Abbotswood Primary School

Calculation Policy

January 2022

Review Date: September 2022

Our Maths Rationale

If you look deeply enough into any problem, you will often see Maths, whether it be working out the change at a shop, or working out how long you've got before your favourite TV show. The use of numbers and sequences, shapes and graphs are commonplace in today's society. We use Maths daily and as a result, we believe that the children should be exposed to the skills they will need in later life. A sound understanding of mathematical concepts will ensure that our children feel comfortable and confident when the time comes for them to head out into our community. We hope to break the 'fear factor' surrounding Maths and show the children that it can be creative, relevant and fun!

How do we teach Maths at Abbotswood?

At Abbotswood we teach challenging and engaging Maths lessons every day across the school. We ensure challenge for all children through our 'Try it, Use it, Prove it' teaching sequence.

'**Try it**' tasks aim to improve the children's fluency of the skill. Fluency refers to knowing key mathematical facts and methods and recalling these efficiently. '**Use it**' tasks are usually in context (e.g.money and measures) and challenge the children to draw on the skills they have achieved in the 'Try it' tasks. '**Prove it**' tasks require the children to explain their understanding demonstrating a developed and broad mathematical understanding.

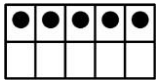
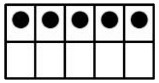
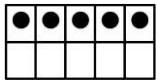
To ensure all children start at the correct point of the unit and move through the unit at a pace that is suitable for their needs, we complete 'hot and cold' tasks. The 'cold' task is completed at the start of the unit and the teacher uses the information to determine the correct starting point for that child. The 'hot' task is then completed at the end of the unit to assess the progress and identify children who need additional support.

How do we assess Maths at Abbotswood?

We assess Maths on a daily basis, through our cold and hot tasks and the teacher's marking during and after the lessons. Every single lesson has been specifically planned to meet an Age Related Expectation (please see examples below) which meets the needs of every child throughout the school

Maths is assessed using the school's 'Age Related Expectations' (AREs) 6 times a year. From this, we can see any gaps in progress and we can prioritise support for individuals for the following term.

Children are assessed at the end of Years 2 and 6 for the end of Key Stage Statutory Assessments (SATs).

Progression in the use of manipulatives to support learning						
Foundation	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects	Real-life objects
0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards	0 – 9 digit cards
Number track to 10	Number line to 20	Number line to 100	Number line to 100	Number line including negative numbers	Number line including negative numbers	Number line including negative numbers
Numbered counting stick	Counting stick	Counting stick	Counting stick	Counting stick	Counting stick	Counting stick
Tens frame 	Tens frame 	Tens frame 				
	Place value charts – Tens and ones	Place value charts – Hundreds, tens and ones	Place value charts – Thousands, hundreds, tens and ones	Place value charts – Ten thousands, thousands, hundreds, tens, ones and tenths	Place value charts to a million and three decimal places	Place value charts to 10 million and three decimal places
Interlocking cubes - Use one colour to represent one amount	Interlocking cubes - Use one colour to represent one amount Big Dienes?	Dienes	Dienes	Dienes	Dienes	Dienes
			Place value counters	Place value counters	Place value counters	Place value counters
	Place value arrow cards – tens and ones	Place value arrow cards – tens and ones	Place value arrow cards – H, T, O	Place value arrow cards – Th, H, T, O	Place value arrow cards	Place value arrow cards
Part-part-whole mat	Part-part-whole mat	Part-part-whole mat	Part-part-whole model	Part-part-whole model	Part-part-whole model	Part-part-whole model
Bar model with real- life objects	Bar model with real life objects/pictorial objects/representative objects e.g. counters	Bar model with counters /Dienes progressing to numbers	Bar model with numbers	Bar model with numbers	Bar model with numbers	Bar model with numbers
Numicon shapes	Numicon shapes	Numicon shapes				

Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount	Multilink – use one colour to model an amount

