Calculation Policy

Capel-le-Ferne Primary School

Update September 2020

Contents:

Calculation Policy

The following Calculation Policy outlines how we will teach progression within the four operations (addition, subtraction, multiplication and division) at Capel-le-Ferne Primary School.

It will also demonstrate how children's learning will progress when working with fractions and our expectations for the acquisition of times table facts.

It has been developed and updated to reflect our evolving practice in using of the White Rose Maths Scheme of Learning and our work with the National Centre for Excellence in Teaching Mathematics (NCETM) through engagement within a local Maths Hub Group.

At the heart of our approach is children's understanding of the calculating process. Our policy will outline the key language and strategies we will use at each stage, including how physical ***manipulatives*** will be used to inform and underpin the pupils learning, supporting their mathematical development as they progress to use pictorial and more formal abstract methods.

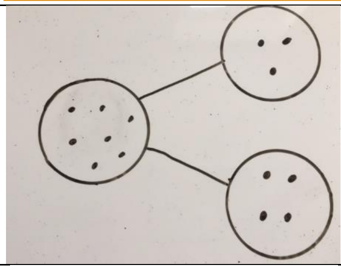
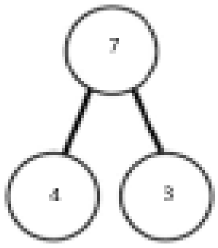
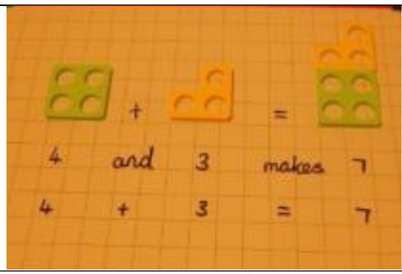
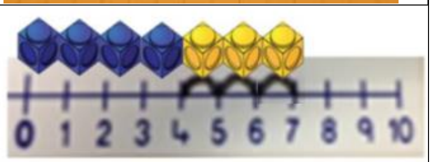
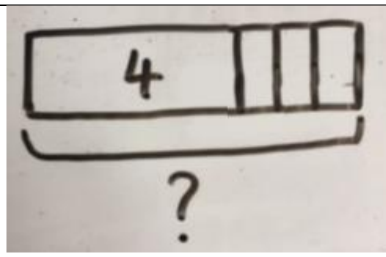
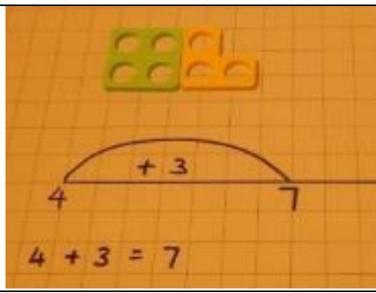
The national curriculum for mathematics highlights the importance of ensuring that children are competent and confident at choosing and using the right calculation method, when working within any area of mathematics such as solving problems presented in real-life contexts.

In the Foundation Stage and Key Stage 1, there is a strong focus on pupil's understanding and ability to work with number. They will be introduced to many of the models, strategies and resources which will underpin their future work, providing a strong foundation to build upon as they progress through the school.

Children in Key Stage 1 will develop number confidence and mental fluency with a good understanding of place value using all four operations. Key stage 2 will then move children towards more formal written methods for each. Throughout their working, pupils will expand the depths of their reasoning and ability to tackle an increasing breadth of problem-solving and level of challenge.

Class teachers will use the methods outlined in this policy to teach calculations throughout the school. They will use their professional judgement to decide when the children are ready to move on to the next stage in calculating or whether a different approach may be necessary for some individuals who need further support to overcome barriers to learning.

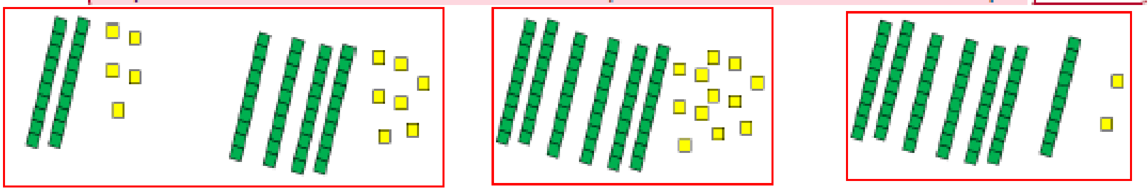
Progression in addition

Calculation Methods	
The children will begin to add by combining two groups of objects together and counting the ***total.***	
They will be introduced to the language of ***parts*** and the ***whole***, learning to use a pictorial method known as the ***part-part-whole model.*** Children can use dots or crosses to represent the different values.	
Children will use numerical values to replace physical objects and mark making, enabling them to begin to form ***number sentences*** drawing on their practical exploration of number. e.g. 4 + 3 = 7 or 3 + 4 = 7	
Numicon tiles will be introduced to support children's understanding, ***comparison*** and ability to work with numbers, providing further demonstration of how the different parts of a number are combined to make the whole or total.	
Use of ***number lines*** and ***number tracks*** will also be used to support pupil's ability to relate their understanding of adding with physical objects to the more *abstract method* of using written values.	
Bar model will be introduced to encourage pupils to ***count on***, rather than counting everything by beginning from 0. This will draw on and extend previous work of counting on in sequence from any starting place.	
This can also be reinforced with further work using other resources, including Numicon, number lines and ***counting beads.***	

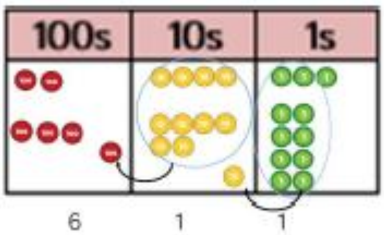
As children begin to work with larger numbers, they will be taught to ***partition*** them using ***place value***. They will use resources such as ***base10 dienes*** and place value cards and counters to learn how to ***combine*** and ***exchange*** values in order to add numbers which require them to ***bridge into the next column***.

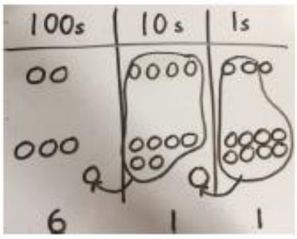
e.g. 25 + 47 = 6 tens + 12 ones = 72

Step 1 Step 2 Step 3



They will learn how their practical activity can be represented in pictorial form and transferred into formal written methods.



