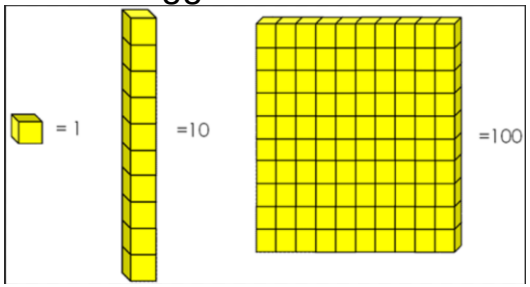
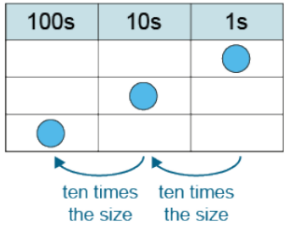
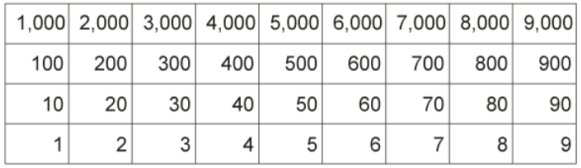
Year 4 Green

Hugglescote Calculation Policy

Progression in Calculations at Hugglescote- reviewed 2021 (with reference to 2020 Ready to Progress Government Guidance and other local schools)

Number and Place Value

Objective and link to RTP criteria	Concrete	Pictorial	Abstract
Use scaling to manipulate facts (by 10 and then 100) Year 3 NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10). Year 4 NF–3 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100)	Children use base 10 and place value counters to work out which numbers are 10 times bigger and then 100 times bigger than a number.  Use place value charts to show how counters move as they become 10x or 100x bigger. 	Children look at this visual representation of scaling.  Children understand how a Gattegno Chart shows scaling.  Figure 3: Gattegno chart showing multiples of 1, 10, 100 and 1,000	Children can use scaling to manipulate facts. 2 x 5 = 10 so 2 x 50 = 100 as 50 is 10 times bigger than 5 so the answer must be 10 times bigger 5 x 6 = 30 so 5 x 600 = 3000 as 600 is 100 time bigger than 6 so the answer must be 100 times bigger
Know equivalence of hundreds and thousands	Children use base 10 and place value counters and 10s frames to show how many tens in one hundred and then how	Children see see pictures of a 10s frame with 10 counters to show 10 hundreds = 1 thousand and pictures of 10 base 10 hundreds and 1000.	Children can completer missing numbers. 1 hundred = ___ tens 1 thousand = ___ hundreds

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

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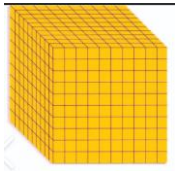
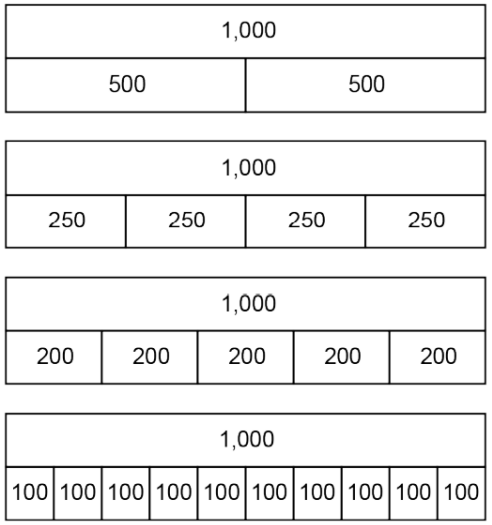
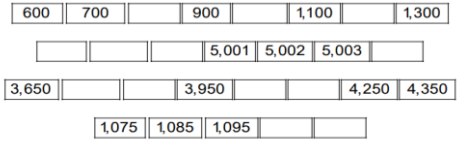
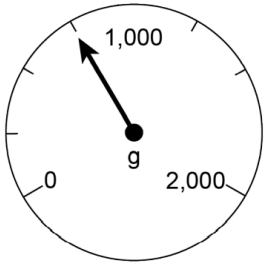
Year 4 NPV–1 Know that 10 hundreds are equivalent to 1 thousand, and that 1,000 is 10 times the size of 100; apply this to identify and work out how many 100s there are in other four-digit multiples of 100.	many hundreds in one thousand.  	 = 1000  = 1000	1 thousand = ___ tens ___ tens = 3 hundreds ___ hundreds = 4 thousands 2 thousands = ___ tens
Read scales to 1000 marked in 2,4 and 5 equal parts Year 4 NPV–4 Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts.	Children use number lines to count in 100s, 500s, 200s and 250s forwards and back. Children read scales to measure weight and capacity. 	Children see a range of scales including numbers represented on number lines and bar models.  	Children can complete number tracks and bar models with missing numbers.  Children can read scales. 
Find a number on a number line and identify the previous and next multiple of 10, 100 or 1000.	Count forward and back in 10s,100s and 1000s from any number and identify which multiple of 10,100 or 1000 is before and after a given number. Use 1000 squares and number lines to 1000 and 10 000 to help.	Use number lines to find a number and to identify the multiple of 10, 100 or 1000 that is before and after it. Use number lines to work out which is nearest in order to round to the nearest 10, 100 and 1000.	Identify missing numbers on number lines and work out the nearest multiple of 10, 100, 1000 so as to round to the nearest 10, 100 or 1000.

