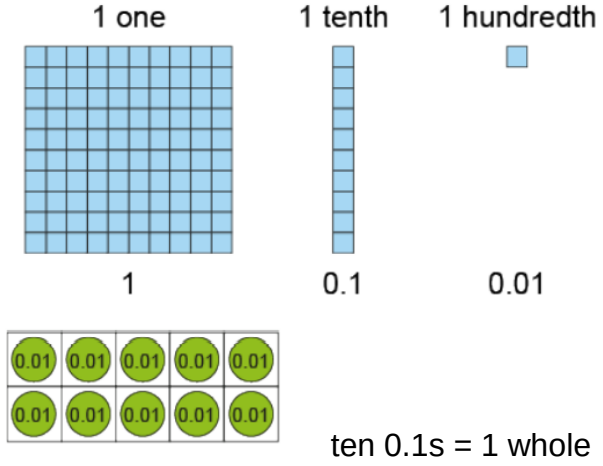
Year 5 Blue

# 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 |
|---|---|---|---|
| Know equivalence of tenths, hundredths and ones<br><br>5NPV–1 Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01. | Children use base 10 and place value counters and 10s frames to show how many tens in one hundred and then how many hundreds in one thousand.<br><br>  <br><br>  | Children see pictures of a 10s frame with 10 0.1 counters to show 1 whole = ten 0.1s. This can also be shown as 1 whole ( 100 square base 10 ) and 0.1 ( as 1 ten base 10 ) and 0.01 ( as one one base 10).<br><br>  | Children can complete missing numbers.<br><br>1 whole = ___ tenths<br><br>1 tenth = ___ hundredths<br><br>1 whole = ___ hundredths<br><br>14 tenths =<br><br>75 hundredths =<br><br>2.4 = ____ tenths<br><br>0.23 = ___ hundredths |
| Develop ability to use scaling | Children use base 10 and place value counters to work out which numbers are 10 | Children see on a place value chart relationships using scaling: | Children can use scaling to manipulate facts. |

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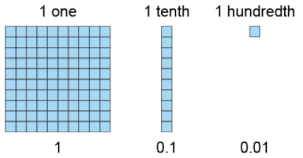
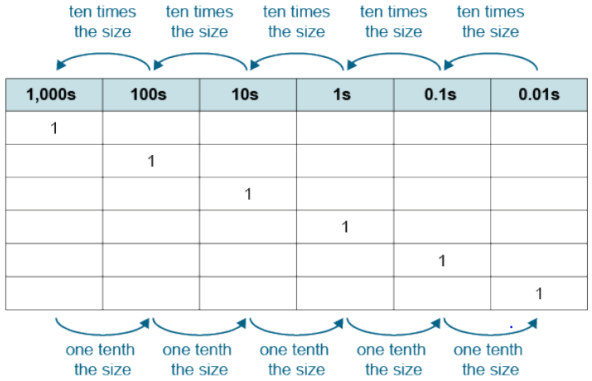
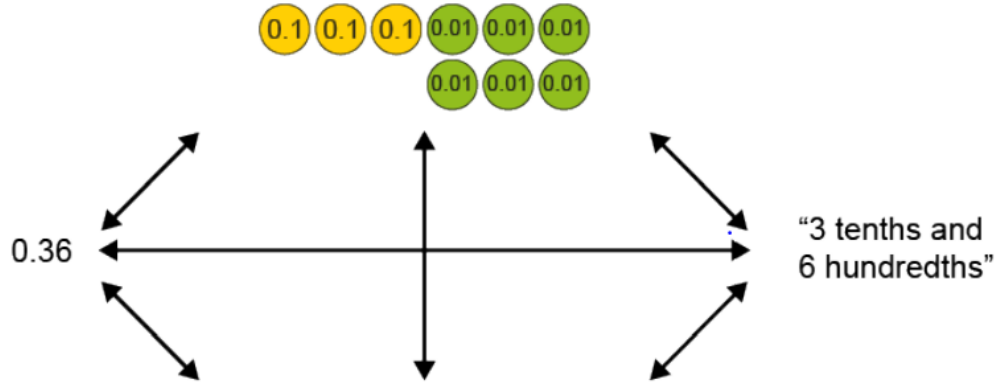
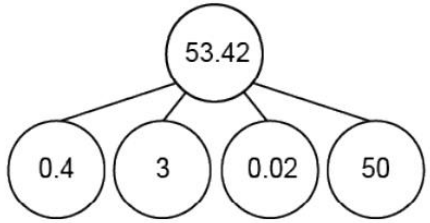
<table>
<tr>
<td>5NF–2 Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth<br>5NPV–5 Convert between units of measure, including using common decimals and fractions</td>
<td>times bigger and then 100 times bigger than a number.<br> 
<br>Use place value charts to show how counters move as they become 10x or 100x bigger.</td>
<td> 
</td>
<td>2 x 5 = 10 so<br><br>2 x 0.5 = 1 as 0.5 is 10 times smaller than 5 so the answer must be 10 times smaller<br><br>5 x 0.6 = 30 so<br><br>5 x 0.06 = 0.3 as 0.06 is 100 times smaller than 6 so the answer must be 100 times smaller</td>
</tr>
<tr>
<td>Know the place value of decimals to 2 decimal places/ decimal fractions and larger numbers up to 1 million/ 10 million<br><br>Year 5 NPV–2 Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and nonstandard partitioning.<br><br>Year 6 NPV–2 As above including decimal fractions and</td>
<td>Use place value counters to make decimals and to show their value.<br> 
<br>Use a Gattegno chart to show the relationship between whole numbers and decimals place value.</td>
<td>Show decimal numbers using a part part whole model.<br> 
<br>Match up fractions and decimals.</td>
</tr>
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numbers up to 10 million

