Oakmeadow Primary School calculation policy

Addition

Year 3	Year 4
Basic to subject specific (Beck's Tiers): Hundreds, tens, ones, estimate, partition, recombine, difference, decrease, near multiple of 10 and 100, inverse, rounding, column subtraction, exchange See also Y1 and Y2 **Instructional vocabulary:** the numbers in the sequence increase….write the missing number, how many, calculate the, complete the, what is the largest, tick, shade **Generalisations** Noticing what happens to the digits when you count in tens and hundreds. Odd + odd = even etc (see Year 2) Inverses and related facts – develop fluency in finding related addition and subtraction facts. Develop the knowledge that the inverse relationship can be used as a checking method. **Key Questions** What do you notice? What patterns can you see? When comparing two methods alongside each other: What's the same? What's different? Look at this number in the formal method; can you see where it is in the expanded method / on the number line?	**Basic to subject specific (Beck's Tiers):** add, addition, sum, more, plus, increase, sum, total, altogether, double, near double, how many more to make..? how much more? ones boundary, tens boundary, hundreds boundary, thousands boundary, tenths boundary, hundredths boundary, inverse, how many more/fewer? Equals sign, is the same as. **Instructional vocabulary:** the numbers in the sequence increase….write the missing number, how many, calculate the, complete the, what is the largest, tick, shade **Generalisations** Investigate when re-ordering works as a strategy for subtraction. Eg. 20 – 3 – 10 = 20 – 10 – 3, but 3 – 20 – 10 would give a different answer. **Some Key Questions** What do you notice? What's the same? What's different? Can you convince me? How do you know?
NC 2014 Add and subtract numbers mentally, Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction. Estimate the answer to a calculation and use inverse operations to check answers. Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.	**NC 2014** Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate. Estimate and use inverse operations to check answers to a calculation. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

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Mental Strategies

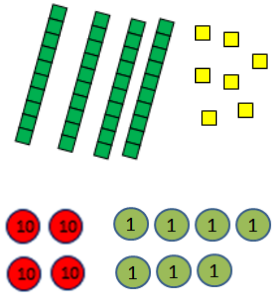
Children should continue to count regularly, on and back, now including multiples of 4, 8, 50, and 100, and steps of 1/10.

The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged. This will help to develop children's understanding of working mentally.

Children should continue to partition numbers in different ways.

They should be encouraged to choose the mental strategies which are most efficient for the numbers involved, e.g.
Add the nearest multiple of 10, then adjust such as 63 + 29 is the same as 63 + 30 – 1; counting on by partitioning the second number only such as 72 + 31 = 72 + 30 + 1 = 102 + 1 = 103

Manipulatives can be used to support mental imagery and conceptual understanding. Children need to be shown how these images are related eg.
What's the same? What's different?



Mental Strategies

Children should continue to count regularly, on and back, now including multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.

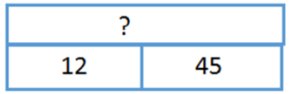
The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate.

Children should continue to partition numbers in different ways.

They should be encouraged to choose from a range of strategies:

- Counting forwards and backwards: 124 – 47, count back 40 from 124, then 4 to 80, then 3 to 77
- Reordering: 28 + 75, 75 + 28 (thinking of 28 as 25 + 3)
- Partitioning: counting on or back: 5.6 + 3.7, 5.6 + 3 + 0.7 = 8.6 + 0.7
- Partitioning: bridging through multiples of 10: 6070 – 4987, 4987 + 13 + 1000 + 70
- Partitioning: compensating – 138 + 69, 138 + 70 - 1
- Partitioning: using 'near' doubles - 160 + 170 is double 150, then add 10, then add 20, or double 160 and add 10, or double 170 and subtract 10
- Partitioning: bridging through 60 to calculate a time interval – What was the time 33 minutes before 2.15pm?
- Using known facts and place value to find related facts.

Continue with HTU + HTU, then extend to ThHTU + ThHTU.
Approximate using the most significant digit, rounding skills.
Check using the inverse. Use the bar model to show the relationship between part, part, whole.
When using the addition bar model: draw the part, then add the other part. Now draw the bar for the whole. By adding the two parts you find the whole.



Written methods (progressing to 4-digits)
Review year 3 final progression adding hundreds. Make sure images are used alongside compact column addition modelled with place value counters, progressing to calculations with

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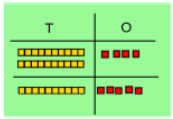
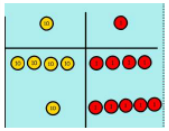
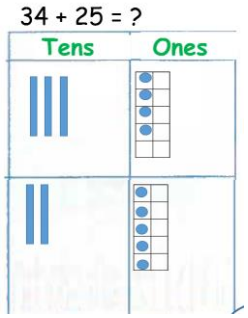
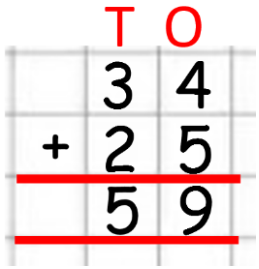
Objective	Concrete
Column method without regrouping	Add together the ones first, then add the tens. Use the Base 10 blocks first before moving onto place value counters. 24 + 15 =  44 + 15 = 

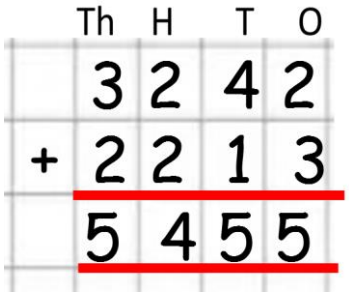
Children were introduced to column method in year 2. Review learning of column addition **without** crossing the boundary first. Ensure you refer to the value of the digitise g. 4 ones add 3 ones is equal to 7 ones. 2 tens add five tens is equal to 7 tens.
Children should use jottings alongside to support their understanding and then move away as soon as they are secure. Make sure the columns are labelled and images are used alongside the written method.





