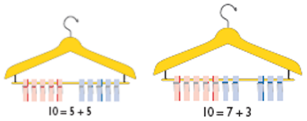
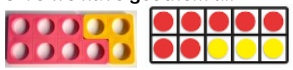
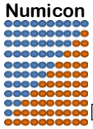
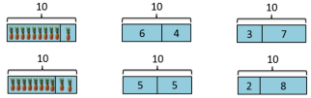
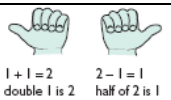
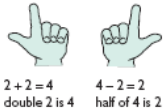
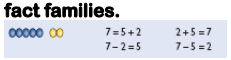
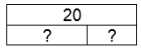
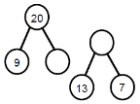
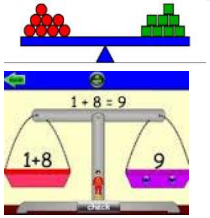
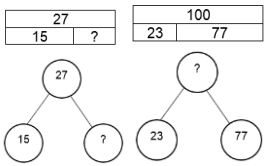
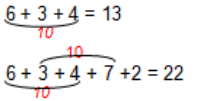
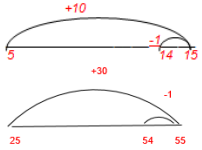
John Fletcher of Madeley Primary School

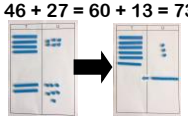
Calculation Policy- ADDITION

Policy reflects: concrete (do it!) abstract (see it!) visual (remember it!) communication (record it!)

<table>
<tr><th>Year</th><th colspan="4">1</th><th colspan="4">2</th></tr>
<tr><td>Overview and key vocabulary</td><td colspan="3">Counting objects, partitioning and recombining sets using practical apparatus.
Pictorial recording of practical experiences.
Understand that the number gets bigger.
Addition is commutative.
Use number tracks to develop counting skills, forwards and backwards.
To have experience of '=' sign as last stage in calculation.</td><td>put together, add, altogether, total, more than</td><td colspan="3">Show that addition of two numbers can be done in any order (commutative).
Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
To know that '=' means 'the same as' and can appear in a different place within a calculation.</td><td>sum, partition, rearrange, recombine, inverse, place value</td></tr>
<tr><td>Written Methods</td><td colspan="4">Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.</td><td colspan="4">Recording addition in columns supports place value and prepares for formal written methods with larger numbers.</td></tr>
<tr><td>Developing Conceptual/ Procedural Understanding

Structures:
Aggregation- combining quantities

Augmentation- increasing quantities</td><td colspan="2">Number bonds
 
10 = 5 + 5 10 = 7 + 3
We have 10 pegs on the coathangers, how can we split them into 2 groups? Is there another way? How can we be sure we have got them all?
 
Numicon Ten Frame
 
2 + □ = 10 10 - □ = 3
5 + □ = 10 10 - □ = 9
□ + 4 = 10 10 – 0 = □
Use the pattern to complete the number sentences.
 
Use bonds of 10 to calculate bonds of 20.</td><td colspan="2"> 
1 + 1 = 2 double 1 is 2 2 – 1 = 1 half of 2 is 1
 
2 + 2 = 4 double 2 is 4 4 – 2 = 2 half of 4 is 2
 
Count all
 
Count on
 
Count on, on number track in 1s.
Develop knowledge of fact families.
 
7 = 5 + 2 2 + 5 = 7
7 – 2 = 5 7 – 5 = 2</td><td colspan="2">Whole-part model
 
 
Fill in the missing numbers
Balance image for concept of equality.
 
 
1 + 8 = 9
1+8 9</td><td colspan="2">Whole-part model
 
Fill in the missing numbers
All answers to be recorded in a number sentence following any informal recording.
Adding more than two numbers
Strategy to include looking for facts or bonds that are useful e.g. bonds up to and including 10, doubles or adding 10 to a given number.
 
6 + 3 + 4 = 13 (10)
6 + 3 + 4 + 7 + 2 = 22 (10, 10)
Children to show notation.</td><td>Adjustment strategy
5 + 9 =
5 + 10 – 1= 14
 
(Round and adjust)
Doubles then near doubles
5 + 6 =
5 + 5 + 1 = 11
7 + 8 =
8 + 8 - 1 = 15
47+50 =
Re-arranging
18+4 =
Tell me what you know about 4, e.g. 3+1, 2+2
18+4= Rearrange the 4 into 2+2
So 18+2+2= 20+2 =22

59+24 = Partition the 24 into 20 +4 and rearrange the 4 into 1+3.
So 59+24= 59+20+1+3
= 59+1+20+3
= 83</td><td>Partition and recombine
Record partitioned steps in number sentences then add mentally.
40+20=60
6+7 =13
60+13=73
Moving on to:
46 + 27 = 60 + 13 = 73
 
