Gresham Village School and Nursery
Written Calculations Policy

Addition

<table>
<tr><td>Year 1</td><td colspan="4">In year 1, we use a range of concrete and pictorial representations following White Rose Mathematics models in their scheme of work and their Calculation Policy. This learning builds the concepts and mathematical understanding for year 2.</td></tr>
<tr><td>Year 2</td><td>Add numbers using concrete objects, pictorial representations, and mentally, including:

U + U + U
TU + U
TU + T
TU + TU

Use a range of concrete and pictorial representations following White Rose Mathematics models. Use of Base 10 to solve TU + TU calculations:

There is no requirement to teach column method addition in year 2.</td><td>36 + 37

<table><tr><td>36</td><td>30
  </td><td>6
  </td></tr><tr><td>37</td><td>30
  </td><td>7
  </td></tr><tr><td></td><td>60</td><td>13</td></tr></table>
= 73</td><td colspan="2">Leading to abstract representations:

30 + 30 = 60, 6 + 7 = 13, so 60 + 13 = 73

Or, counting on from the larger number in tens and ones:

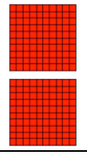
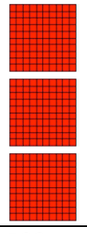
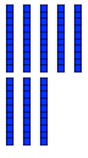
37 + 30 = 67, 67 + 6 = 73</td></tr>
<tr><td>Year 3</td><td>Add numbers with up to 3 digits using an effective written method

Required skills and knowledge:

Children need to be confident adding units, multiples of 10 and multiples of 100 eg 3 + 4, 30 + 40, 100 + 400.

They need to understand place value to HTU.

Initially use base 10 to support with addition of TU and TU, HTU and TU, then HTU + HTU:</td><td>236 + 387

<table><tr><td>236</td><td>200
  </td><td>30
  </td><td>6
  </td></tr><tr><td>387</td><td>300
  </td><td>80
  </td><td>7
  </td></tr><tr><td></td><td>500</td><td>110</td><td>13</td></tr></table>
= 623</td><td>Then move on to expanded column addition:

236 + 387

200 + 30 + 6
<u>300 + 80 + 7</u>
<u>500 + 110 + 13</u> = 623</td><td>Moving to:

236
+ <u>387</u>
13 (6 + 7)
110 (30 + 80)
<u>500</u> (200 + 300)
623</td></tr>
</table>

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<table>
<tr><td>Year 4</td><td>Add numbers with up to 4 digits, including using the formal written method

Children need to understand the value of digits up to THTU. Do not move to the compact method until children are absolutely secure with the expanded version.</td><td>Expanded vertical addition:

3236
+ 2387
13 (6 + 7)
110 (30 + 80)
500 (200 + 300)
5000 (3000 + 2000)
5623</td><td>Leading to the compact vertical addition method:

3236
+ 2387
5623
1 1</td></tr>
<tr><td>Year 5</td><td colspan="2">Add numbers with more than 4 digits, including using the formal written method

23236
+ 32387
55623
1 1</td><td>Add decimals with the same number of decimal places, using a compact written method

23.57
+ 17.48
41.05
1 1 1</td></tr>
<tr><td>Year 6</td><td colspan="3">Add decimals with a different number of decimal places using a compact written method

Compact method as above.</td></tr>
</table>

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Written Calculations Policy

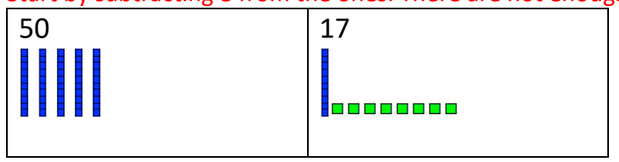
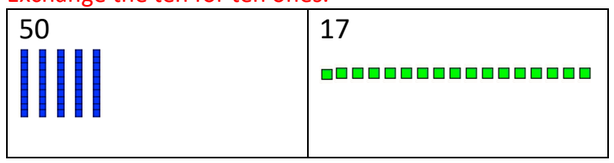
Subtraction

<table>
<tr><td>Year 1</td><td colspan="2">In year 1, we use a range of concrete and pictorial representations following White Rose Mathematics models in their scheme of work and their Calculation Policy. This learning builds the concepts and mathematical understanding for year 2.</td></tr>
<tr><td>Year 2</td><td>Subtract numbers using concrete objects, pictorial representations, and mentally, including subtraction of two 2-digit numbers

Use a range of concrete and pictorial representations following White Rose Mathematics models in their scheme of work and their Calculation Policy.

There is no requirement to teach column method addition in year 2. However, the use of base 10 apparatus to assist with subtraction by ‘taking away’ two to digit numbers will give children the model for the Key Stage 2 formal methods.</td><td>Use base 10 on a HTU mat to support with subtraction of TU and TU, initially without the need for exchange.

67 - 38
This is 67.

60 | 7
 
↓
Start by subtracting 8 from the ones. There are not enough ones, so move a 10 into the ones column to make 17.
 
