These notes show the stages in building up to a formal written method for division. Our aim is that children use mental methods when appropriate but for calculations that they cannot do in their heads they choose an appropriate written method which they can use accurately and with confidence. Time must be taken building up to the formal written method to ensure complete understanding at each stage. Division should be taught alongside its inverse, multiplication.

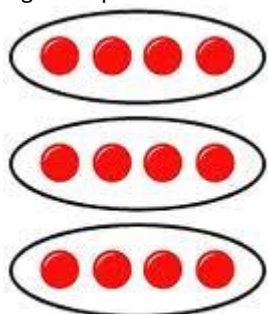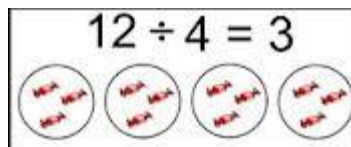|	Children need to be able to:
Stage 1 *Typically children in Years 1 and 2 will be at this stage* **Grouping and Sharing: Practical Division** Children should have plenty of opportunity to use objects, diagrams and pictorial representations to solve problems involving both grouping *and* sharing. Children should be taught to understand the difference between grouping and sharing (how many groups of 2 can you make with 6 sweets? Share these 6 sweets between 2 people). Children should be able to find half of a group of objects by sharing it into 2 equal groups.	• Count in multiples of 2s, 5s and 10s. **Key Vocabulary:** Share, share equally, one each, two each, group, groups of, lots of, half.

e.g. Group these 12 sweets into 4s (how many groups of 4 in 12?):	e.g. Share these 12 sweets equally between 4 people:
  $12 \div 4 = 3$	 $12 \div 4 = 3$

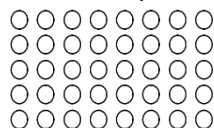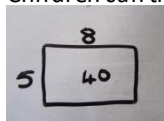|	Children need to be able to:
Stage 2 - *Typically children in Years 2 and 3 will be at this stage. Children needs LOTS of practice at this stage.* **Repeated Addition: Arrays** Children should be introcuced to using arrays for division at the same time as using them for multiplication. e.g. 40 ÷ 5 can be asked as how many 5s in 40? This can be linked back to grouping. Children can then draw this as an array: **Repeated Addition: Number lines**	• Count in steps. • Understand division as grouping. • Understand that division is the inverse of multiplication. • Solve one step problems involving division. **Key Vocabulary:**

Children should be taught to link their array to a number line using practical apparatus.

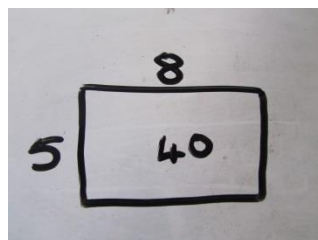**Example without a remainder**

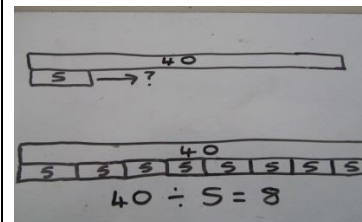40 ÷ 5 = 8 (Phrase this as "how many 5s in 40?")
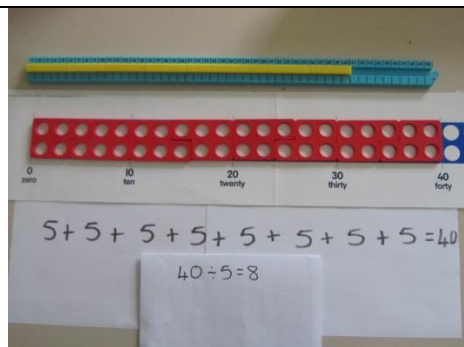
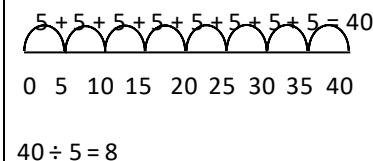Children can use Cuisenaire or Numicon to work this out using grouping.

Children can then take the Cuisenaire from the rod track and rearrange it into an array.

Children should be taught to represent this as a bar model:

This can then be recorded on an empty number line:

5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40

0 5 10 15 20 25 30 35 40

40 ÷ 5 = 8

Example with a remainder

This should first be done practically using Cuisenaire and Numicon as above. Children should also be able to represent it as a bar model as above.

38 ÷ 6 = 6 r 2

6 + 6 + 6 + 6 + 6 + 6 + 2   = 6 sixes with a remainder of 2

0 6 12 18 24 30 36 38
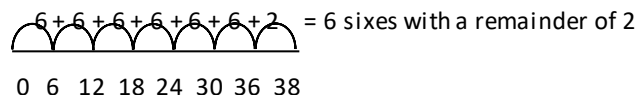
Fractions of quantities (where the numerator is 1 and the denominator is under 12) should be introduced alongside division. (For example, children can find one fifth of 40 and realize that this is the same as 40 ÷ 5).

Share, share equally, one each, two each, group, groups of, lots of, half, array, divide, division.

Children need to be able to:

- Count in steps.
- Understand division as grouping.
- Understand that division is the inverse of multiplication.
- Be more familiar with times tables up to 12 x 12.
- Understand remainders.
- Derive larger multiples using known facts e.g. 10 x 3 = 30 so 20 x 3 = 60.
- Add multiples mentally and work out differences.
- Solve one and two step problems involving division.

