# Progression in Written Calculations

The aim of this agreement is to ensure consistency and progression throughout the school in written methods of calculation and reflects a whole school agreement. It contains the key pencil and paper procedures that will be taught throughout the school. Our aim is that most children follow this progression successfully and with understanding. Other methods may be introduced for more able pupils to investigate and explore.

The aim for the school is that by the end of Y6, children will have been taught and be secure with a compact method for each operation. The children will have acquired their understanding through a wide range of models, representations, skills based developments and then embedded the knowledge through real life problems and contexts. Children will be encouraged to look at a calculation/problem/ investigation and then decide which calculation will best solve the problem. They will then select the most efficient method. The long-term aim is for children to be able to select the most efficient method of their choice (whether this be mental, written) that is appropriate for a given task.

Children should be guided towards increased efficiency and less dependence on informal jottings. Countries that are most successful at teaching number, avoid the premature teaching of standard written methods in order not to jeopardise the development of mental strategies.

**Key points:**

| Children should be encouraged to: | Points for teachers: |
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| Ask themselves, 'Can I do this calculation mentally?' | Refer to accompanying documents:<br>Detailed Progression (Appendix 1)<br>Progressive success criteria (Appendix 2 -5) |
| Approximate first | Continue to develop a range of mental strategies |
| Choose an efficient method appropriate for the numbers | Use appropriate numbers for child's ability |
| Apply knowledge of known facts | Present calculations in real life/problem solving contexts |
| Check results of calculations using the inverse | Make links between 4 operations |
| | Encourage children to share and discuss their methods |
| | Encourage a deeper conceptual understanding |
| | Use clear representations to support learning |

**Division**

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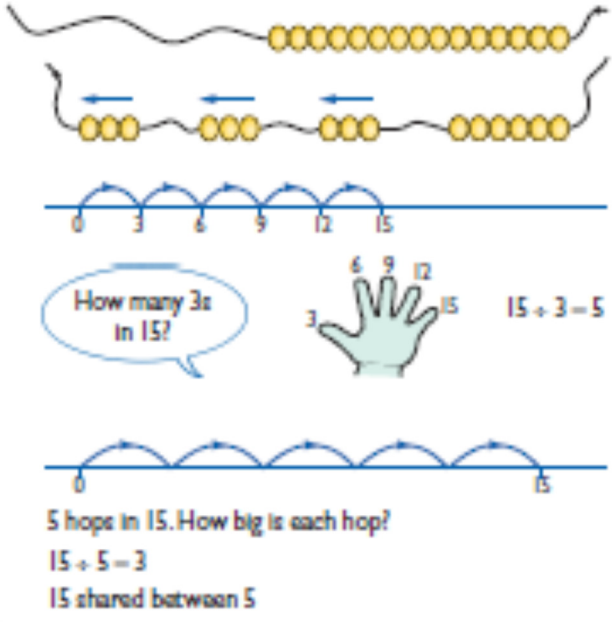
| **Stage A** | Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.<br>  |
| **Stage B** | Children will understand equal groups and share items out in play and problem solving. They will count in **2s and 10s and later in 5s**.<br>  <br><br>Children will use words alongside pictures and arrays (teacher modelled) to solve 1-step problems |

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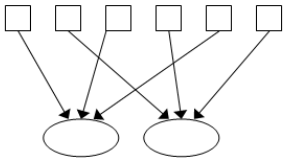
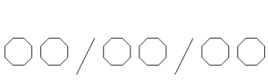
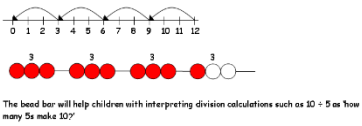
| **Stage C** | Children will develop their understanding of division and use jottings to support calculation<br><br>They will understand the link between multiplication and division and use the ÷ and = sign<br><br>✓ **Sharing equally**<br><br>6 sweets shared between 2 people, how many do they each get?<br><br>  <br><br>✓ **Grouping or repeated subtraction**<br><br>There are 6 sweets, how many people can have 2 sweets each?<br><br>   <br><br>✓ **Repeated subtraction using a number line or bead bar**<br><br>12 ÷ 3 = 4<br><br>  <br>The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'<br><br>✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**<br><br>□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4<br><br>Show the non-commutativity of division<br><br>Eg. 24 ÷ 2 does not give the same answer as 2 ÷ 24 |