Classroom/Learning Wall visual prompts						
Foundation	**Year 1/2**		**Year 3/4**		**Year 5/6**	
Big focus 10	Big focus 20	Big focus 100				
Numicon number line with Numicon shapes	Numicon number line with Numicon shapes	Numicon number line	Fractions number line	Fractions and decimals number line	Fractions, decimals and percentages number line	
	Odd and even numbers				Prime, square and cube numbers	
	Number pairs totalling 10 Number pairs totalling 20	Multiples of 10 totalling 100	Number pairs totalling 10 Multiples of 10 totalling 100			
0 – 10 number line / track	0 -20 number line	0 – 100 number line	Number line including negative numbers		Number line including negative numbers	
	100 square		100 square			
Real coins Large coins	Real coins Large coins		Real coins Large coins		Real coins Large coins	
	1, 2, 5 and 10 times tables	3 and 4times tables	All times tables up to 12 x 12		All times tables up to 12 x 12	
			Roman numerals		Roman numerals	
		< , > and = signs	< , > and = signs		<, > and = signs	
Real-life / pictorial fractions	Real-life / pictorial fractions	Fractions including fraction number line/wall	Fractions including fraction number line/wall		Fractions, decimals and percentages including fraction number line/wall	
						BIDMAS

2d and 3d shapes	2d and 3d shapes	2d and 3d shapes	2d and 3d shapes

Progression in the teaching of counting in EYFS

Pre-counting

The key focus in pre-counting is an understanding of the concepts more, less and the same and an appreciation of how these are related. Children at this stage develop these concepts by comparison and no counting is involved.

Ordering

Count by reciting the number names in order forwards and backwards from any starting point.

One to one correspondence

One number word has to be matched to each and every object.

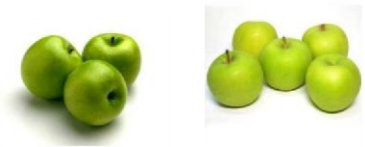
Lack of coordination is a source of potential error – it helps if children move the objects as they count, use large rhythmic movements, or clap as they count

Cardinality (Knowing the final number counted is the total number of objects)

Count out a number of objects from a larger collection. Know the number they stop counting at will give the total number of objects.

Pre-counting ideas

Provide children with opportunities to sort groups of objects explicitly using the language of ***more*** *and* ***less***



Which group of apples has the most? Which group of apples has the least?

Ordering ideas

Provide children with opportunities to count orally on a daily basis. Rote count so that children are able to understand number order and can hear the rhythm and pattern. Use a drum or clap to keep the beat.

One to one correspondence ideas

Play counting games together moving along a track, play games involving amounts such as knocking down skittles.

Use traditional counting songs throughout the day ensuring children have the visual/kinesthetic *resources e.g. 5 little ducks, 10 green bottles*

Cardinal counting ideas

How many bananas are in my fruit bowl? Allow children to physically handle the fruit. Provide children with objects to point to and move as they count and say the numbers.

Progression in the teaching of counting in EYFS

Subitising (recognise small numbers without counting them)

Children need to recognize small amounts without counting them e.g. dot patterns on dice, dots on tens frames, dominoes and playing cards as well as small groups of randomly arranged shapes stuck on cards.

Abstraction

You can count anything – visible objects, hidden objects, imaginary objects, sounds etc. Children find it harder to count things they cannot move (because the objects are fixed), touch (they are at a distance), see that move around.

Children also find it difficult to count a mix of different objects, or similar objects of very different sizes.

Conservation of number

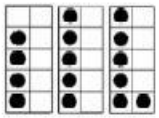
Ultimately children need to realise that when objects are rearranged the number of them stays the same.

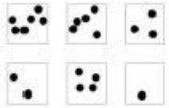
End of year counting expectations

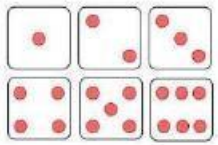
- count reliably to 20
- count reliably up to 10 everyday objects
- estimate a number of objects then check by counting
- use ordinal numbers in context e.g. first, second, third
- count in twos, fives and tens
- order numbers 1-20
- say 1 more/ 1 less than a given number to 20