↓
Exchange the ten for ten ones.
 
↓
Now subtract/ take away the 8 ones, leaving 9. And the 3 tens leaving only 2 tens.
 
67 – 38 = 29</td></tr>
</table>

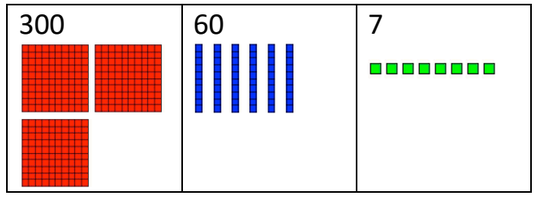
<table>
<tr>
<td>Year 3</td>
<td>Subtract numbers with up to 3 digits using an effective written method

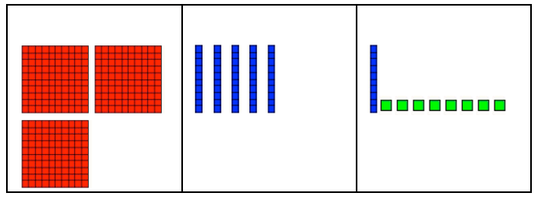
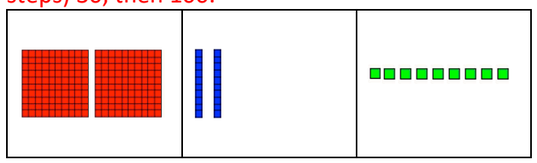
Required skills and knowledge:

Children need to be confident subtracting units, multiples of 10 and 100 eg 6 – 2, 70 – 20, 700 – 200.

They need to be able to partition HTU.</td>
<td>Initially use base 10 on a HTU mat to support with subtraction of TU and TU, HTU and TU, then HTU – HTU.

367 - 138

This is 367
 

Subtract 8 from the ones. There are not enough ones, so move a 10 into the ones column to make 17.
 
Exchange the ten for ten ones, then subtract 8, then (in separate steps) 30, then 100.
 
367 – 138 = 229</td>
<td>Then teach the abstract version alongside this: 367 – 138 using expanded vertical subtraction (decomposition).

50 17
300 + <s>60</s> + <s>7</s>
- <u>100 + 30 + 8</u>
200 + 20 + 9 = 229</td>
</tr>
<tr>
<td>Year 4</td>
<td>Subtract numbers with up to 4 digits using the formal written method

Ensure children are confident with expanded decomposition without any apparatus (year 3), before moving on to full decomposition. It is not usually necessary to go back to expanded version, when moving on to THTU – THTU.

A common difficulty is subtracting when there is a zero in the larger number.</td>
<td>Expanded decomposition model:

3367 - 1138

50 17
3000 + 300 + <s>60</s> + <s>7</s>
- <u>1000 + 100 + 30 + 8</u>
2000 + 200 + 20 + 9 = 2229</td>
<td>Leading to full decomposition:

5 17
<s>3</s>67
- 138
229</td>
<td>Leading to:

5 17
33<s>67</s>
- 1138
2229</td>
</tr>
</table>

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Year 5	**Subtract numbers with more than 4 digits, including using the formal written method** Ensure children are secure with compact decomposition (year 4). 5 17 33~~6~~~~7~~ - 21138 12229	***Subtract decimals with the same number of decimal places, using a compact written method*** Ensure that children are completely secure with compact decomposition before introducing decimals. 1 13 4 17 ~~23~~.~~57~~ - 17.48 6.09
Year 6	***Subtract decimals with a different number of decimal places using a compact written method*** Compact method as above.	

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Multiplication

<table>
<tr><td>Years 1 and 2</td><td colspan="3">We follow the White Rose Mathematics Calculations Policy in Key Stage 1, which sets out clearly the progression in understanding early multiplication concepts and mental calculations, including times tables in year 2. It is on these early concepts that the following written methods are based.</td></tr>
<tr><td>Year 3</td><td>Develop reliable written methods for multiplication…, starting with … 2 digit numbers by 1 digit numbers and progressing to the formal written method

Continue with methods and concrete and pictorial and mental with jottings and apparatus, as explained in the White Rose Mathematics scheme of work.

Children need to be becoming proficient in times tables. In setting calculations for the children to do, use tables that they know well.</td><td>Teach proficiency in multiplying by partitioning:

34 x 4

30 x 4 = 120
4 x 4 = 16

So 120 + 16 = 136</td><td>Leading to expanded vertical multiplication:

34
X 4
16 (4 x 4)
120 (4 x 30)
136</td></tr>
<tr><td>Year 4</td><td>Multiply 2 and 3 digit numbers by a one digit number using formal written layout

Children need to know tables facts and be able to apply these to multiples of 10 and 100 eg 6 x 60, 6 x 600.