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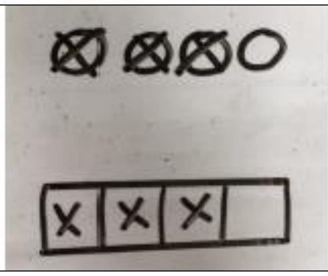
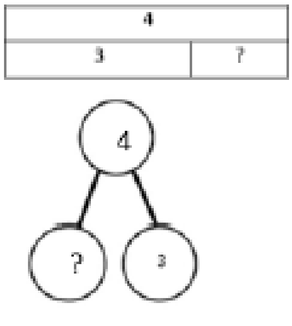
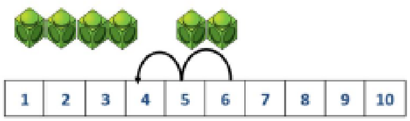
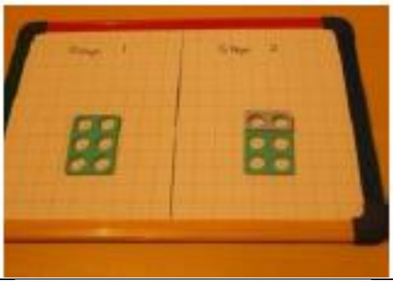
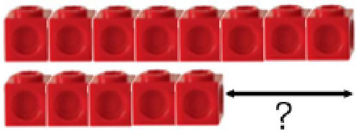
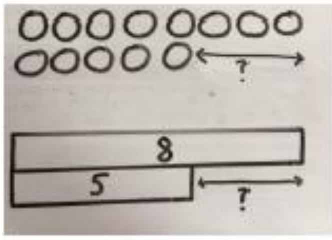
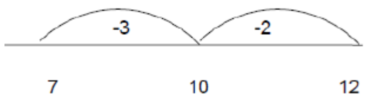
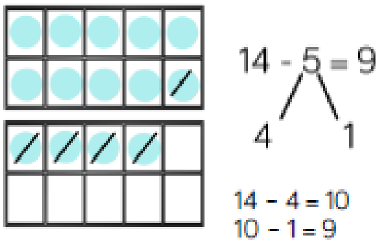
  243
 +368
  611
  1 1
```

As children progress through the school and grow in confidence, they will be given opportunity to work with increasingly larger numbers and ***decimal values.*** Children will develop the understanding and ability to select and use ***appropriate mental and written methods*** to perform calculations depending on the level of challenge involved. They will be encouraged to use methods to both ***estimate*** and ***check*** their answers, drawing on their understanding of place value to ensure solutions are appropriate and accurate.

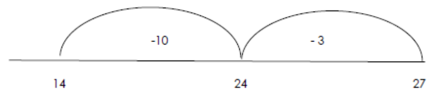
Progression in subtraction

Calculation Methods	
Subtraction involves three discreet skills: take away; less than and find the difference between. It is important that children know that all of these operations are a form of subtraction.	
The children begin to subtract by taking objects from a group and counting what is **left over.**	
The children will be taught to cover (mask) a section of the first number using their hand or a cover. This is called **take away**.	
Children will be shown to draw their objects in jotting form and cross out the items they are taking away. **Bar model** will also be used to represent the value taken away (crossed out) from what you started with.	
Much like with addition, children will progress to use numerical values. The ***part-part-whole model*** will also be used to present subtraction by providing the total and amount taken away to find the missing value.	
The children will be taught to **count backwards** using a number line or number track. They will show the number being taken away by drawing this number of jumps from the starting value.	
They will progress to form ***number sentences*** and label the value begin taken away collectively on an empty number line.	

The children will be taught to **find the difference**. Using Numicon, this involves placing the smaller number over the larger number and naming the number that is left uncovered.	
The children will be taught to find **how many more** and **how many less**. **e.g. How many more** is 10 than 4? When finding how many more, the lower number is always placed at the <u>bottom</u> of the higher number. **How many less** is 4 than 10? When finding how many less, the lower number is always placed at the <u>top</u> of the higher number.	 
Finding the difference will also be represented physically by comparing two rows of object as if in a **bar-model**, allowing the 'missing' value to be counted. This will be transferred to self-drawn representations.	 
When ***bridging a tens boundary,*** the children will be taught to ***partition*** the number to hop to the previous multiple of ten.	12 – 5 = 
This will be modelled using Numicon and ***tens frame*** to support children to identify the partitioned values (applying understanding of part-part-whole model) and support their working towards a solution.	

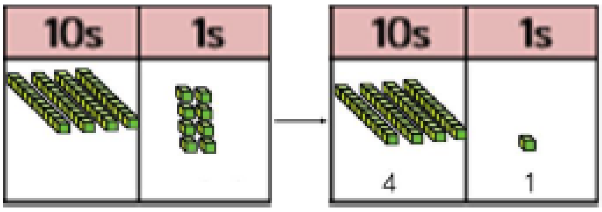
When taking away larger values, children will be taught to partition values using ***place value.***

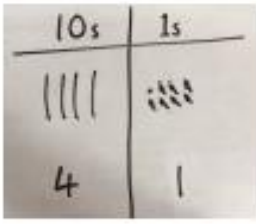
27 – 13 =

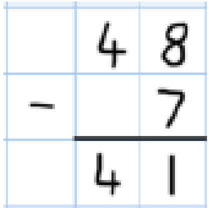


Children will use Base10 dienes to begin to set out their calculation in a ***columnar method,*** supporting their preparation for formal written method. This can be represented with jottings as ***sticks and dots***, and the subtracted values crossed out to show what remains.

48 – 7 =

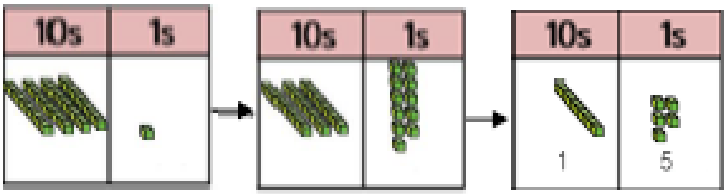


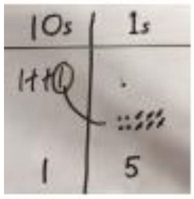


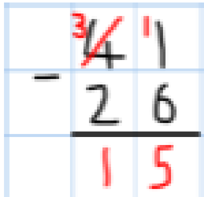


Children will be extended to develop an understanding of ***exchanging*** a ten for ten ones when required in order to complete the required subtraction.

41 – 26 =

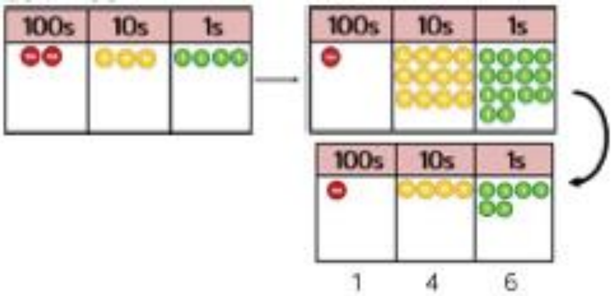


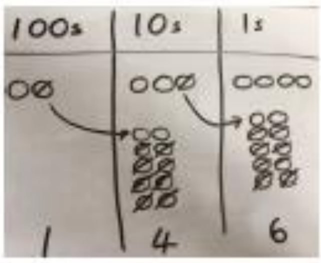


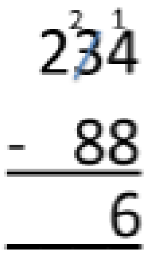


The same process will be modelled using ***place value counters*** to allow pupils to extend their progress to work with larger numbers and decimal values, and secure their understanding of what happens when exchanging in formal written method.