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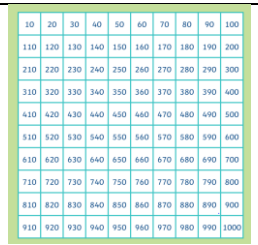
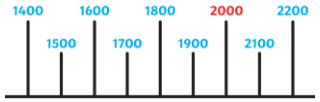
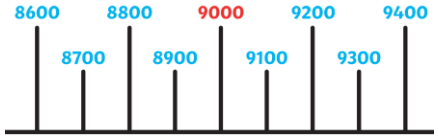
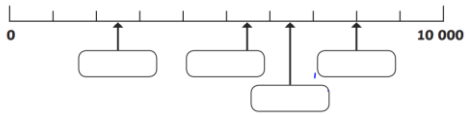
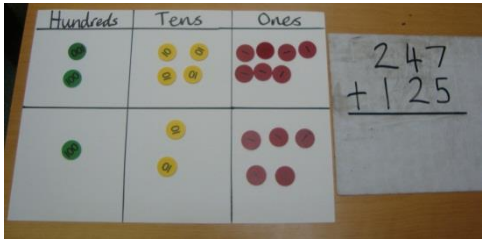
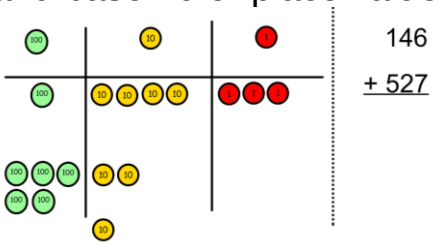
Round to the nearest 10,100 or 1000. Year 4 NPV–3 Reason about the location of any fourdigit number, including identifying the previous and next multiple of 1,000 and 100, and rounding to the nearest of each.	 		 Round 2045 to the nearest 10 = Round 2045 to the nearest 100 = Round 2045 to the nearest 1000 =

Addition and Subtraction

Objective and link to RTP criteria	Concrete	Pictorial	Abstract
Column addition- with exchanging (Year 4 to ensure secure) Year 3 NF–1 Secure fluency in addition and subtraction facts that bridge 10, through continued practice.	Use Base 10 first and then place value counters to make both numbers on a place value grid.  Add up the ones and exchange 10 ones for one 10 as needed. 10 tens for 1 hundred as needed.	Children can be shown or could draw a pictoral representation of the columns and base 10 or place value counters. 	Start by partitioning the numbers before moving on to clearly show the exchange above the column. 23 + 47 = 70 20 + 3 + 40 + 7 60 + 10 1 23 +47 70