Introducing columns without crossing the boundary
24 (20+4)
+53 (50+3)
77 (70 + 7)
Balance in the equation
14 = 8 + 6, 7+6=8+5
□= 13+9
3+ □+6 =16
14+ ◇= 15+27
Decision making
Using statements such as:
Ben did 14 + 9 = 23
How could he have done it?</td></tr>
<tr><td>With jottings… or in your head</td><td colspan="4">Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as: 7 = □ – 9</td><td colspan="4">Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures. Add and subtract numbers using concrete objects, pictorial representations and mentally, including: a 2 digit number and ones; a 2 digit number and tens; two 2 digit numbers; adding three 1 digit numbers.</td></tr>
<tr><td>Just know it!</td><td colspan="4">Represent & use number bonds and related subtraction facts within 20
Add and subtract 1 digit and 2 digit numbers to 20, including zero</td><td colspan="4">Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.</td></tr>
<tr><td rowspan="6">Foundations</td><td>1 more</td><td>Number bonds: 5 and 6</td><td colspan="2"></td><td>10 more</td><td>Number bonds:20,12 and 13</td><td colspan="2"></td></tr>
<tr><td>Largest number first.</td><td>Number bonds: 7 and 8</td><td colspan="2"></td><td>Add 1 digit to 2 digit by bridging</td><td>Number bonds: 14 and 15</td><td colspan="2"></td></tr>
<tr><td>Add 10.</td><td>Number bonds:9 and 10</td><td colspan="2"></td><td>Partition second number and add tens then ones.</td><td>Number bonds: 16 and 17</td><td colspan="2"></td></tr>
<tr><td>Ten plus ones.</td><td>Use number bonds of 10 to derive bonds of 11</td><td colspan="2"></td><td>Add 10 and multiples of 10.</td><td>Number bonds: 18 and 19</td><td colspan="2"></td></tr>
<tr><td>Doubles up to 10.</td><td></td><td colspan="2"></td><td>Doubles up to 20 and multiples of 5.</td><td>Partition and recombine.</td><td colspan="2"></td></tr>
<tr><td></td><td></td><td colspan="2"></td><td>Add near multiples of 10.</td><td></td><td colspan="2"></td></tr>
</table>

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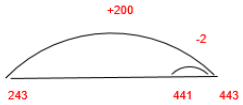
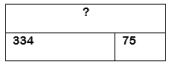
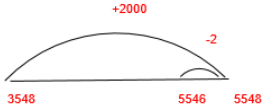
<table>
<tr><th>Year</th><th colspan="4">3</th><th colspan="4">4</th></tr>
<tr><td>Overview and key vocabulary</td><td colspan="3">Estimate the answer to a calculation and use inverse operations to check answers.
Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.
Check answers by repeating addition in a different order.
Adding zero leaves a number unchanged/adding ten to a number keeps unit digit constant.</td><td>complement</td><td colspan="3">Estimate and use inverse operations to check answers to a calculation.
Approximate using the most significant digit, rounding skills.
Refer to the carried digit as a ten or a hundred.
Extend method to include decimals to 2 decimal places.</td><td></td></tr>
<tr><td>Written Methods</td><td colspan="4">Add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction.</td><td colspan="4">Add and subtract numbers with up to 4 digits using the formal written method of columnar addition and subtraction where appropriate. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</td></tr>
<tr><td>Developing Conceptual/ Procedural Understanding

Structures:
Aggregation- combining quantities

Augmentation- increasing quantities</td><td>Near doubles
13+14 =
Double 13= 26
26+1 =27
or
Double 14 =28
28-1=27
Using known facts
40 + 80 = 120 using 4 + 8 = 12
So 400 + 800 = 1200
Adjustment strategy
243 + 198
by +200 then -2
(Round and adjust)
 

Place value materials to represent calculations
Diennes and then place value counters.</td><td colspan="2">Start with least significant digit
67
+ 24
11 (7+4)
+ 80 (60+20)
91

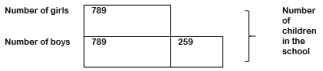
“7 add 4 equals 11 and 60 add 20 equals 80. 1+ 0 = 1 and 1 ten + 8 tens = 9 tens”

625
+ 48
13 (5+8)
60 (20 + 40)
+600 (600 + 0)
673
All language in the context of the place value and the mental addition of the totals to be done in any order.</td><td>Columnar addition
625
+ 48
673
1
Representing problems
There are 334 children at Springfield School and 75 at Holy Trinity Nursery. How many children are there altogether?
 