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
| 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |

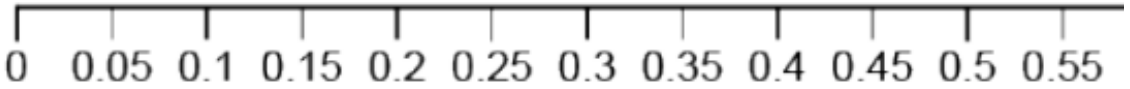
| | |
|---|---|
| 0.20 | $\frac{2}{100}$ |
| 0.02 | $\frac{21}{100}$ |
| 0.12 | $\frac{2}{10}$ |
| 0.21 | $\frac{12}{100}$ |

Identify decimals on a number line and round to the nearest 1 or 0.1
Choose to round as appropriate

Year 5 NPV–3 Reason about the location of any number with up to 2 decimals places, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.

Year 6 NPV–3 As above including numbers up to 10 million and decimal fractions

Count forward and back in tenths and hundredths from any number and identify which whole number or tenth is before and after a given number. Use number lines to help.



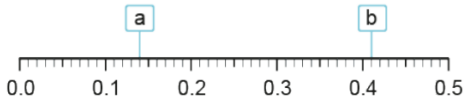

Look at bar models to see the relationships between different numbers.

| 1,000,000 | | | |
|---|---|---|---|
| 250,000 | 250,000 | 250,000 | 250,000 |

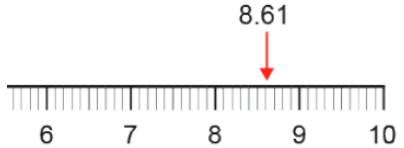
| 1,000 | | | |
|---|---|---|---|
| 250 | 250 | 250 | 250 |

| 1 | | | |
|---|---|---|---|
| 0.25 | 0.25 | 0.25 | 0.25 |

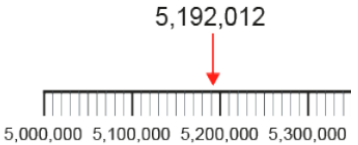
Identify decimals on a number line.




Find the nearest whole and the nearest tenth and round to the nearest whole and the nearest tenth.




Identify numbers on a number line.



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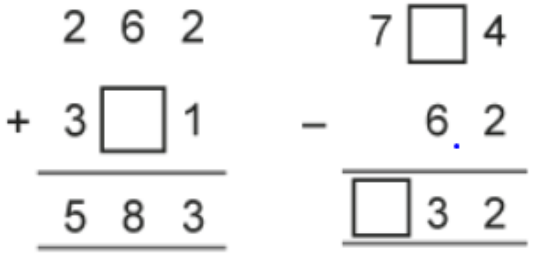
# Addition and Subtraction

| Objective and link to RTP criteria | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Choose an efficient method either mental or written<br><br>(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.<br><br>Children could sort cards into two groups labelled: 'solve mentally' or ' with a written method'.<br><br>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.<br><br>  | If using written methods use compact and record exchanging as above.<br>e.g.<br><br>1 1 1<br>172.83<br>+ 54.68<br>227.51 |

