Beeston Primary School: Progression in Division

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.

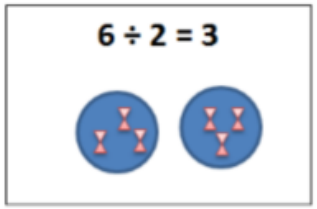
Stage 1

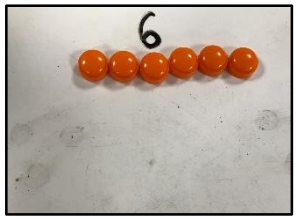
Children should have plenty of opportunity to use objects, diagrams and pictorial representations to solve problems involving both grouping *and* sharing.

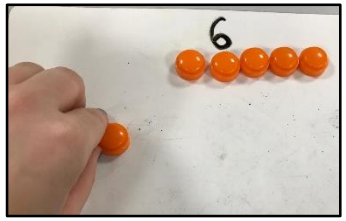
Sharing: Practical Division

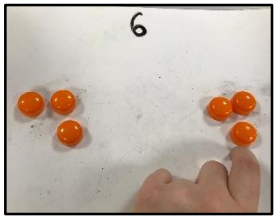
Children should have plenty of opportunity to use objects, diagrams and pictorial representations to solve problems involving sharing

E.g. Share these 6 sweets equally between 2 people: 6 ÷ 2 = 3 or 3 = 6 ÷ 2

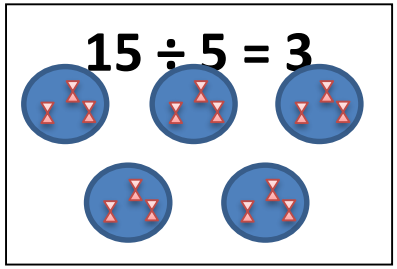


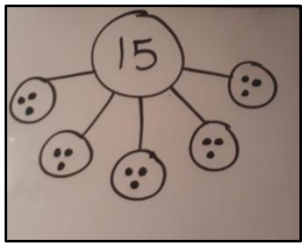


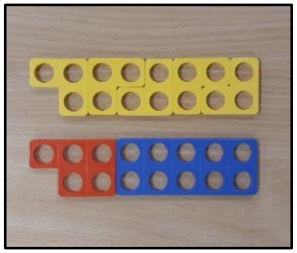
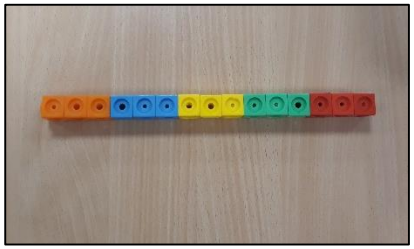
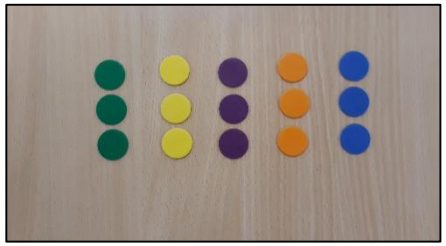




e.g. Share these 15 sweets equally between 5 people: 15 ÷ 5 = 3 or 3 = 15 ÷ 5





Children should be able to find half of a group of objects by sharing it into 2 equal groups.

Children need to be able to:
Foundation:

- Solve problems involving sharing

Stem Sentence:
The whole amount is 6…

Children need to be able to:
Key Stage 1: Year 1/2

- Count in multiples of 2s, 5s and 10s.
- Know that an equal number is a multiple of 2
- Know that an odd number is not a multiple of 2

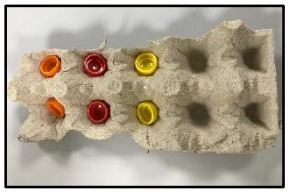
Key Vocabulary:
Share, share equally, one each, two each, group, groups of, lots of, half, whole.

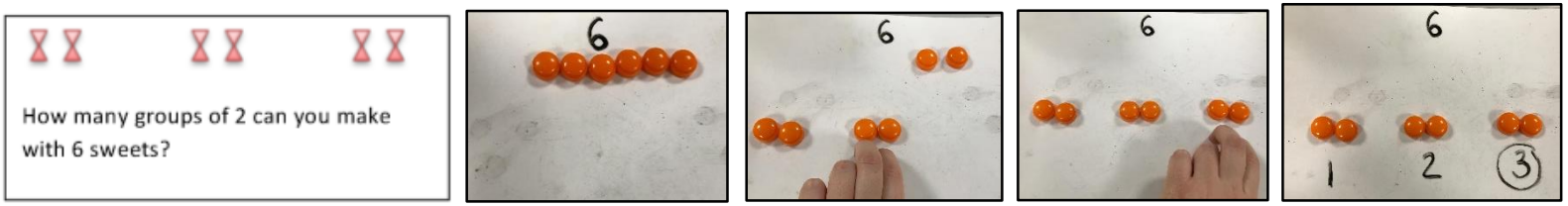
Think: Can I do this in my head? Can I use a jotting? Do I need a formal strategy