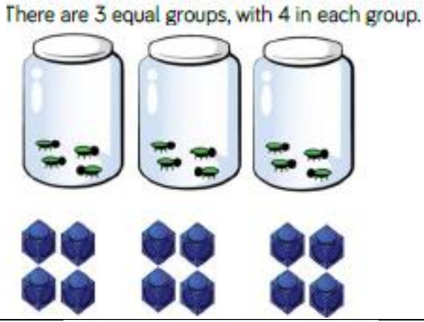
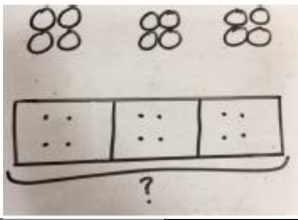
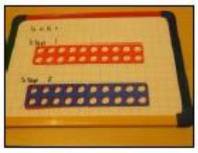
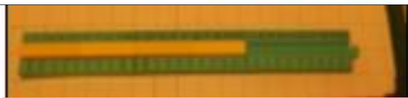
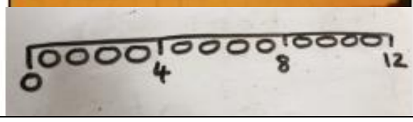
234 – 88 =

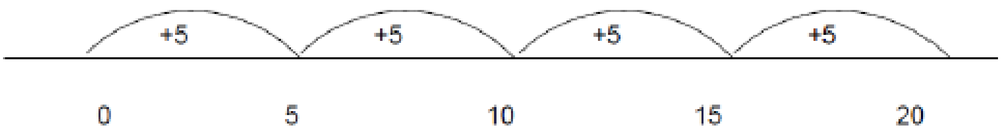


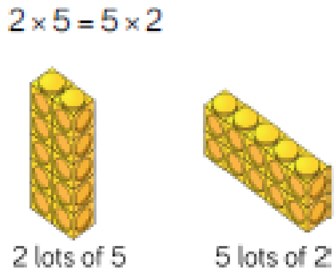
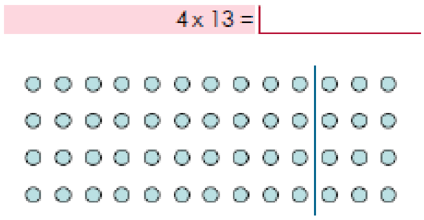
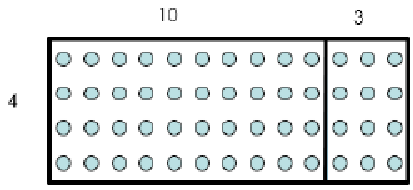
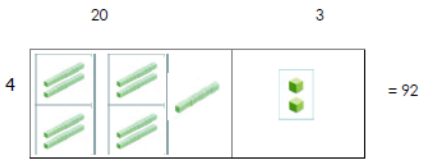
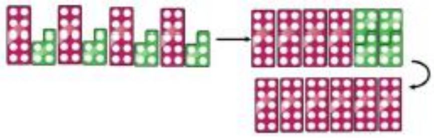
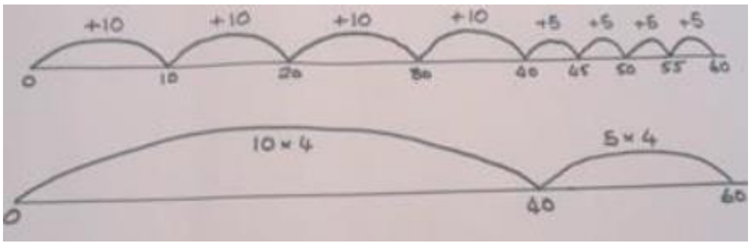
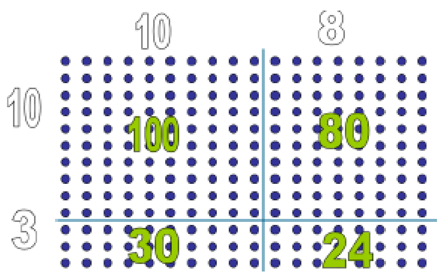




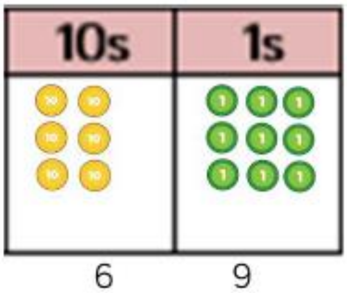
Progression in multiplication

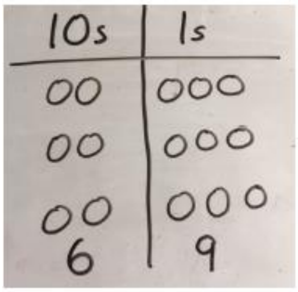
Calculation Methods	
Much like with addition, children will be taught that multiplication is ***commutative,*** meaning that for example, 4 x 5 = 5 x 4. The language we use to explain our calculation is important in determining which calculation is performed as a result. Multiplication can be understood as ***repeated addition,*** and as such, 5 x 4 could be understand as [5] 4 times. Alternatively, multiplication can be explained as so many ***'lots of'*** a number, and therefore 5 x 4 can also be read as 5 lots of 4. Both calculations lead to the same outcome. For consistency, we begin with the first number recorded in a calculation and perform the operation instructed to this number. When multiplying, we call the first number the **multiplicand,** and the second number become known as the **multiplier**.	
Children will begin with understanding multiplication as ***repeated equal groupings/ repeated addition.*** They will relate this to prior rehearsal of ***counting in sequences,*** identifying and discussing patterns and strategies to support their oral counting.	
Children will be shown how to represent their understanding using jottings, including applying to use ***bar-model.***	
Children will be given opportunity to visually represent multiplication facts using Numicon. Tiles can be laid out as a number line, and other tile lay upon them to check to outcome.	 
Dienes or ***Cuisenaire rods*** can be used and placed upon a number line track to read the outcome. Children can create their own number tracks to show their working and understanding.	 
Pupils will also be taught to use numberlines to demonstrate multiplcation as repeated addition. 5 x 4 =	



Children will use objects and counters to create ***arrays*** and further ***illustrate commutativity.*** They will use arrays to write a range of calculations. e.g. 10 = 2 x 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5	
Children will develop their use of arrays to begin to multiply a 1digit number by a 2digit number.	
When using a ***multiplication grid,*** the tens number is ***partitioned*** into tens and ones.	
Base10 dienes or place value counters can be used to support further work using grid multiplication method. * *Multiplying 3 ones by 4 requires exchanging.*	
Numicon may also be used to model partitioning to multiply, supporting understanding of ***exchanging.*** e.g. 15 x 4 =	
Children can show their evidence of their step by step working using informal written methods as well as on a number line. 	4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60
Children will go on to using a multiplication grid to multiply a 2digit number by another 2digit number. e.g. 18 x 13 = They will be guided by their class teacher as to which manipulatives, if any would be the most appropriate to use.	
Children with secure times table knowledge will be encouraged to use the grid without manipulates where appropriate.	

Pupils will use place value counters (or base10 dienes) to begin to use ***formal written methods*** with increasingly larger numbers.
e.g. 23 x 3 =





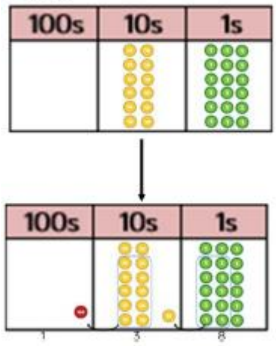
3 × 23
20 3

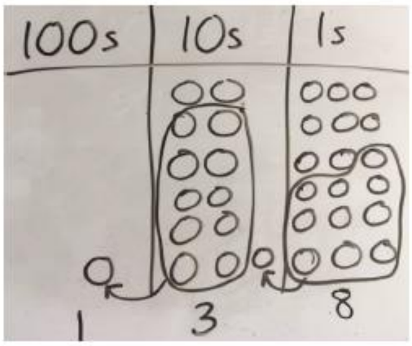
3 × 20 = 60
3 × 3 = 9
60 + 9 = 69

$$\begin{array}{r} 23 \\ \times\ \ 3 \\ \hline 69 \\ \hline \end{array}$$

Exchanging will be required if values bridge the next column.

6 x 23





6 x 23 =

$$\begin{array}{r} 23 \\ \times\ \ 6 \\ \hline 138 \\ \hline {\scriptstyle 1\ 1} \end{array}$$

Children with sound times table knowledge will progress to learn the ***expanded method*** and ***compact formal written methods***. ***Long multiplication*** is then the final step to enable multiplying a 2 or more digit number by a 2 or more digit number.

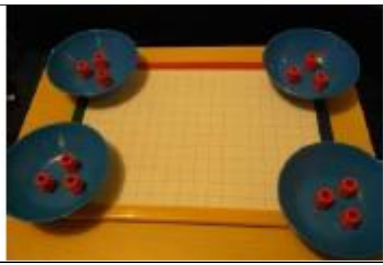
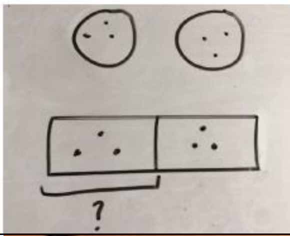
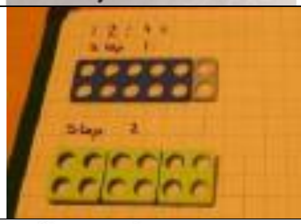