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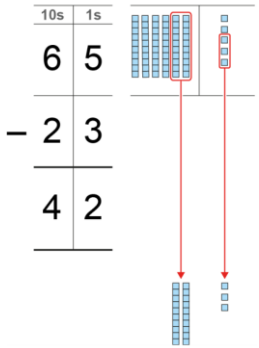
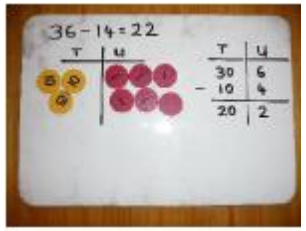
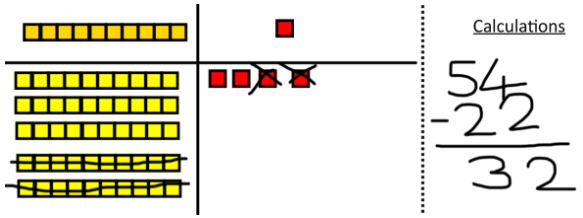
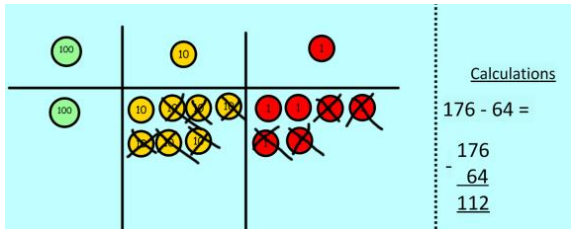
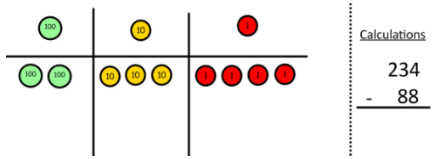
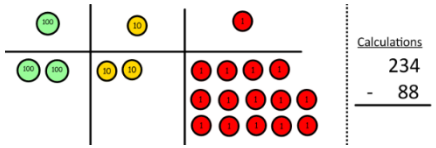
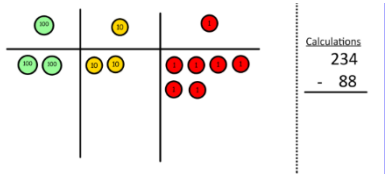
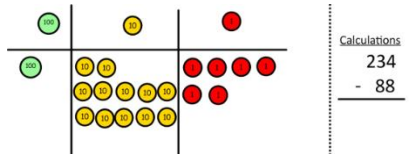
Column subtraction without exchanging **(Once ready in Year 2)** **(Year 3 to ensure secure before moving on)** Year 2 AS–4 Add and subtract any 2 two digit numbers.	Use Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Use place value counters. 	Show pictures or children could draw the Base 10 or place value counters alongside the written calculation to help. Cross out what is taken away.  	When ready children then record in columns. Labelling columns to start with as T for tens and O for ones. Largest number on top line. Children must subtract ones first then tens. First children can partition to subtract. 50 + 2 - 20 + 1 30 + 1 Then: T O 5 2 - 2 1 3 1
Column subtraction with exchanging (Year 4 to ensure secure) Year 3 NF–1 Secure fluency in addition and subtraction facts that bridge 10, through continued practice.	Use Base 10 and then place value counters to show how to use exchanging when subtracting. Always start with ones. 1.  2. 	Children can be shown or could draw a pictoral representation of the columns and base 10 or place value counters to help with understanding. 3.  4. 	Start by partitioning the numbers before moving on to clearly show the exchange next to the column. 65 - 47 = 18 60 + 5 + 40 + 7 50 + 15 - 40 + 7 10 + 8 5 6 15 - 4 7 1 8

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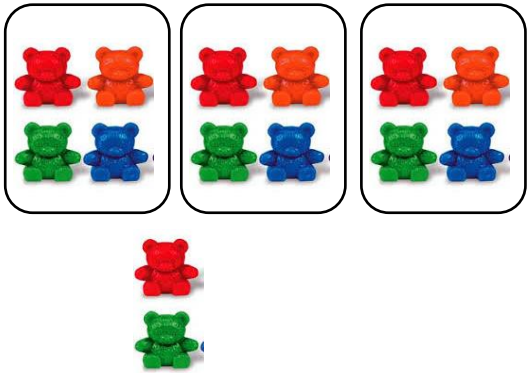
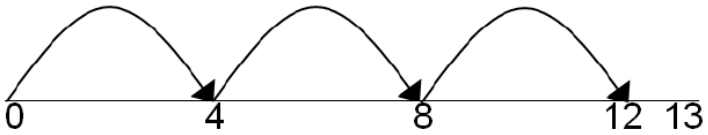
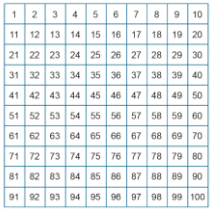
Choose an efficient method either mental or written (Year 5 and Year 6)	Ask children to choose which methods mental or written they use in order to solve a range of number and written problems. Children could sort cards into two groups labelled: 'solve mentally' or ' with a written method'. Children could write on a post it their choice of method and why they have chosen it. Discuss and display the most efficient strategies.	Give children opportunities to solve missing number problems in order to demonstate secure understanding of written calculations. 2 6 2 + 3 □ 1 5 8 3 7 □ 4 – 6 2 □ 3 2	If using written methods use compact and record exchanging as above. e.g. 1 1 1 172.83 + 54.68 227.51

Multiplication and Division

Objective and link to RTP criteria	Concrete	Pictorial	Abstract
Division with a remainder of two digits by 1 digit/interpret in context 3MD–1 Apply known multiplication and division facts 4NF–2 Solve division problems, that involve remainders, and interpret remainders appropriately	Divide objects between groups and see how much is left over. 14 ÷ 3 = 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  	Complete written divisions and show the remainder using r.  Also solve problems using context such as: Each mini-bus holds 6 children. There are 13 children.