Stage 1 Continued

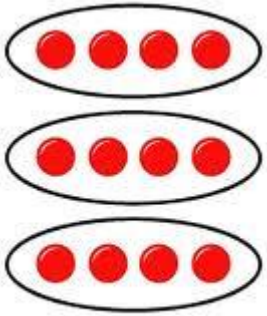
Grouping: Practical Division
Children should be taught to understand the difference between grouping and sharing.

Stem sentence: In 6 how many groups of 2? 6 ÷ 2 = 3

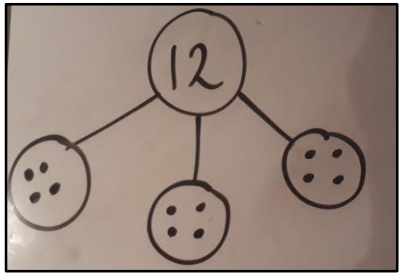


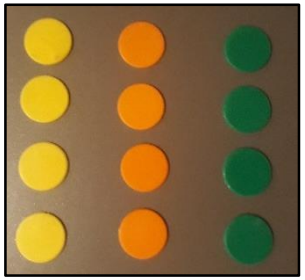


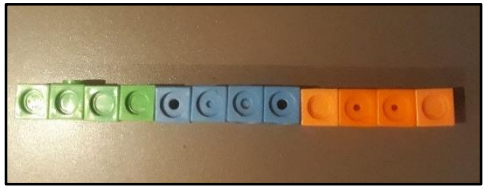
e.g. Group these 12 sweets into 4s (how many groups of 4 in 12?):

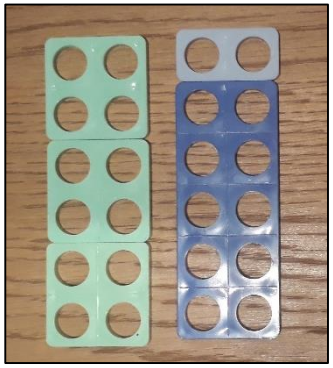


12 ÷ 4 = 3









Children need to be able to:
Key Stage 1: Year 1/2

- Count in steps of 5.
- Understand division as grouping.
- Solve one step problems involving division.
- They make connections between arrays, number patterns, and counting in 2s, 5s and 10s.

Key Vocabulary:
Share, share equally, one each, two each, group, groups of, lots of, half, array, divide, division, fraction, inverse, remainder, whole.

Stem Sentences:

- In 10, how many equal groups of 2 are there?
- In 15, how many equal groups of 5 are there?

Think: Can I do this in my head? Can I use a jotting? Do I need a formal strategy?

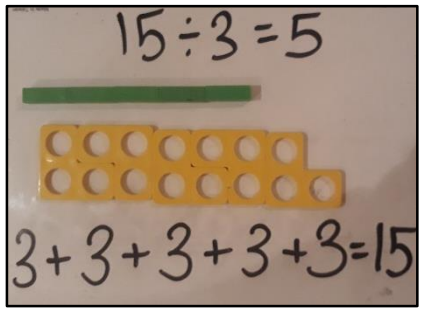
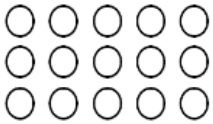
Stage 2

Repeated Addition: Number lines

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

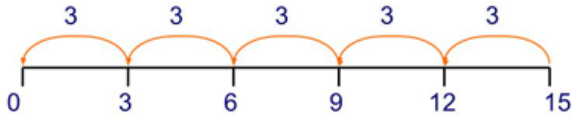
Example without a remainder

15 ÷ 3 = 5

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 or draw an array with dots. 

Links can be made with times tables by recording division on a number line:

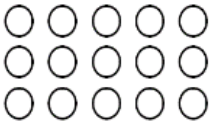
15 ÷ 3 = 5



Repeated Addition: Arrays

Children should be introduced to using arrays for division at the same time as using them for multiplication - e.g. 15 ÷ 3 can be asked as how many 3s in 15?

This can be linked back to grouping.
Children can then draw this as an array:



Children need to be able to:

Lower Key Stage 2: Year 2

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Solve problems involving division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts

Stem Sentence: In 15, how many groups of 3?

Think: Can I do this in my head? Can I use a jotting? Do I need a formal strategy?

Example with a remainder:

35 ÷ 4 = 8 r3

This should first be done practically using counters, Cuisenaire and Numicon.