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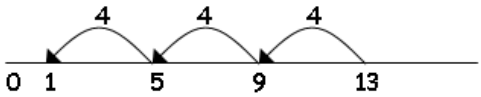
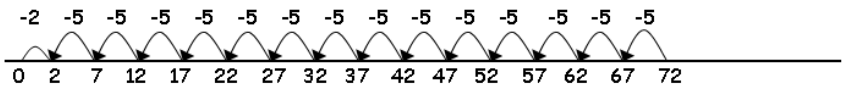
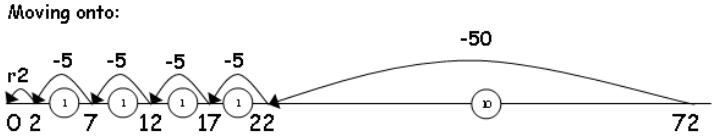
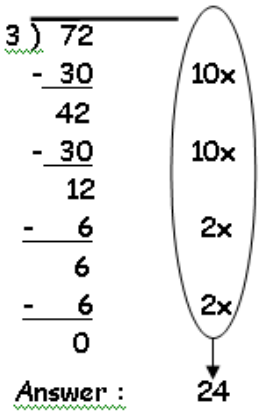
| **Stage D** | Ensure that the emphasis in Y3 is on grouping rather than sharing.<br><br>Children will continue to use:<br><br>✓ **Repeated subtraction using a number line**<br><br>Children will use an empty number line to support their calculation.<br><br>24 ÷ 4 = 6<br>  <br><br><br>Children should also move onto calculations involving remainders.<br><br>13 ÷ 4 = 3 r 1<br>  <br><br><br>✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**<br><br>26 ÷ 2 = □ 24 ÷ △ = 12 □ ÷ 10 = 8<br><br>Children will us their times tables knowledge to solve 2 digit divided by 1 digit problems e.g. 24 ÷ 6 = |
| **Stage E** | Children should know the associated division facts up 12 x 12 and also that when dividing by 1 you get the same answer.<br><br>Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s – numbers with which the children are more familiar.<br><br>72 ÷ 5<br>  <br><br><br>Moving onto:<br>  <br> |

Then onto the vertical method:

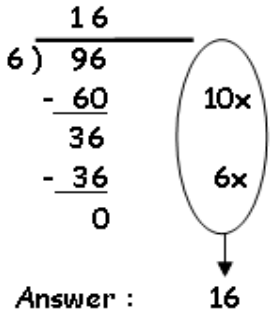
**TU ÷ U**

72 ÷ 3




Leading to subtraction of other multiples.

96 ÷ 6




Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.

Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division.

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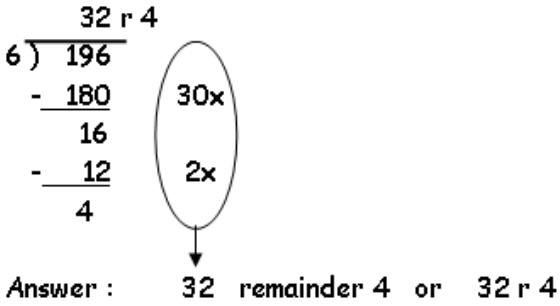
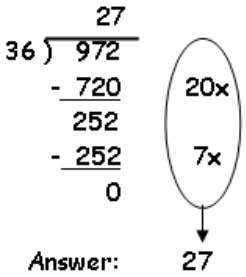
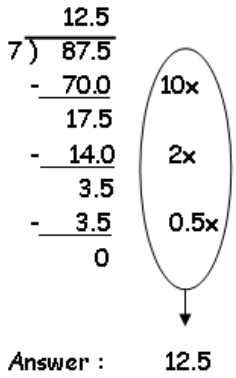
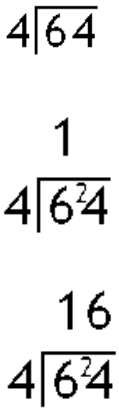
| **Stage F** | Children will continue to use written methods to solve short division TU ÷ U.<br><br>Children can start to subtract larger multiples of the divisor, e.g. 30x<br><br>**ThHTU ÷ U**<br><br>196 ÷ 6<br><br>  <br><br>Answer : 32 remainder 4 or 32 r 4<br><br>Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.<br><br>Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division.<br><br>Children should be able to divide any whole numbers and those including decimals by 10, 100 and 1000 |
| **Stage G** | Children will continue to use written methods to solve short division TU ÷ U and HTU ÷ U.<br><br>**ThHTU ÷ TU**<br><br>972 ÷ 36<br><br>  <br><br><br>Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as $3\ ^{2}/_{10}$ which could then be written as $3\ ^{1}/_{5}$ in it's lowest terms.<br><br>Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other. |

87.5 ÷ 7




**Bus stop method**




**By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.**

**Children should not be made to go onto the next stage if:**

1) **they are not ready.**
2) **they are not confident.**

**Children should be encouraged to approximate their answers before calculating.**

**Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.**