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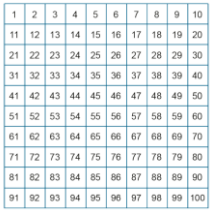
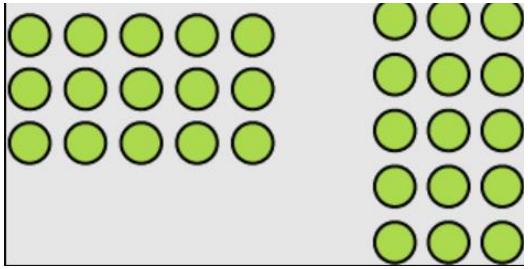
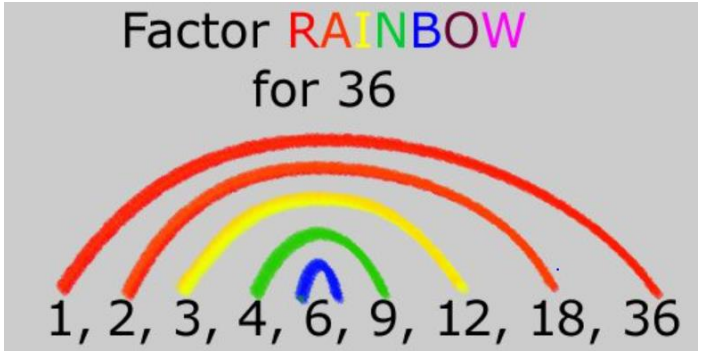
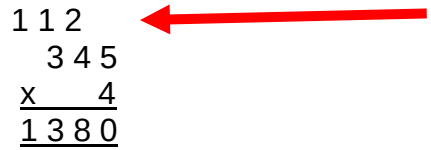
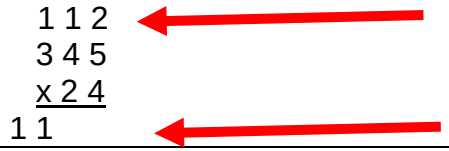
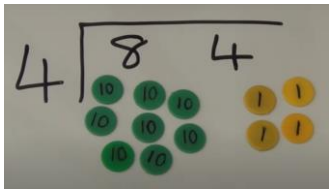
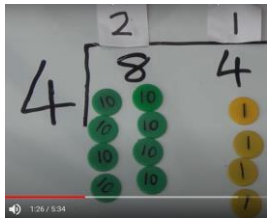
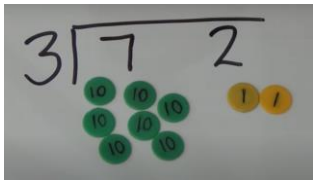
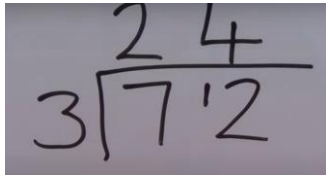
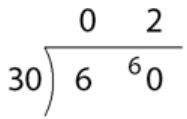
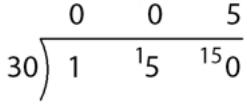
# Multiplication and Division

| Objective and link to RTP criteria | Concrete | Pictorial | Abstract |
|---|---|---|---|
| Know all multiplication and matching division facts to 12 x 12<br>4NF–1 Recall multiplication and division facts up to 12 x 12<br>5NF–1 Secure fluency in multiplication and division facts. | Count on and back in multiples.<br>Use a counting stick to rehearse counting forward and back in multiples.<br>  <br>Sort multiples using hoops as Venn diagrams to help spot patterns. | 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!)<br>  <br>7 14 21 28 35<br>42 49 56 63 70<br>77 84 91 98 105 | Children can use facts they know from KS1 – 1x,2x,5x and 10x to work out those they don't know.<br>e.g.<br>3x = 2x + 1 multiple more<br>6x = 5x + 1 multiple more<br>7x = 5x + 2x<br>9x = 10x count back 1 multiple<br>4x = double 2x<br>8x = double 2x double 4x |
| Find factors and multiples<br>5MD–2 Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors. | Use counters or cubes to explore how many factors a number has by making diferent arrays.<br>  | Show children how to systematically find all the factors of a number.<br>  <br>Check children know how to use divisibilty and known patterns to ideintify multiples. | Understand and use the vocabulary factors and multiples.<br>e.g.<br>I know 2100 is a multiple of 7 because …<br>The highest common factor of 24 and 18 is …<br>The product of 7 and 8 is … |