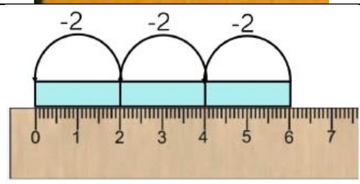
$$\begin{array}{r} 3\ 4\ 7 \\ \times\ \ \ \ \ 3 \\ \hline 2\ 1 \\ 1\ 2\ 0 \\ 9\ 0\ 0 \\ \hline 1\ 0\ 4\ 1 \\ \hline \end{array}$$

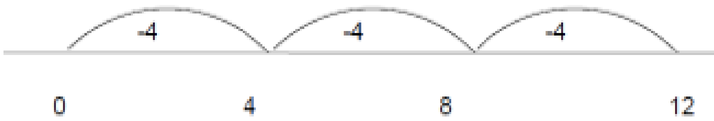
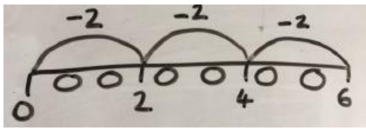
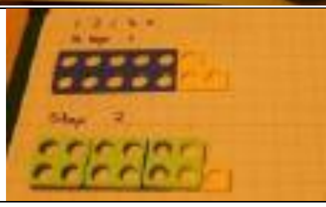
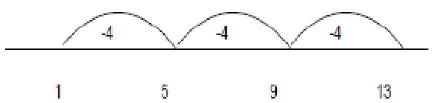
$$\begin{array}{r} 3\ 4\ 7 \\ \times\ \ \ \ \ 3 \\ \hline 1\ 0\ 4\ 1 \\ \hline {\scriptstyle \cancel{1}\ \cancel{2}\ \ } \end{array}$$

The children will be encouraged to cross through numbers they are carrying once they have been added otherwise they may be forgotten.

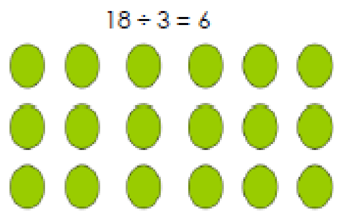
$$\begin{array}{r} 3\ 5\ 2 \\ \times\ \ \ 2\ 7 \\ \hline 2\ 4\ 6\ 4 \\ {\scriptstyle \cancel{3}\ \ \cancel{1}\ \ } \\ 7\ 0\ 4\ 0 \\ {\scriptstyle \cancel{1}\ \ \ \ \ \ \ \ \ } \\ \hline 9\ 5\ 0\ 4 \\ \hline {\scriptstyle \cancel{1}\ \ \ \ \ \ } \end{array}$$

Progression in division

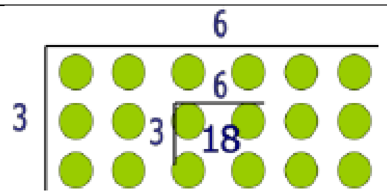
<table>
<tr><th colspan="2">Calculation Methods</th></tr>
<tr><td>The children will be taught division as sharing equally. This will begin with use of practical equipment being places into groups. Bowls or hoops may be used to represent the divisor. The starting number (dividend) will divide exactly by the divisor to begin with. There will be no remainders.
e.g. 12 ÷ 4 =</td><td></td></tr>
<tr><td>The same models for drawing and jottings will be introduced to support children’s pictorial working, including bar model.
e.g. 6 ÷ 2 =</td><td>
</td></tr>
<tr><td>Children will be extended to prepare their understanding to written methods using Numicon to make a number line and overlaying the divisor.</td><td></td></tr>
<tr><td>Cuisenaire rods will also be used to make a number line, and these can be measures and counted against a measuring ruler.</td><td>

3 groups of 2</td></tr>
<tr><td colspan="2">Children will be taught to transfer their understanding of division as repeated subtraction onto empty number lines.</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>The same methods will be used to introduce children to working with remainders, establishing that they cannot share out all the object equally. The items left over are the remainder.
e.g. 13 ÷ 4 =</td><td></td></tr>
<tr><td>Numicon will again be used to make a number line and overlay with the divisor, identifying that the value cannot be covered completely and that a value remains uncovered.</td><td></td></tr>
<tr><td>The numberline can be completed in the same way as before, demonstrating the repeated subtraction leaving a value at the end rather than arriving at zero.</td><td>
</td></tr>
</table>

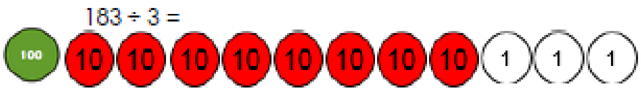
The children will go on to using counters (either ones or plain counters) to divide 2digit numbers by a single digit. They will begin by creating arrays using the divisor as a guide e.g. if I am dividing by 3, I would have 3 rows.

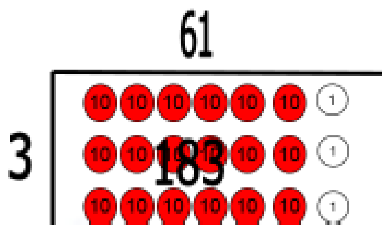


By drawing the ***'bus shelter frame'*** around of array of counters, children are prepared for beginning to use and understand ***compact method of division.***

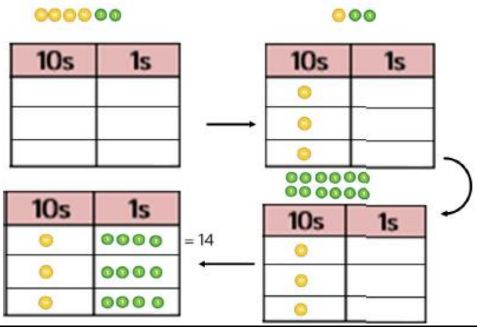


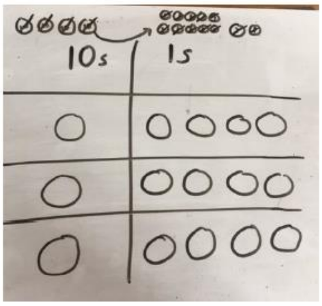
When working with larger numbers, the children will move on to use ***place value counters.*** If the counter values will not divide by the divisor, they will need to be exchanged.





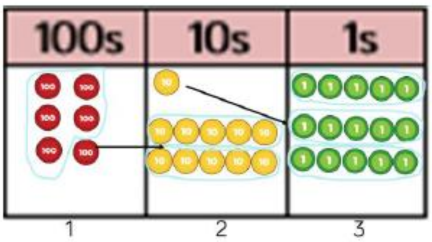
Place value counters can also be shared out into groups using bowls, hoops or in the example below, rows of ***paritioned*** working out, creating a system for sharing and ***exchanging*** where required. E.g. 42 ÷ 3 =





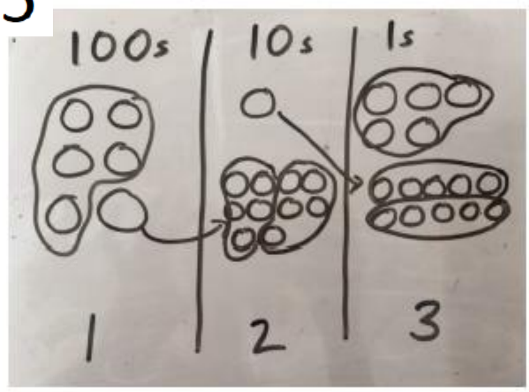
$42 \div 3$
$42 = 30 + 12$
$30 \div 3 = 10$
$12 \div 3 = 4$
$10 + 4 = 14$

The children will progress to use the ***formal written method for short division*** alongside the practical resources. When exchanging counters (100 for 10 x 10 counters, 10 for 10 x 1 counters) they will represent this as carrying a 1 (or more) on the written method.



$$\begin{array}{r|l} & 123 \\ 5 & 6^{1}1^{1}5 \end{array}$$

1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?



Once children have secure times table knowledge, they will be expected to carry out the **short division** ('bus shelter' method) without the use of practical resources.

The children will learn to present the **quotient** in different ways depending on the context of the question (***remainder, decimal or fraction***).
E.g. 110 r3, 110.5 or 110 3/6