Subitising ideas

Provide children with opportunities to count by recognising amounts







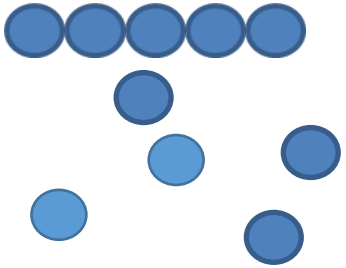
Abstraction ideas

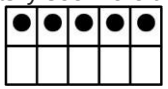
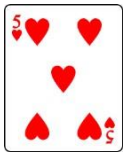
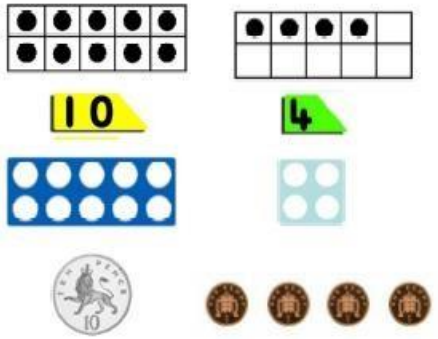
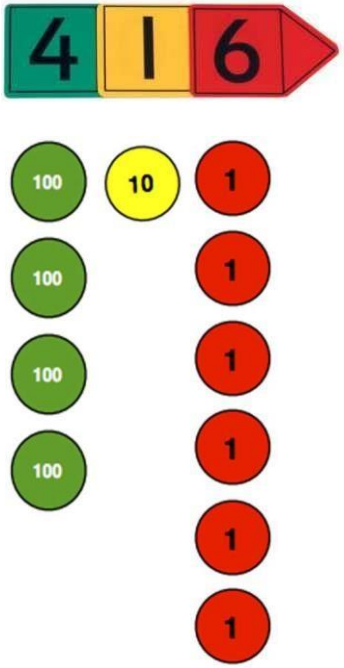
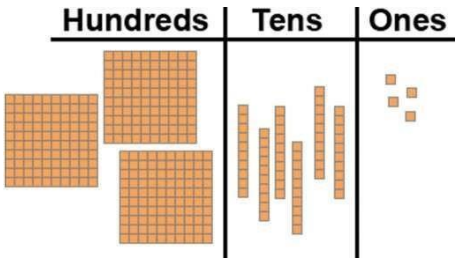
How many pigs are in this picture?

Provide children with a variety of objects to count

Conservation of number

The amount is 'five' and doesn't change.



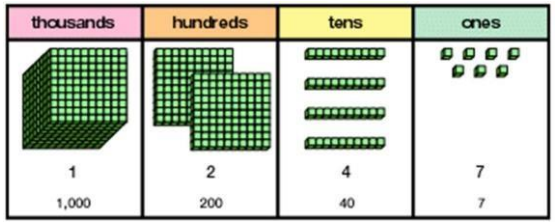
Progression in the teaching of place value			
Foundation **Understanding ten**	**Y1** **Understanding numbers up to 20**	**Y2** **Understanding numbers up to one hundred**	**Y3** **Understanding numbers up to one thousand**
Use ***tens frames*** flash cards daily to ensure children recognise amounts. Use empty ***tens frames*** to fill with counters to enable children to understand number relationships. Either fill the ***tens frame*** in pairs or in rows. In rows shows 5 as a benchmark. Children can easily see more than 5 or less.  Include other visual images such as dice, cards, dominoes etc.  	Ten-frames provide a first step into understanding two-digit numbers simply by the introduction of a second frame. Placing the second frame to the right of the first frame, and later introducing numeral cards, will further assist the development of place- value understanding. 	Continue developing place value through the use of ***tens frames***.	Continue developing place value through the use of manipulatives.  Use Dienes blocks and gattegno Charts 

Progression in the teaching of place value

Y4
Understanding numbers up to ten thousand

Continue developing place value through the use of manipulatives.

- Place value arrow cards
- Place value counters
- Dienes blocks
- Gattegno Charts



10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
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
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Y5
Understanding numbers up to one million including decimals

Continue developing place value through the use of manipulatives.