<table>
<tr><td></td><td></td><td>e.g. 245 is a multiple of 5 as it ends in 5, 236 is a multiple of 3 as it is divisible by 3</td><td></td></tr>
<tr><td>Use knowledge of multiplication and division to manipulate calculations to multiply or divide efficiently.<br>Make choices.<br><br>Year 4MD–2 understand and apply the commutative property of multiplication.<br><br>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.<br><br>Children secure understanding of:<br>• Commutativity of multiplication - multiplication can be done in any order<br>• Associativity with multiplication – rearranging the calculation will not change the result<br><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<br>  <br>0.03 x 5 = 0.15<br>• Using inverse relationships – 45 x 9 = 405 so 405 divided by 9 = 45</td></tr>
<tr><td>Use formal written multiplication<br>Choose appropriate method to multiply<br><br>5MD–3 Multiply any whole number with up to 4 digits by any one-digit number using a formal written method.</td><td>Children will benefit from seeing formal written multiplication and steps for how to do this displayed on working walls as reminders.<br><br>Exchanging must be shown above columns.<br><br>  <br><br><br>When ready move children on to:<br>  <br></td><td>Children should first be shown multiplying up to 4 digits by 1 digit and how to record this in formal written multiplication before moving on to multiplying by 2 digits and multiplying decimals.<br><br>Children should be asked to choose appropriate methods to</td></tr>
</table>

| | | |
|---|---|---|
| | 1 3 8 0<br>+ 6 9 0 0<br>8 2 8 0 | multiply mental or written. |
| Formal written short division introduced Year 4, consolidated Year 5.<br>Choose appropriate methods.<br><br>Year 4 NF–2 Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders<br><br>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.<br>  <br>  <br>Start with divisions with no exchanging.<br>Move on to divisions that require exchanging.<br>  <br>  <br>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.<br><br>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.<br><br>Remainders should be recorded as a r until children are able to show remainders as a fraction or decimal fraction. |
| Formal written long division to divide numbers by 2 digits. Introduced in Year 6. | Begin by reminding children they can count in multiples to divide and reminding them how to record exchanging using a simple example, with no remainder.<br>e.g.<br>  <br>Move on to larger numbers still with a simple divisor and no remainder.<br>e.g.<br>  <br>Move on to an example with a simple divisor that gives a remainder.<br>Record how much is left to be divided as shown below. | Display examples and steps to success on working walls.<br><br>Children 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.<br><br>Remainders should be recorded as a r until children are able to show remainders as a fraction or decimal fraction. |

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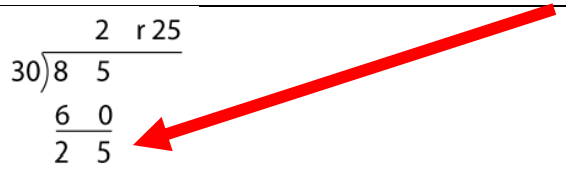
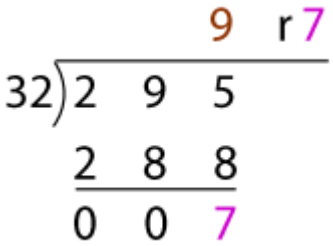
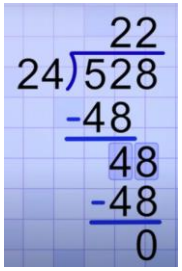
| | | |
|---|---|---|
| |  <br><br>Finally move on to more complicated divisors, which require children to fully understand the process.<br>  <br><br>  <br><br>Children should use multiplicative reasoning to help. Here children could use 32 x 10 = 320 to work out 32 x 9 = 288 making the first long division more efficient. They could use 2 x 24 = 48 to solve the second efficiently, this is close to 2 x 25 is 50 so here estimation may help as well..<br>Useful NCETM guidance: Division: dividing by two-digit divisors \| NCETM | When children are secure they can move on to more complicated divisors and dividends |