```
  1 1 0 r3
6|6 6 3

  1 1 0 . 5
6|6 6 3 .³0
```

When working with larger numbers, the children will use the ***'chunking'*** method in ***long division*** to divide a 3 or more digit number by a 2 digit number. The children will be encouraged to subtract the largest 'chunks' possible.

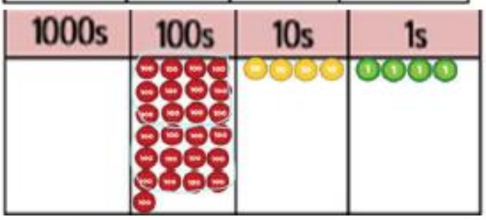
```
235 ÷ 17

      1 3   r1 4
17 | 2 3 5
   - 1 7 0   (17 x 10)
       6 5
   -   5 1   (17 x 3)
       1 4
```

Long division can be supported and modelled with place value counter, developing an adapted long division model using the ***partitioned approach.***

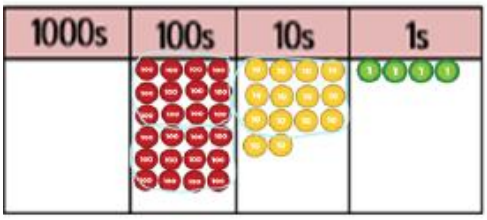
2544 ÷ 12

We can't group 2 thousands into groups of 12 so will exchange them.



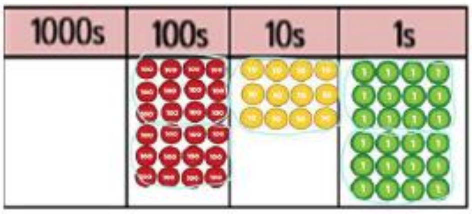
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

```
    0 2
12|2544
   24
    1
```



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