<table>
<tr><td>according to the context’</td><td></td><td></td><td>How many buses are needed?</td></tr>
<tr><td>Know all multiplication and matching division facts to 12 x 12
4NF–1 Recall multiplication and division facts up to 12 x 12
5NF–1 Secure fluency in multiplication and division facts.</td><td>Count on and back in multiples.
Use a counting stick to rehearse counting forward and back in multiples.
 
Sort multiples using hoops as Venn diagrams to help spot patterns.</td><td>Use a 100 square to explore patterns in times tables and also show multiples in 5 by 3 grids of 15 squares to help spot patterns (even in the 7x!)
 
<table><tr><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td></tr><tr><td>42</td><td>49</td><td>56</td><td>63</td><td>70</td></tr><tr><td>77</td><td>84</td><td>91</td><td>98</td><td>105</td></tr></table></td><td>Children can use facts they know from KS1 – 1x,2x,5x and 10x to work out those they don’t know.
e.g.
3x = 2x + 1 multiple more
6x = 5x + 1 multiple more
7x = 5x + 2x
9x = 10x count back 1 multiple
4x = double 2x
8x = double 2x double 4x</td></tr>
<tr><td>Use knowledge of multiplication and division to manipulate calculations to multiply or divide efficiently.
Make choices.

Year 4MD–2 understand and apply the commutative property of multiplication.

6AS/MD–2 Using arithmetic properties, inverse relationships.</td><td colspan="3">Children use knowledge of times tables to 12 x 12 and scaling to explore how to manipulate calculations in order to multiply or divide efficiently.

Children secure understanding of:
• Commutativity of multiplication - multiplication can be done in any order
• Associativity with multiplication – rearranging the calculation will not change the result
<table><tr><th>Applying commutativity</th><th>Applying associativity (example)</th></tr><tr><td>$3\times7\times10=210$ $3\times10\times7=210$</td><td>$3\times7\times10=210$</td></tr></table>• Multiplicative reasoning and scaling – 3 x 4 = 12 so 0.3 x 4 = 1.2
 
0.03 x 5 = 0.15
• Using inverse relationships – 45 x 9 = 405 so 405 divided by 9 = 45</td></tr>
</table>

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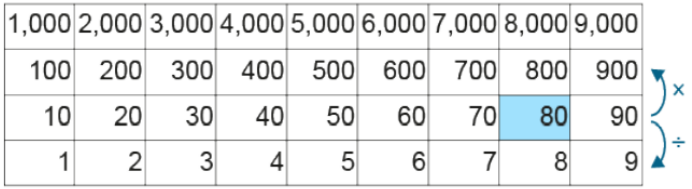
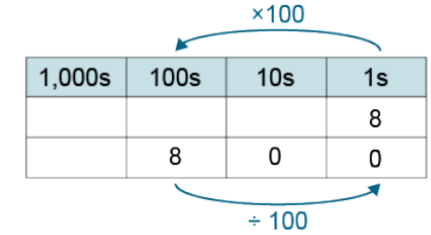
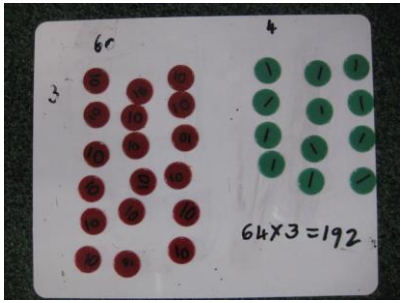
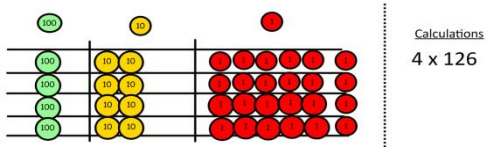
Multiply and divide by 1, 0, 10 and 100 Year 4 MD–1 Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size.	Children use Base 10 and place value counters and place valeu charts to explore what happens when you multiply by 1,0, 10 and 100.	Children use gattegno charts and place value charts to see how to multiply and divide by 10 and 100.  80 × 10 = 800 80 ÷ 10 = 8  8 × 100 = 800 800 ÷ 100 = 8	Children can solve calculations: 130 x 0 = 0 130 divided by 1 = 130 $13 \times 10 = 130$ $130 \times 10 = 1{,}300$ $13 \times 100 = 1{,}300$ $130 \div 10 = 13$ $1{,}300 \div 10 = 130$ $1{,}300 \div 100 = 13$
Expanded column multiplication (for multiplying 2 and 3 digit numbers by 1 or 2 digits)	Children use place value counters to multiply ones first and then tens.  	Show pictures of place value counters being multiplied using grid method, which links with arrays to show what is happening in expanded multiplication.  	Start with multiplying 2 and 3 digit numbers by a 1 digit. Multiply ones first and record answer under line, then tens, then hundreds. Use scaling to help e.g. 4 x 4 = 16 so 4 x 40 = 160. Then total. Move on to multiplying by 2 digits. 345 x 4 20 160 +1200 1380 345 x 24 20 160 1200 100 800 + 6000 8280