- Place value arrow cards
- Place value counters (including decimal counters)
- Dienes blocks
- Gattegno Charts

MILLIONS			THOUSANDS			ONES		
hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
7	4	5	3	0	9	2	8	1

10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
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
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

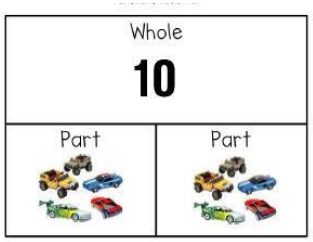
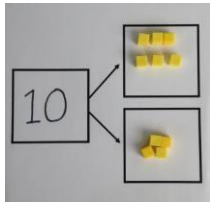
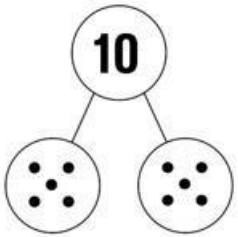
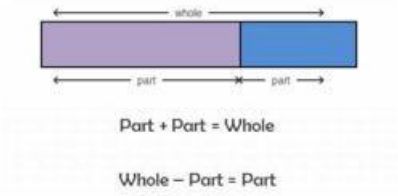
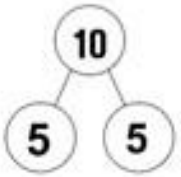
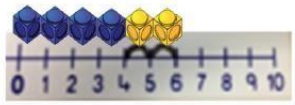
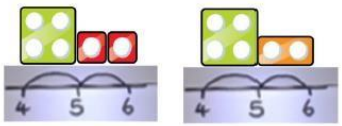
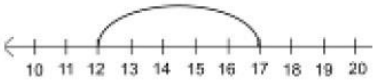
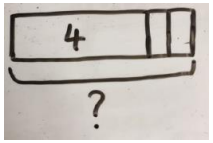
Y6
Understanding numbers beyond one million including decimals

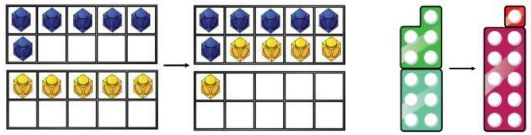
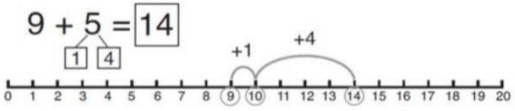
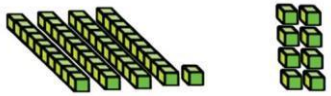
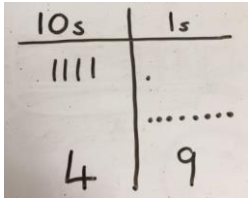
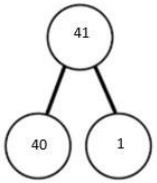
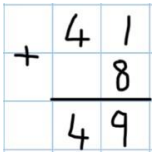
Continue developing place value through the use of manipulatives.

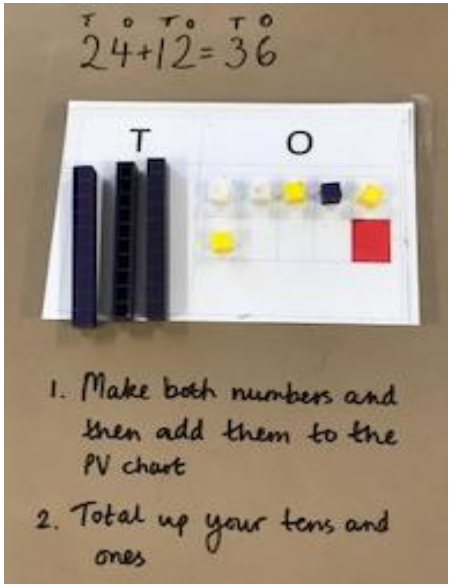
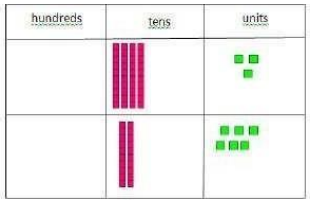
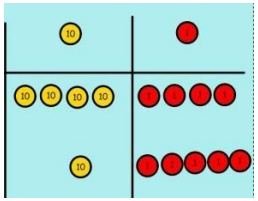
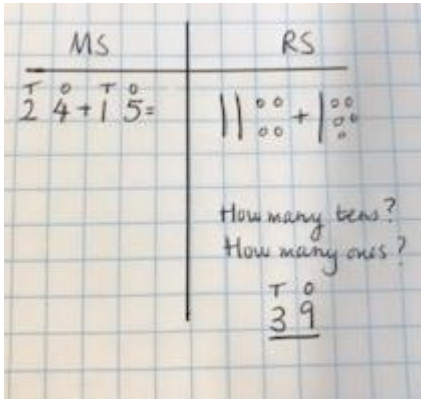
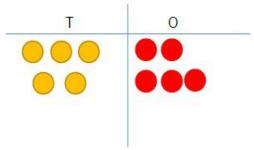
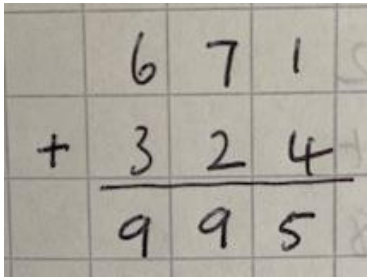
- Place value arrow cards
- Place value counters (including decimals counters)
- Dienes blocks
- Gattegno Charts