```
    0 2 1
12|2544
   24
    14
    12
     2
```



After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

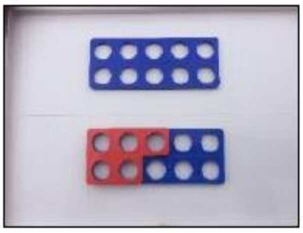
```
    0 2 1 2
12|2544
   24
    14
    12
     24
     24
      0
```

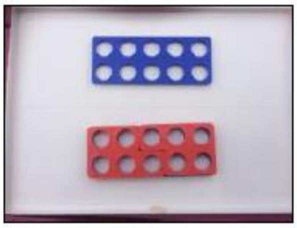
Progression with fractions

Calculation Methods

The teaching strategies shown in this section will be for introducing fractions in Key Stage 1and calculating with fractions (adding/subtracting, multiplying and dividing fractions). When the children are calculating fractions/decimals/percentages of numbers or quantities, they will use the strategies set out in the multiplication and division sections of this document.

The children will begin by finding half of numbers, objects or quantities. They will be introduced to the words numerator and denominator and understand that half is written as ½.

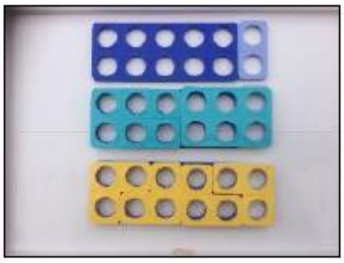




Using Numicon, the children will lay out the whole number (10 in the first two pictures), they will then explore which tiles they can fit exactly over the whole twice. They will then lay these over the top.

When children understand that a half is two equal parts of the whole, they will use the sharing out strategy shown in the division section to find half of sets of objects. They will also use folding to find half of shapes.

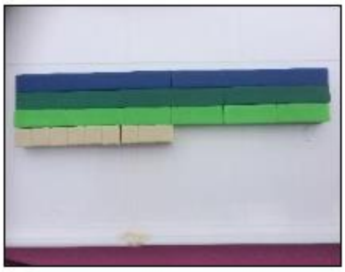
The children will use the same strategy as above to find quarters. When laying tiles over the top, the children will be encouraged to find ½ then a quarter ¼ so that they can see the link between these fractions.



The children will use Cuisenaire rods or Numicon to help them explore equivalent fractions.

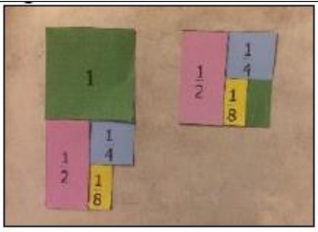
Using the rods, you can see that ½ is the same as (equivalent) 2/4. You can see that one whole is the same as 2/2 or 4/4

Using the rods, you can see that ½ is the same as (equivalent) 3/6. You can see that 2/6 are the same as 1/3 and that 3/18 are equal to 1/6.

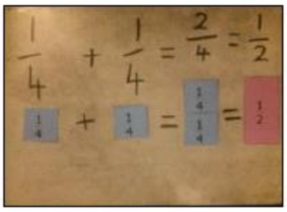


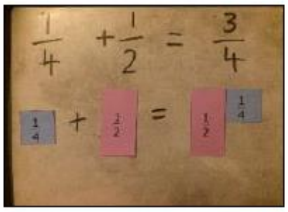
Adding fractions with the same **denominator families**

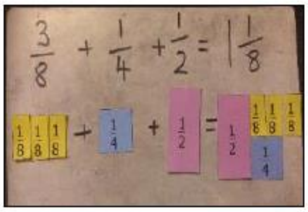
The children will begin by exploring how fraction families fit together using fraction cards.

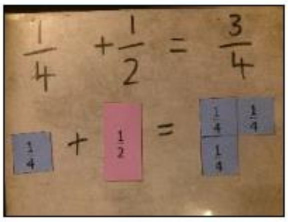


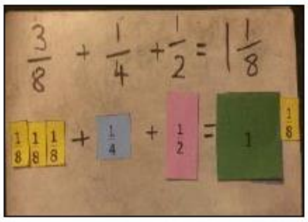
They will then add fractions with the same denominator followed by the same denominator families (as shown on the fractions cards).





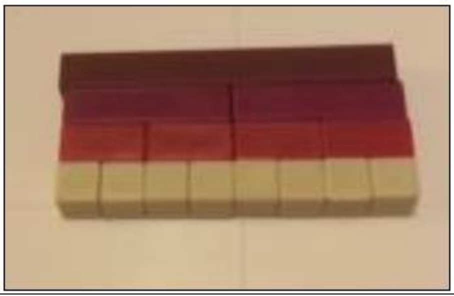


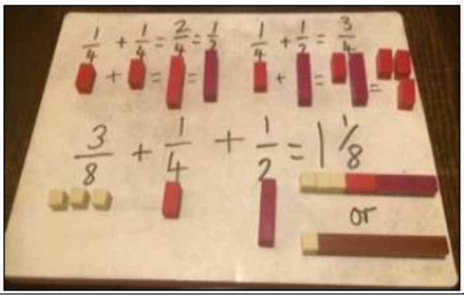




Layering the cards over the top at the answer stage will enable the children to start making links between fractions and recognise equivalence.

The children will then move on to carrying out similar calculations using Cuisenaire rods. They will have the opportunity to select the rods that they need for their calculations.

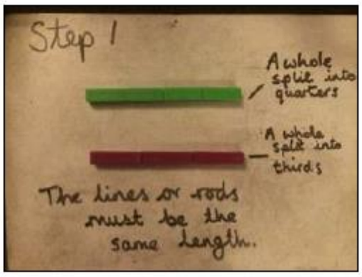


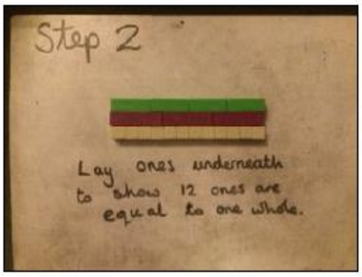


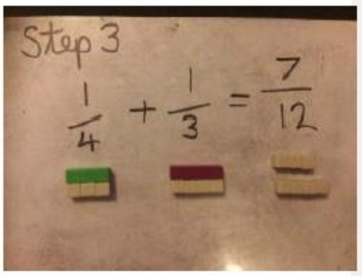
Adding fractions with different denominators

The children will also use Cuisenaire to support them when they begin to add fractions with different denominators. They will follow the steps outlined in the pictures below.

1/4 + 1/3 =



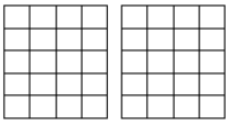




The children will move on from this to create arrays when adding fractions. This method will enable children to visualise the fractions when they are adding non **unit fractions**.

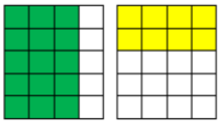
The children will follow the steps below to solve these calculations:
3/4 + 2/5 =

Step 1:



The children create two identical arrays using the denominators of the fractions in the calculation. Across for the first denominator (4) and down for the second (5).

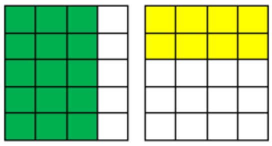
Step 2:



3/4 or 15/20   2/5 or 8/20

They then shade the arrays to create the numerators of the fractions in the calculation.

Step 3:



15/20   +   8/20

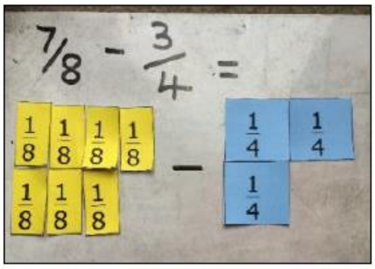
= 23/20 or 1 3/20

They add the fractions using the total number of squares in the array as the denominator (20) and the shaded squares as the numerator.

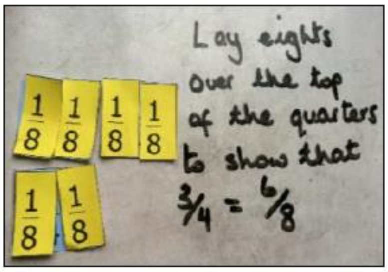
Subtracting fractions with the same denominator families

The children will begin by using the fraction cards to subtract fractions with the same denominator or denominator families.

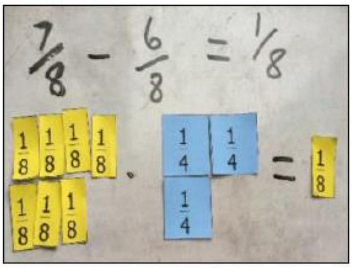
Step 1:



Step 2:

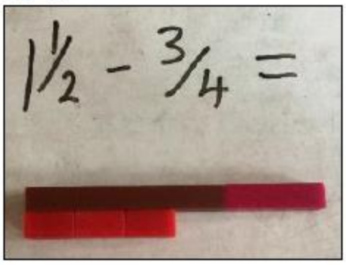


Step 3:

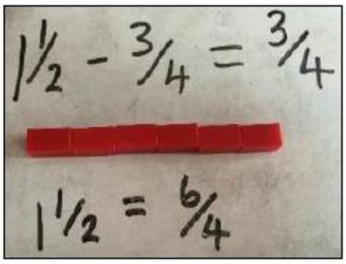


The children will then move on to using Cuisenaire to carry out their calculations.

Step 1:

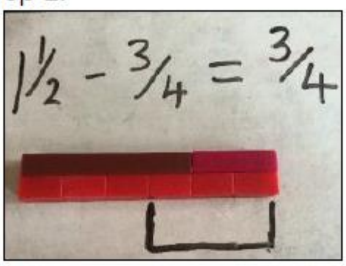


OR Step 2:



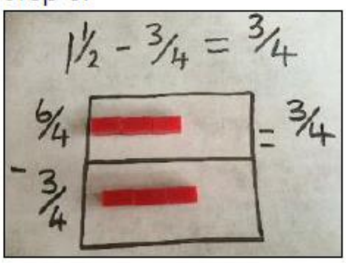
The children will use these steps 2 and 3 once they are familiar with improper fractions.

Step 2:



Add quarters until the two lines are the same length. The answer is the amount you have added.

Step 3:

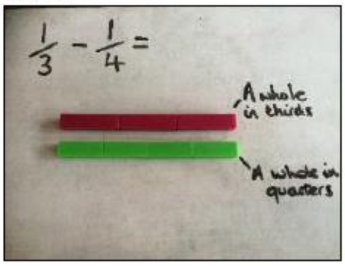