During the same lesson move onto crossing boundaries as for the example below.

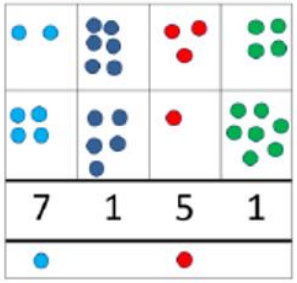
4-digit numbers. Introduce adding thousands with no exchange/ crossing boundary to begin with



Children can label the columns. Refer to the value of the digits e. g add 2 ones add 3 ones is equal to 5 ones. In the tens column add 4 tens add 1 ten is equal to 5 tens etc.
Move onto crossing boundaries.

Compact written method

Extend to numbers with at least



Refer to the carried digit as a ten or a hundred.

"7 ones add 5ones equals 12ones . That's 2 ones and 1 ten to carry over.
8 tens add 7 tens equals 15 tens and the one ten to carry makes 16 tens. That's 6 tens and 100 to carry over. 500 add 400 equals 900 and the one hundred to carry makes 1000"

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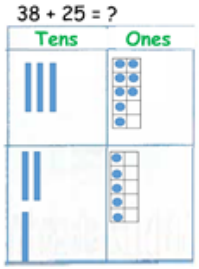
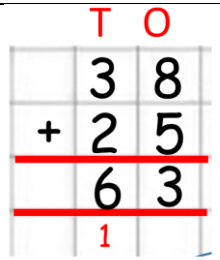
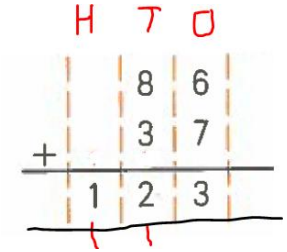




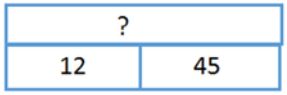
Steps for addition:

1. Keep the digits aligned in the correct columns.
2. Calculate from the ones place.
3. Exchange 10 ones for 1 ten and carry the digit.
4. Add the tens



Before moving onto adding hundreds ensure you give children opportunity to cross the hundreds boundary. Eg the example given.

Use the bar model to show the relationship between the, part, part, whole. When using the addition bar model: draw the part, then add the other part. Now draw the bar for the whole. By adding the two parts you find the whole.



Introduce adding hundreds with no exchange. Ensure images are used to expose structure. Ones need to be placed in a ten frame to ensure calculating rather than counting. **(This should be one lesson at the most and might not even need a whole lesson).**

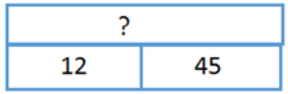
```
  7648
+ 1486
  9134
  111
```

Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

```
  72.8
+ 54.6
 127.4
 1 1
```

Place value counters should be used alongside columnar method to develop conceptual understanding.

Use the bar model to show the part, part whole relationship.



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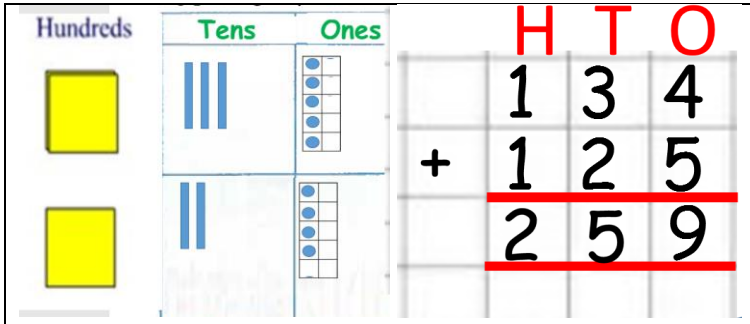
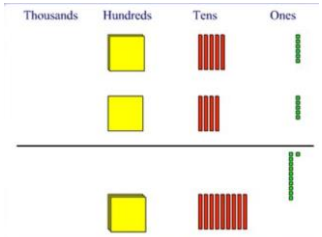


Introduce **crossing boundary** using denies apparatus or place value counters.



625
+ 48
13 (5+8)
60 (20 + 40)
+ 600 (600 + 0)
673

Expanded notion to be used before compact to ensure understanding. T**his is a bridging method and children should be moved on for the next lesson.**

All language in the context of the place value and the mental addition of the totals to be done in any order. Some children may begin to use a formal columnar algorithm, initially introduced alongside the expanded method. The formal method should be seen as a more streamlined version of the expanded method, not a new method.

625
+ 48
673
1

Carrying digits to be noted under the line.

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Use the bar model to show the part, part whole relationship.