MILLIONS			THOUSANDS			ONES		
hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
7	4	5	3	0	9	2	8	1

10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000
1000	2000	3000	4000	5000	6000	7000	8000	9000
100	200	300	400	500	600	700	800	900
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
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

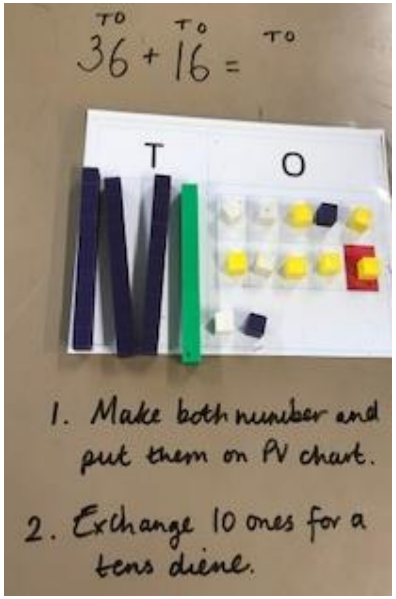
Progression in Addition				
Objective and Strategies	**Concrete** Build it	**Pictorial** Draw it	**Abstract** Solve it	**Vocabulary**
Combining two parts to make a whole: part-whole model EYFS - onwards	   Counters represent real-life objects.  Use cubes to add two numbers together as a group or in a bar. 	  	 5 + 5 = 10 10 = 5 + 5 Five is a part, 5 is a part and the whole is 10.	Part – part – whole calculation equation + total altogether increase sum (meaning total) plus add more and make double one more two (ten) more addition equals = is the same as hundred ten one regrouping exchange column column addition
Counting on using a number line EYFS - onwards	Using cubes or Numicon  	Counting on  A bar model which encourages children to count on rather than count all. 	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 	

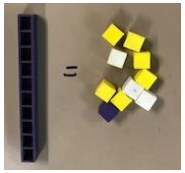
Regrouping to make 10 Year 1 - onwards	Using ten frames and counters/cubes alongside Numicon 6 + 5 	Children to draw tens frame and counters. Use number line 	7 + 4 = 11 If am I at seven, how many more do I need to make 10? (Partitioning of numbers is a key skill) How many more do I add on now?	
TO + O Year 1 - onwards	Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the base 10 e.g. lines for tens and dots for ones. 	41 + 8   1 + 8 = 9 40 + 9 = 49	

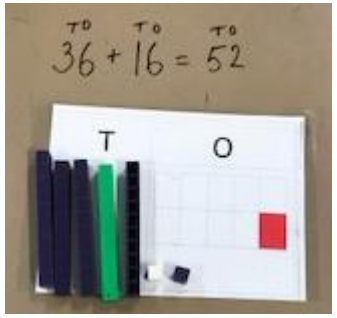
TO + TO - no regrouping Year 2 - onwards	Use the dienes/base 10 and a Place Value (PV) chart to begin adding.   43 + 26 _____ Use Dienes to add tens and ones before moving on to place value counters. 	 After practically using the base 10/dienes blocks and place value counters, children can draw the counters/Dienes to help them to solve additions.  	Column addition is introduced at the beginning of Year 3 when children understand the value of the digits.  	