Subtracting fractions with different denominators

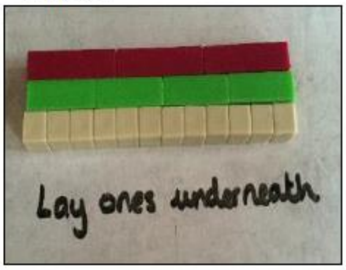
The children will use Cuisenaire when they begin to subtract fractions with different denominators.

1/3 – 1/4 =

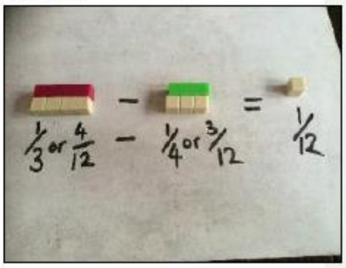
Step 1:



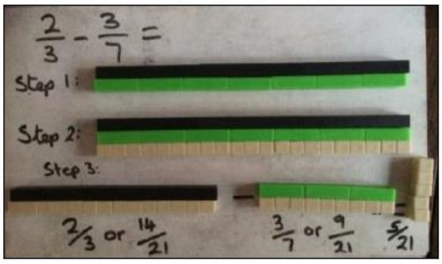
Step 2:



Step 3:

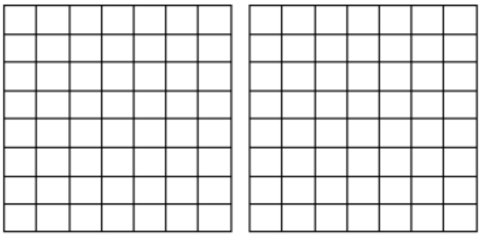


This method can also be used to subtract **non unit fractions**, before moving on to the method set out next.

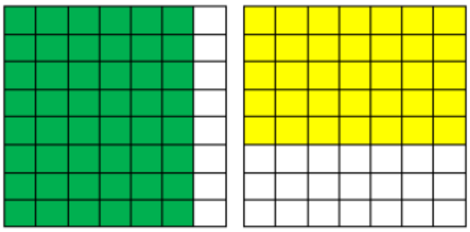


The children will move on from this to create arrays when subtracting fractions. This method will enable children to visualise the fractions when they are subtracting non **unit fractions**.

6/7 – 5/8 =



The children create two identical arrays using the denominators of the fractions in the calculation. Across for the first denominator (7) and down for the second (8)



6/7 or 48/56 5/8 or 35/56

They then shade the arrays to create the numerators of the fractions in the calculation.

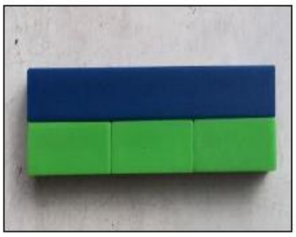
48/56 - 35/56

= 13/56

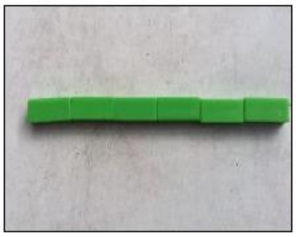
They subtract the fractions using the total number of squares as the denominator (56) and the shaded squares as the numerator.

Multiplying a fraction by a whole number

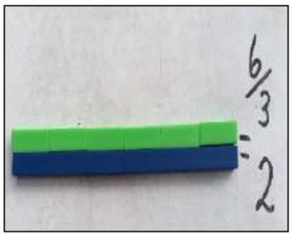
1/3 x 6 =



Select rods to represent the denominator and one whole e.g. each green rod equals 1/3 and the blue is a whole.

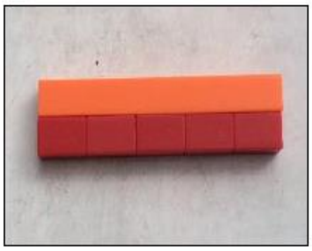


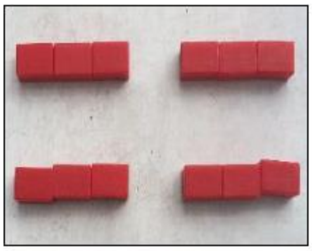
Select the amount of thirds to match the number you are multiplying by. E.g. 1/3 six times.

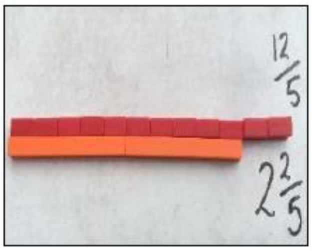


Line up whole rods underneath to find the answer to the calculation. E.g. 6/3 = 2

We can use this same method when multiplying non unit fractions: 3/5 x 4 =

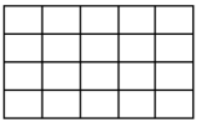




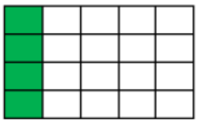


Multiplying a fraction by another fraction

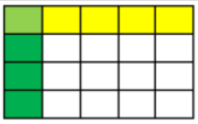
1/5 x 1/4 =



Create **one** array using the denominators from the calculation

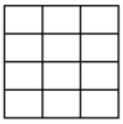


Shade the array to match the first fraction in the calculation (1/5)

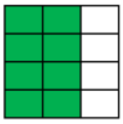


Shade the array to match the second fraction. The section where the two overlap is the answer (1/20)

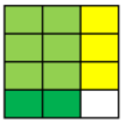
We can use this same method when multiplying non unit fractions: 2/3 x 3/4 =



Create **one** array using the denominators from the calculation



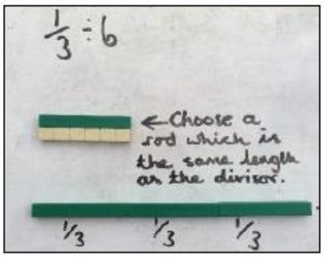
Shade the array to match the first fraction in the calculation (2/3)

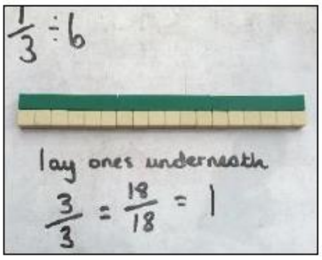


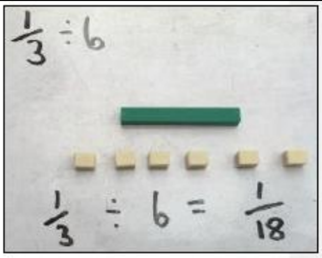
Shade the array to match the second fraction. The section where the two overlap is the answer (6/12 or 1/2)

Those children with good times tables skills may recognise the link between the starting numbers and the final answer. Once they understand how to get from the calculation to the answer they need not draw the arrays.

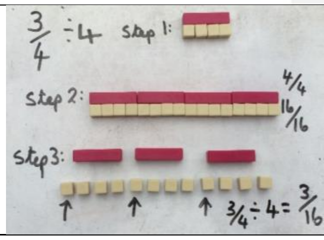
Dividing a Fraction by a whole number







This method can also be used when dividing non unit fractions:



Those children who demonstrate an excellent understanding of calculating with fractions may go on to divide a fraction by another fraction.

They will be taught to use their knowledge of inverses and the multiplication method to help them.
For example:

$$\frac{1}{2} \div \frac{1}{5} = \frac{1}{2} \times \frac{5}{1}$$

Progression with multiplication facts (times tables)

Year Group	Curriculum Expectations	School Expectations
1	Count in multiples of 2, 5 and 10	• Daily practice counting in 2, 5 and 10. • Use of manipulate resources to make number patterns / sequences. • Initial understanding and calculating of 1, 2, 5 and 10 times tables. • Introduction to Times Table Rock Stars in the Spring/Summer term.
2	Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables	• Initial daily practice counting in 2, 5, 10 and extending to count in 3s. • Adapted daily practice to recall multiplication facts for 2, 5 and 10 times tables and related division facts, once taught through progression sequence. • Homework related to times tables • Regular individual multiplication fact testing introduce from Spring to chart progress. • Whole class tracking to be maintained and intervention planned accordingly.
3	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	• Daily practice counting in 2, 5, 10 and extending to count in 3, 4 and 8s. • Adapted daily practice to recall multiplication facts for 2, 5, 10 and 3, 4 and 8 times tables and related division facts once taught through progression sequence. • Homework related to times tables. • Regular individual multiplication fact testing to chart progress. • Whole class tracking to be maintained and intervention planned accordingly.