Children should be taught to find $\frac{1}{2}$ and $\frac{1}{4}$ of numbers alongside division. (For example, children can find one half of 20 and realise that this is equivalent to 20 ÷ 2).

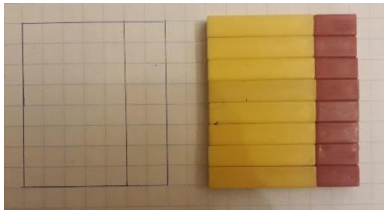
20	
10	10

Stem Sentence: What does that remainder represent? Not a whole group of 4. There are 3 out of a possible 4 in the group i.e. $\frac{3}{4}$

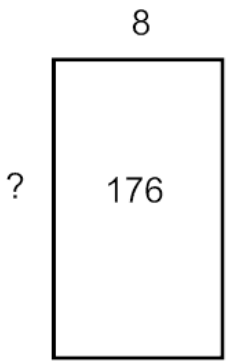
Stage 3
To scale Arrays
Division can be represented using 'to scale' arrays allowing children to make links with multiplication:

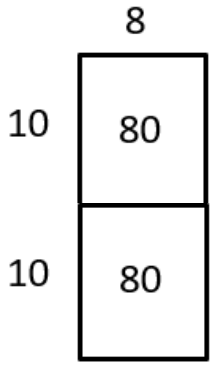
56 ÷ 8 = 7 or 56 ÷ 7 = 8

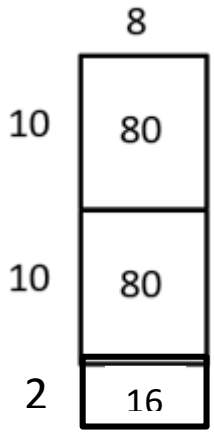
Children to recognise that 7 can be partitioned into
5 and 2. 8 x 5 = 40 and 8 x 2 = 16
40 + 16 = 56



Blank Arrays
Division can be represented as a blank array allowing children to make the links with multiplication:
Not to scale







This blank array can be partitioned using known facts.

10 x 8 = 80
10 x 8 = 80
2 x 8 = 16

80 + 80 + 16 = 176

Children need to be able to:
Key Stage 2

- 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, whole.

Stage 4
Short Division
When children have a secure understanding of all the previous steps they can move onto short division.
No remainder

- Firstly with no exchanging within the number you are dividing
- Then with one lot of exchange within the number you are dividing

These steps should be modelled with the place value counters first to ensure children understand the concept before using the written calculation.

2 3 1 3) 6 9 3 200 30 1 3 | 600 | 90 | 3 Children will learn to use place value counters to arrange into arrays as a bridge into short division, allowing them to see and understand the process.	48 ÷ 2 = 24 2 4 2) 4 8 **Discuss why this calculation should be done mentally.**	Children then progress to calculations involving exchange. 81 ÷ 3= 27 2 7 3) $8^{2}1$ 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, with 20 remaining (2 tens are exchanged over to the next column) Now ask: "How many threes in 21".

Remainders: Once secure, children can use this to find remainders and interpret remainders appropriately for context.
Again this should be modelled with the place value counters first

285 ÷ 6 = 47 r3 **0 4 7 r3** **6) $\not{2}$ $^{2}8$ $^{4}5$**	285 ÷ 6 = 47 $\frac{3}{6}$ **0 4 7 r3** **6) $\not{2}$ $^{2}8$ $^{4}5$** **answer: 47 r 3** **Expressed as a fraction the answer is 47 $\frac{3}{6}$. This means 47 and $\frac{3}{6}$ not 47 remainder 3.**

Children need to be able to:
Key Stage 2

- 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 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 should divide whole numbers by 10 and 100 making links with known facts.

e.g. 3200 ÷ 10 = 320

Th	H	T	Ones
3	2	0	0
	3	2	0

e.g. 4800 ÷ 100 = 48

Th	H	T	Ones
4	8	0	0
		4	8

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).

Stage 4 Continued

Once secure with short division and understanding that they can convert remainders into fractions children can extend their work into decimals.

285 ÷ 6 = 47.5

```
  1 3 2 . 5
6 7 19 15 . 30
```

This can then be extended to explore recurring decimal.

284 ÷ 6 = $47.\dot{3}$

```
  0 4 7 . 3 3
6 2 28 44 . 20 20
```

Children should divide numbers by 10, 100 and 1000 including when this results in a decimal.
e.g. 481 ÷ 10 = 48.1

H	T	Ones	. $\frac{1}{10}$
4 →	8 →	1 →	. 0
	4	8	. 1

e.g. 930 ÷ 1000 = 0.93

H	T	Ones	. $\frac{1}{10}$	$\frac{1}{100}$
9 →	3 →	0	. 0	→
		0	. 9	3

The most able can also look at recurring decimal strings