Key Vocabulary:

Share, share equally, one each, two each, group, groups of, lots of, half, array, divide, division, fraction, inverse, remainder.
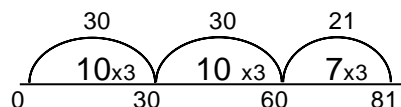
<u>Examples for a larger numbers</u> *(the aim of this method is to improve mental calculations)*
For larger numbers it would be inefficient to count in single multiples so bigger jumps need to be recorded using known facts.
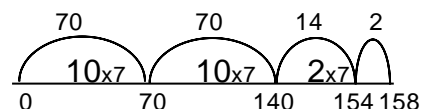
e.g without a remainder
$81 \div 3 = 27$

This is done by working out the numbers of threes in each jump as you go along (10 threes are 30, another 10 threes makes 60, and another 7 threes makes 81. That's 27 threes altogether).

e.g. with a remainder
$158 \div 7$

10 sevens are 70, add another 10 sevens is 140, add 2 more sevens is 154 add 2 makes 158. So there are 22 sevens with a remainder of 2.
The remainder is indicated above the jump rather than inside it, so that children do not mistakenly add 10, 10, 2 and 2 and get an answer of 24.
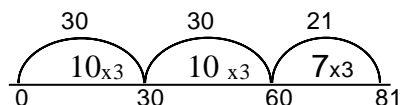

Stage 3 - *Typically children in Years 4, 5 and 6 will be at this stage*
Short Division
When children have a secure understanding of all the previous steps they can move onto short division.
<u>No remainder</u>

$81 \div 3 = 27$ 	$81 \div 3$ $\quad\quad 2\ 7$ $\quad 3\ \overline{\mid\ 8^2 1}$ Children use their knowledge of the 3 times table to find, "How many 3s in 80 where the answer is a multiple of 10?" This gives 20 threes (since 30 threes would be too many), with 20 remaining (2 tens are carried over to the next column) Now ask: 'How many threes in 21".	Show children the two methods side by side. Ask children to unpick the steps of the short division method and note the similarities and differences between that and the number line method.

<u>Remainders:</u> Once secure, children can use this to find remainders, then remainders as fractions and then remainders as decimals:

$284 \div 6 = 284\ r2$ $\quad\quad 4\ 7\ r\ 2$ $\quad 6\ \overline{\mid 2\ 8^4 4}$	$284 \div 6 = 284\ \frac{2}{6}$ $\quad\quad 4\ 7\ r\ 2$ $\quad 6\ \overline{\mid 2\ 8^4 4}$	$284 \div 4 = 70.5$ $\quad\quad 7\ 0\ .\ 5$

Children need to be able to:
- Recall all multiplication facts and related division facts up to 12 x 12.
- Understand place value and use this to divide and multiply by 10, 100 and 100.
- Relate division to fractions.
- Understand division and multiplication as the inverse.
- Find fractions of quantities where the numerator is 1.

Key Vocabulary:
Share, share equally, one each, two each, group, groups of, lots of, half, array, divide, division, fraction, inverse, remainder, quotient (the answer), divisor (number you are dividing by), dividend (number you are dividing into), decimal.

| | | 4 2 8 2 . ²0 0 | |

Stage 4 – *Typically children in Year 6 will be at this stage.*

Long Division
When dividing by numbers larger than 12, children will need to use long division.
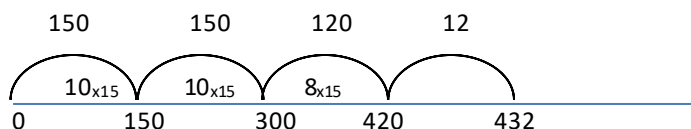
<u>Chunking on a number line</u> – *Children who are secure with mental number line methods for division should be able to understand this method, show it to children first before showing them formal long division.*

e.g. 432 ÷ 15 = 28 r12

First children should write out the 15 times table up to ten lots of 15:

1	2	3	4	5	6	7	8	9	10
15	30	45	60	75	90	105	120	135	150

Encourage children to do this using known facts. Start with one 15 and double it to get two 15s. Double this to get four 15s and double again to get eight 15s. Then find ten 15s and halve to get five 15s. Children can then fill in the rest.

```
     150        150       120      12
    ⌒‾⌒      ⌒‾⌒     ⌒‾⌒    ⌒‾⌒
   10ₓ15     10ₓ15     8ₓ15
 0          150       300      420     432
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<u>Formal Long Division</u>
 Introduce it along with the example on the number line so that children can see the similarities and differences and discuss these.

Example with a remainder	Example with the remainder as a fraction	Example with the remainder as a decimal
$\begin{array}{r} 2\ 8\ \ r12 \\ 15\overline{\smash{)}4\,^43\ 2} \\ 3\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \end{array}$ 432 ÷ 15 = 28 r12	$\begin{array}{r} 2\ 8\ \ r12 \\ 15\overline{\smash{)}4\,^43\ 2} \\ 3\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2 \end{array}$ 432 ÷ 15 = 28 $\frac{12}{15}$	$\begin{array}{r} 2\ 8.8 \\ 15\overline{\smash{)}4\,^43\ 2\,.\,0} \\ 3\ 0 \\ \hline 1\ 3\ 2 \\ 1\ 2\ 0 \\ \hline 1\ 2\ 0 \\ 1\ 2\ 0 \\ \hline 0 \end{array}$ 432 ÷ 15 = 28.8

Children need to be able to:
- Recall all multiplication facts and related division facts up to 12 x 12.
- Understand place value and use this to divide and multiply by 10, 100 and 100.
- Relate division to fractions.
- Understand division and multiplication as the inverse.
- Understand fractions
- Understand decimals and decimal palce value.
- Find fractions of quantities where the numerator and denominator could be any number.

Key Vocabulary:
Share, share equally, one each, two each, group, groups of, lots of, half, array, divide, division, fraction, inverse, remainder, quotient (the answer), divisor (number you are dividing by), dividend (number you are dividing into), decimal.

	Children can simplify $\frac{12}{15}$ to $\frac{4}{5}$		