TO + TO
- regrouping

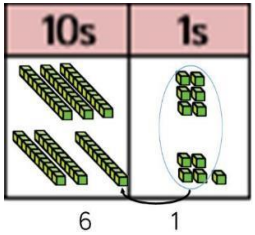
Year 2 - onwards

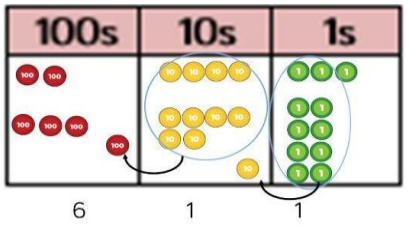


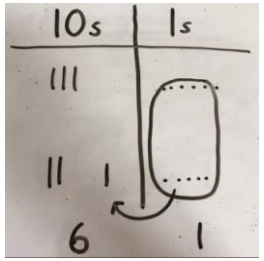




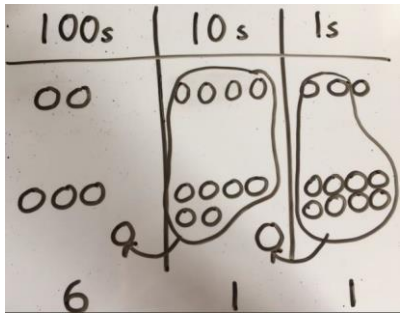
When there are more than 9 ones the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.

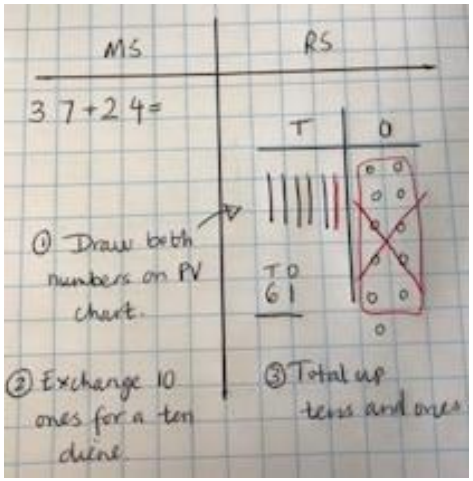


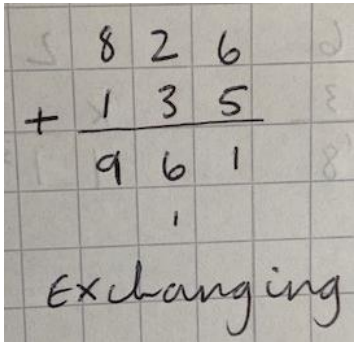




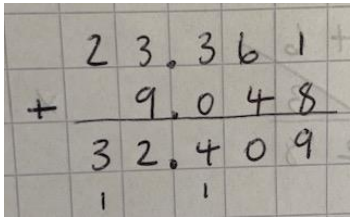
Children to represent the counters in a place value chart, circling when they make an exchange.







As the children move on, introduce decimals with the same number of decimal places.



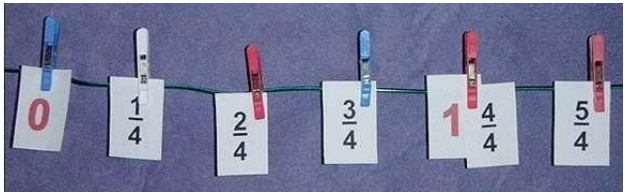
Then move onto decimals with a different number of decimal places.

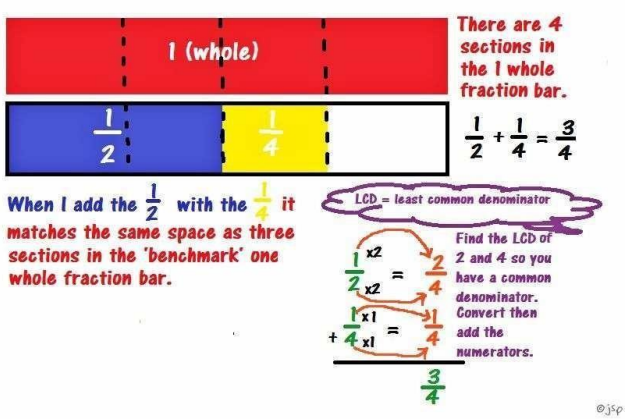
2	3	.	3	6	1
	9	.	0	8	**0**
5	9	.	7	7	**0**
+	1	.	3	**0**	**0**
9	3	.	5	1	1
2	1		2		