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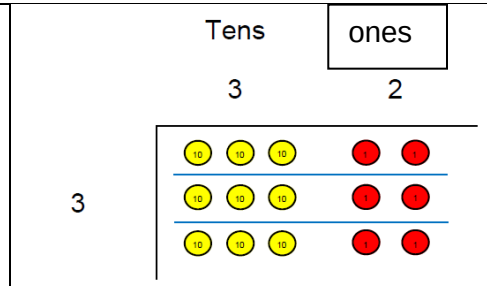
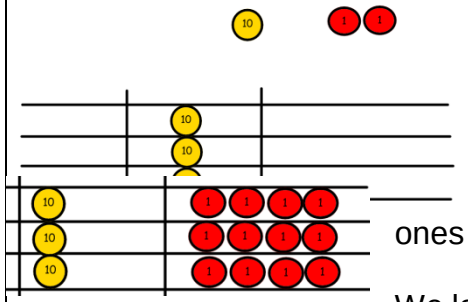
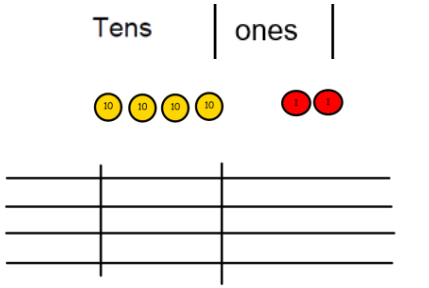
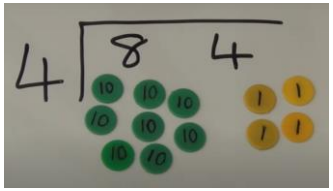
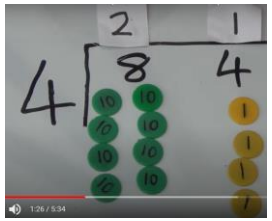
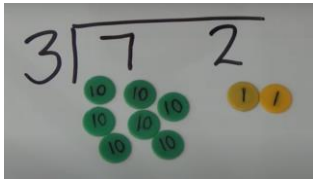
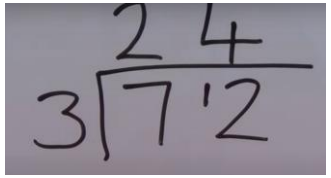
Divide two digit numbers by 1 digit with remainders (Place value grid division) Year 4 NF–2 Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, and interpret remainders appropriately according to the context.	 Use place value counters to divide using a tens and ones grid. Children physically share the tens into the number of rows they are dividing by and repeat for the ones. Start with the tens as the biggest place value.  Move on to examples with exchanging. Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over. We exchange this ten for ten ones and then share the ones equally among the groups. We look how much in 1 group so the answer is 14.	Children must start by dividing the highest value digit first in preparation for formal written methods. Use drawing in books to help show division: 42 ÷ 3= 
Formal written short division introduced Year 4, consolidated Year 5. Choose appropriate methods. Year 4 NF–2 Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders 5MD–4 Divide a number with up to 4 digits by a one-digit number using a formal written method.	Start by asking children to divide using place value counters alongside introducing the formal short division method.   Start with divisions with no exchanging. Move on to divisions that require exchanging.   Useful model: Short division / bus stop method division with place value counters - Bing video	Children should move on to recording short divisions and solving them without place value counters. They should always start by dividing the highest value digit. Exchanging should be recorded as a small digit in front of the digit in the column it is being exchanged into. Remainders should be recorded as a r until children are able to show remainders as a fraction or decimal fraction.

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