Go back to Y3 concrete and pictorial, if children are not ready for expanded ‘long’ multiplication.</td><td>Teach expanded vertical multiplication

267
X 6
42 (6 x 7)
360 (6 x 60)
1200 (6 x 200)
1602
1</td><td>Leading to compact short multiplication:

267
X 6
1602
4 4</td></tr>
<tr><td>Year 5</td><td colspan="2">Multiply numbers up to 4 digits by a 1 or 2-digit number using the formal written method

Compact short multiplication

3267
X 6
19602
1 4 4</td><td>Multiply whole numbers by a decimal number to 1 decimal place

For example, 32.5 x 7 or 3.56 x 6

32.5
X 6
192.0
1 1 3

Explain how to read the decimal within the calculation eg 0.5 x 6 = 3.0, so put the 0 in the tenths column and carry 3.</td></tr>
</table>

Year 6	**Multiply numbers up to 4 digits by a 2 digit number** This is an extension of the compact HTU x U method above, but differs in that two multiplications are performed, then added up at the end. Showing the expanded version across is a good starting point, but may not be needed if the children are proficient in the Y5 method. It is important that the children know they need to add a place holder to the second line, because they are multiplying by a multiple of 10.	3267 x 26 Partition into 3267 x 20 and 3267 x 6 3267 x 20 = 65340 (11) 3267 x 6 = 19602 (144) Then combine: 65340 + 19602 84942 (1)	Moving on to the standard compact method: 3267 X 26 19602 (144) 65340 (11) 84942

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Written Calculations Policy

Division

<table>
<tr><td>Years 1 and 2</td><td colspan="4">We follow the White Rose Mathematics Calculations Policy in Key Stage 1, which sets out clearly progression in understanding early division concepts and mental calculations, including times tables in year 2. It is on these early concepts that the following written methods are based.</td></tr>
<tr><td>Year 3</td><td>Develop reliable written methods for division…, starting with … 2-digit numbers by 1-digit numbers and progressing to the formal written method

Continue with methods and concrete and pictorial and mental with jottings and apparatus, as explained in the White Rose Mathematics scheme of work.

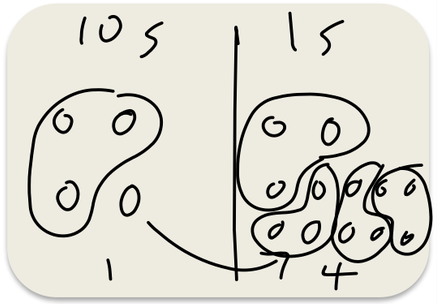
Children need to be becoming proficient in times tables. In setting calculations for the children to do, use tables that they know well.</td><td>Develop this White Rose Mathematics division scaffold using place value counters as the basis for short division:

42 ÷ 3 42 is the total number; 3 is the number of groups.

Make 42 with place value counters and place on a place value mat:

<table><tr><td>10s</td><td>1s</td></tr><tr><td>10 10 10 10</td><td>1 1</td></tr></table>
How many groups of 3 can you make with the 10s?

<table><tr><td>10s</td><td>1s</td></tr><tr><td>10 10 10 10</td><td>1 1</td></tr><tr><td>1</td><td></td></tr></table>
Move the spare 10 exchange it for 1s and put them into the ones to make 12.
How many groups of three in the ones?
<table><tr><td>10s</td><td>1s</td></tr><tr><td>10 10 10</td><td>1 1 1 1
1 1 1 1
1 1 1 1</td></tr><tr><td>1</td><td>4</td></tr></table></td><td>Then represent this pictorially:

The answer is 14.

See WRM Calculation Policy guidance for further exemplification of HTU ÷ U.</td><td>And progress on to represent this with an expanded version of the formal written method:

10 + 6 = 16
6 ⟌ 90 + 36</td></tr>
</table>

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<table>
<tr>
<td>Year 4</td>
<td>Become fluent in the formal written method of short division with exact answers when dividing by a 1- digit number

Continue using place value counters to support division to HTU ÷ U as necessary.

Proficiency in times tables is essential for all division. Provide tables squares and charts as appropriate.</td>
<td>Start by partitioning as in year 3:

6 ⟌ 90 + 6

10 + 6 = 16
6 ⟌ 90 + 36</td>
<td>Then introduce the compact method of short division and extend up to 3 digits.

16
6 ⟌ 936</td>
<td>Express quotients as remainders:

161 r1
6 ⟌ 967</td>
</tr>
<tr>
<td>Year 5</td>
<td>Divide numbers up to 4 digits by a 1-digit number using short division and interpret remainders appropriately for the context</td>
<td>161 r1
6 ⟌ 967

Or-

161 1/6
6 ⟌ 967</td>
<td colspan="2">Extending to:

159.5
6 ⟌ 95570

But ensure that the calculation works up to 2 decimal places.</td>
</tr>
<tr>
<td>Year 6</td>
<td>Divide numbers up to 4 digits by a 2-digit whole number using long division and interpret remainders as whole number remainders, fractions or by rounding, as appropriate for the context</td>
<td colspan="3">162
14 ⟌ 2268
14 (1 x 14)
86
84 (6 x 14)
28
28 (2 x 14)
0</td>
</tr>
</table>