4	Recall multiplication and division facts for multiplication tables up to 12 × 12	• Daily practice counting in sequences. • Adapted daily practice to recall multiplication facts for all times tables and related division facts to 12 x 12, once taught through progression sequence. • Homework related to times tables. • Regular individual multiplication fact testing to chart progress. • Whole class tracking to be maintained and intervention planned accordingly. • Additional 'Sound Check' practice on Times Table Rock Star to prepare pupils for Multiplication Tables Check due to be taken in the Summer term.

5	Multiples, factors, primes, square and cube numbers	• Daily practice counting in sequences, including square, cube and prime numbers. • Adapted daily practice to recall multiplication facts for all times tables and related division facts to 12 x 12, once taught through progression sequence. • Extended practice to include multiples of 10, 100 and 1,000 (e.g. 300 x 4). • Homework related to times tables. • Regular individual multiplication fact testing to chart progress. • Whole class tracking to be maintained and intervention planned accordingly.
6	Multiples, factors, primes, square and cube numbers Multiply by decimals using times tables facts 0.2 x 4 = 0.8	• Daily practice counting in sequences, including square, cube and prime numbers. • Adapted daily practice to recall multiplication facts for all times tables and related division facts to 12 x 12, once taught through progression sequence. • Extended practice to include multiples of 10, 100 and 1,000 (e.g. 300 x 4) and decimal values (0.03 x 4). • Homework related to times tables. • Regular individual multiplication fact testing to chart progress. • Whole class tracking to be maintained and intervention planned accordingly.

Our whole school strategy for improving recall of multiplication and associated division facts includes resourcing each class for shared and individual daily practice.

Each classroom has been equipped with a whole class set on Number-link boards, dice, playing cards, a range of practical counters/cubes and visual grids/containers to allow pupils to make, see and discover patterns with number.

Each class teacher has a counting stick and should lead children from the front in recalling multiplication and division facts, building up associative, commutative and distributive facts through progression. This should include discussion identifying and exploring the reasoning and understanding within the strategies being used for transference of skill and increase of independence.

Each pupil should have an on-going opportunity to grow in confidence and ability with times tables through daily practice and game play, rehearsing and reinforcing facts they already know and setting small appropriate challenge to gradually increase their knowledge and fluency (speed) of recall.

Glossary and Useful Vocabulary

Array – numbers or objects arranged in rows and columns.

Commutative law – numbers can be *added* or *multiplied* in any order and the answer will be the same.

Denominator – the number on the bottom of a fraction. It represents how many parts the **whole** has been split up into.

Denominator families – denominators which are multiples of the same number (e.g. ½, ¼, 1/8)

Dividend – The number (of objects) that you begin with when dividing.

Divisor – the number you are dividing by in a division calculation.

Find the difference – Subtraction method where children cover the larger number with the smaller number and then name the uncovered number.

Manipulatives – practical resources to support the children when they are calculating.

Multiplicand – the number that you start with which you wish to multiply by another number.

Multiplier – the number which you are using to multiply another number by.

Non-unit fractions – A fraction where the numerator is more than one. I have more than one part of the whole e.g. 2/3 of a pizza.

Numerator – the number on the top of a fraction. This represent how many parts of the **whole** we are looking for.

Partition – To split numbers to make them easier to work with. Most commonly numbers will be split into thousands, hundreds, tens and ones. However, sometimes it may be helpful to partition numbers in different ways. For example, when trying to halve 70, I may partition it into 60 + 10 as both of these numbers are easier to halve. When partition, you should still have the same amount, just organised in a different way.

Quotient – the answer in a division calculation.

Remainder – the number (of objects) left over when you do not have enough left to share equally.

Take away – Subtraction method (cover or mask what you are taking away when using Numicon).

Unit fraction – a unit fraction is just one part of the **whole**. The Numerator of the fraction is just 1.

Whole – when working with fractions the whole is the complete shape, the starting number or amount of objects.

With special thanks for use of images from White Rose Maths, Aycliffe Community Primary School and Laurie Jacques (SMaR+ – Specialists in Mathematical Reasoning and Thinking).