Add Fractions

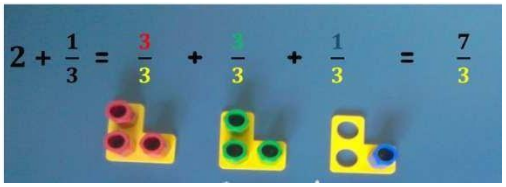
Year 4 - onwards

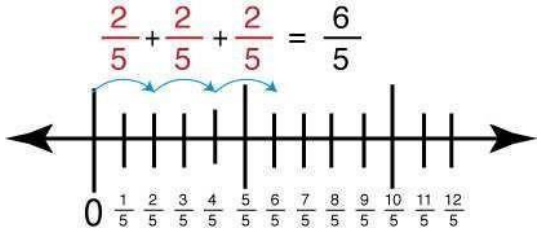
Count in fraction steps using real objects and a number line.



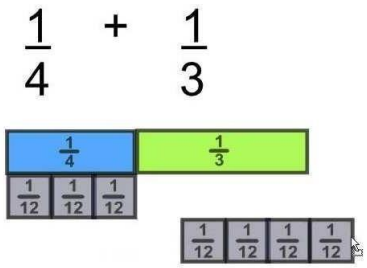


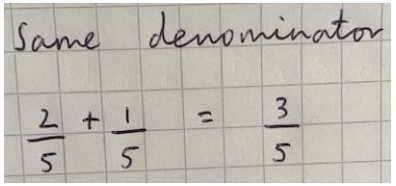
Use Numicon to add fractions.

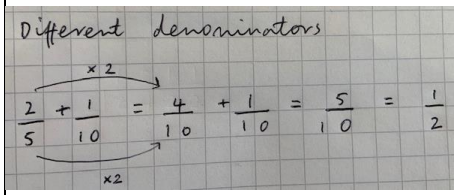


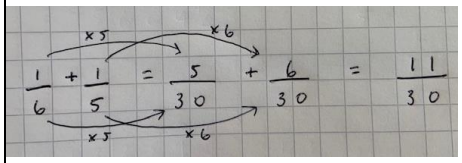


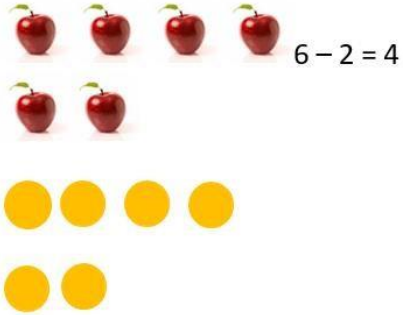
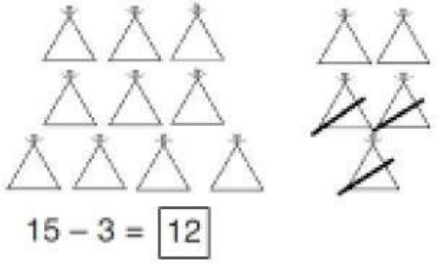
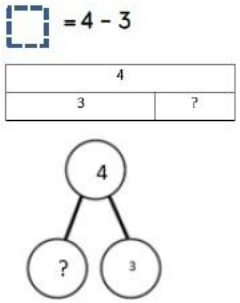
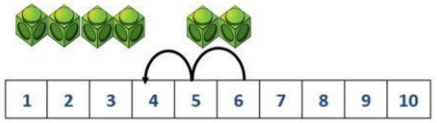
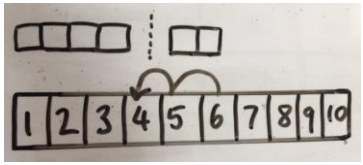
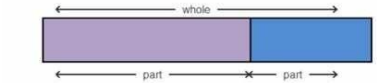
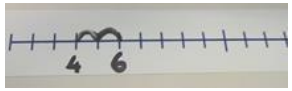
Use the bar model to add fractions.