</td><td>Using known facts
40 + 80 = 120 using 4 + 8 = 12
So 400 + 800 = 1200 and 4000+8000=12,000
Adjustment strategy
3548+ 1998
by +2000 then -2
(Round and adjust)
 

Place value materials to represent calculations
Place value counters.</td><td>Columnar addition
587
+ 475
1062
1 1
“7 add 5 equals 12. That’s 2 units and 1 ten to carry over. 80 add 70 equals 150 and the1 ten to carry makes 160. That’s 6 tens and 100 to carry over. 500 add 400 equals 900 and the 1 hundred to carry makes 1000”

7648
+1486
14 (8+6)
120 (40+80)
1000 (600+400)
+ 8000 (7000+1000)
9134

7648
+ 1486
9134
1 1 1</td><td colspan="2">Columnar addition (decimals) in contexts such as money and measurement
12.45
7.36
+ 24.50
44.31
1 1 1

Representing problems
There are 259 more boys than girls in Lucy’s school. If there are 789 girls, how many pupils are there altogether?
 
</td></tr>
<tr><td>With jottings… or in your head</td><td colspan="4">Add and subtract numbers mentally, including: a 3 digit number and ones; a 3 digit number and tens; a 3 digit number and hundreds.</td><td colspan="4">Add and subtract numbers mentally, including: a 4 digit number and ones; a 4 digit number and tens; a 4 digit number and hundreds.</td></tr>
<tr><td>Just know it!</td><td colspan="4">Derive and use addition and subtraction facts to 100, e.g. 33+ 67 =100.</td><td colspan="4">Derive and use addition and subtraction facts (for multiples of 10) to 1000, e.g. 330+ 670=1000.</td></tr>
<tr><td rowspan="4">Foundations</td><td colspan="2">Add single digit bridging through boundaries</td><td colspan="2">Add multiples of 10,100</td><td colspan="2">Fluency of 2 digit + 2 digit</td><td colspan="2">Add multiples of 10, 100 and 1000</td></tr>
<tr><td colspan="2">Partition second number to add</td><td colspan="2">Pairs of 100 (complements of 100)</td><td colspan="2">Partition second number to add</td><td colspan="2">Decimal pairs of 10 and 1</td></tr>
<tr><td colspan="2">Use near doubles to add</td><td colspan="2">Add near multiples of 10 and 100 by rounding and adjusting</td><td colspan="2">Use near doubles to add</td><td colspan="2">Adjust both numbers before adding</td></tr>
<tr><td colspan="2">Partition and recombine</td><td colspan="2"></td><td colspan="2">Add near multiples</td><td colspan="2">Partition and recombine</td></tr>
</table>

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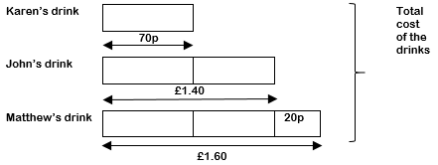
<table>
<tr><th>Year</th><th colspan="3">5</th><th colspan="3">6</th></tr>
<tr><td>Overview and key vocabulary</td><td colspan="3">Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Add with increasingly large numbers.
Promote decision making so that pupils choose an appropriate method/strategy.
Decimals, fill ‘empty columns’ with zeros as place holders.</td><td colspan="3">Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</td></tr>
<tr><td>Written Methods</td><td colspan="3">Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).
Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</td><td colspan="3">Solve problems involving addition, subtraction, multiplication and division.</td></tr>
<tr><td>Developing Conceptual/ Procedural Understanding

Structures:
Aggregation- combining quantities

Augmentation- increasing quantities</td><td>Columnar addition
Include calculations involving more than 2 numbers and carrying figures >1.

25567
16397
+15984
57948
1 1 2 1

Include calculations with ‘empty columns’.
124.9 + 7.25

124.90
+7.25
132.25
1 1</td><td colspan="2">Representing problems
The three Fletcher children need to cool down and they all choose a drink at the shop. Karen’s is the cheapest, only half the price of John’s. Matthew’s is the most expensive at £1.60. John chooses the one that costs 20p less than his brother’s. What is the total cost of the drinks?
  </td><td colspan="2">Columnar addition
Include calculations with up to 3 ‘empty columns’.
128.7 + 3.014

128.700
+3.014
131.714
1</td></tr>
<tr><td>With jottings… or in your head</td><td colspan="3">Add and subtract numbers mentally with increasingly large numbers.</td><td colspan="3">Undertake mental calculations with increasingly large numbers and more complex calculations.</td></tr>
<tr><td>Just know it!</td><td colspan="3">Derive and use addition and subtraction facts to 10 and 1, e.g. 3.3+ 6.7 =10 and so 0.33 + 0.67 = 1.</td><td colspan="3"></td></tr>
<tr><td rowspan="3">Foundations</td><td>Fluency of 2 digit + 2 digit including with decimals</td><td>Add multiples of 10, 100, 1000 and tenths</td><td></td><td>Fluency of 2 digit + 2 digit including with decimals</td><td>Add multiples of 10, 100, 1000, tenths and hundredths</td></tr>
<tr><td>Partition second number to add</td><td>Use number facts, bridging and place value</td><td></td><td>Partition second number to add</td><td>Use number facts, bridging and place value</td></tr>
<tr><td>Adjust numbers to add</td><td>Partition and recombine</td><td></td><td>Adjust numbers to add</td><td>Partition and recombine</td></tr>
</table>