subtracting near multiples of ten. They should apply their knowledge of rounding. It is very easy to be confused about how to adjust and so visual representations and logical reasoning are essential to success with this strategy	**Addition**  54 128 + 9987 = 54 128 + 10 000 – 13 = 64128 - 13 Pupils should realise that they can adjust first:  54128 + 9987 = 54128 – 13 + 10 000 = 54 115 + 10 000 **Subtraction**  78 051 – 9992 = 78 051 – 10 000 + 8 = 68 051 + 8
Near doubles Pupils should be able to double numbers up to 100 and use this to derive doubles for multiples of ten as well as decimal numbers. These facts can be adjusted to calculate near doubles.	160 + 170 = double 150 + 10 + 20 160 + 170 = double 160 + 10 or 160 + 170 = double 170 - 10 2.5 + 2.6 = double 2.5 + 0.1
Partition both numbers and combine the parts Pupils should be secure with this method for numbers up to 10 000, using place value counters or Dienes to show conceptual understanding. If multiple regroupings are required, then pupils should consider using the column method.	7230 + 5310 = 12 000 + 500 + 40  Pupils should be aware that the parts can be added in any order.

Year 5 & Year 6 Addition and Subtraction

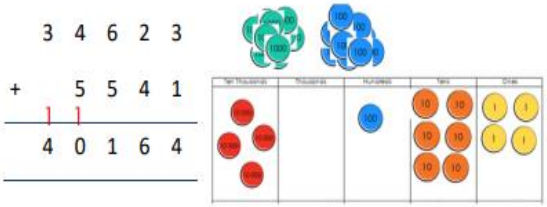
Written column methods for addition

In Year 5, pupils are expected to be able to use formal written methods to add whole numbers with more than four digits as well as working with numbers with up to three decimal places. Pupils should think about whether this is the most efficient method, considering if mental methods would be more effective. Continue to use concrete manipulatives alongside the formal method. When adding decimal numbers with a different number of decimal places, in order to avoid calculation errors, pupils should be encouraged to insert zeros so that there is a digit in every row. This is not necessary for calculation and these zeros are not place holders as the value of the other digits is not changed by it being placed. Exemplification of this method and the language to use are best understood through viewing the tutorial videos found here on the toolkit.

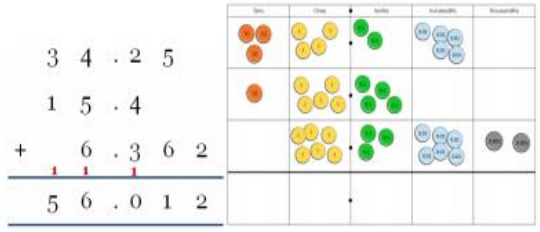
For this method start with the digit of least value because if regrouping happens it will affect the digits of greater value.



Combine the counters in each column and regroup as needed:

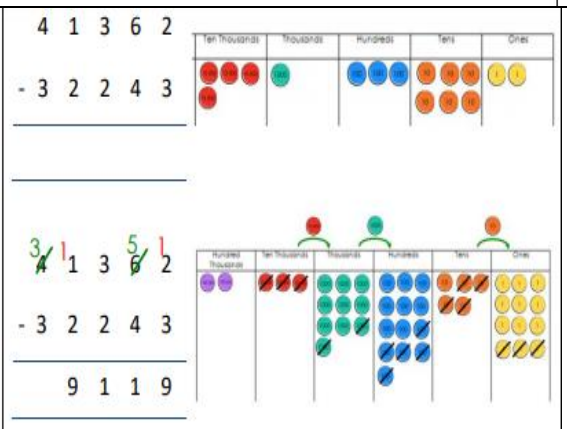


Decimal numbers:



Written column methods for subtraction

In Year 5, pupils are expected to be able to use formal written methods to subtract whole numbers with more than four digits as well as working with numbers with up to three decimal places. Pupils should be given plenty of practice with calculations that require multiple separate instances of regrouping. In Year 3 and 4 they become more familiar with calculations that require 'regrouping to regroup'. Understanding must be secured through the considered use of manipulatives and images, combined with careful use of language. Pupils should think about if this is the most efficient method, considering whether mental strategies (such as counting on, using known number facts, compensation etc.) may be likelier to produce an accurate



The term regrouping should be the language used. You can use the terms 'exchange' with subtraction but it needs careful consideration.

You can regroup 62 as 50 and 12 (5 tens and 12 ones) instead of 60 and 2 (6 tens and 12 ones).

Or you can 'exchange' one of the tens for 10 ones resulting in 5 tens and 12 ones.

If you have exchanged, then the number has been regrouped.

solution. Exemplification of this method and the language to use are best understood through viewing the tutorial videos found here on the toolkit.	