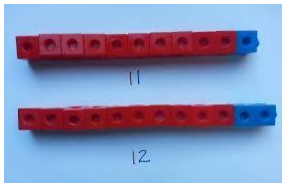
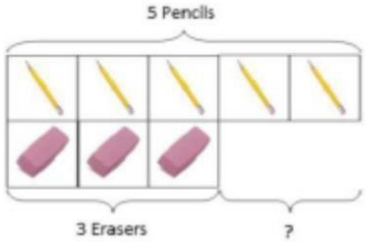
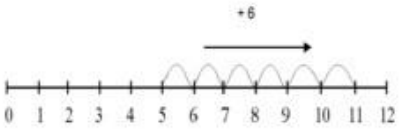
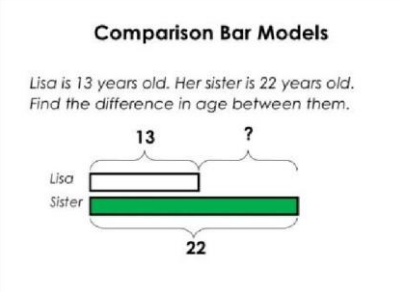
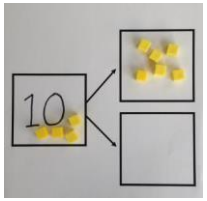
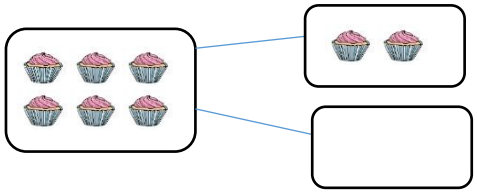
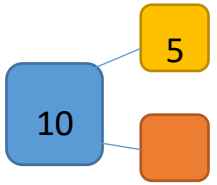
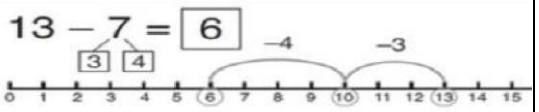
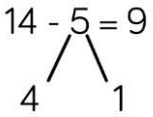


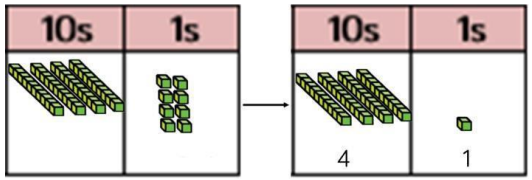
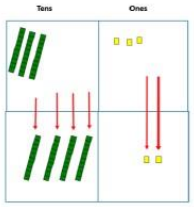
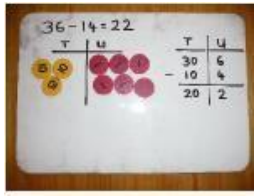
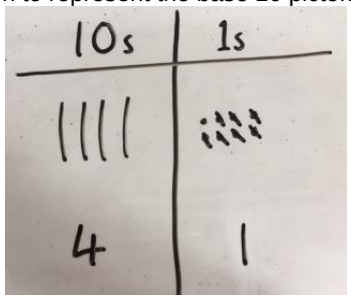
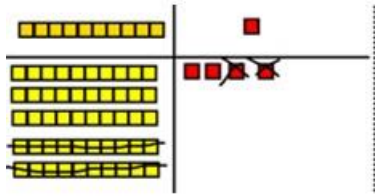
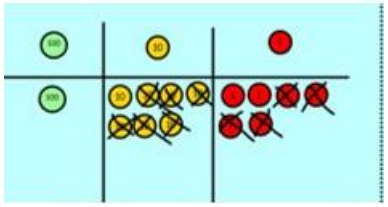
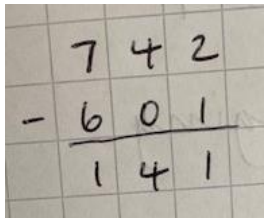
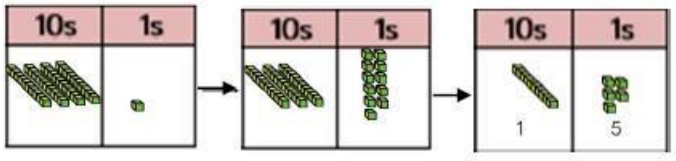
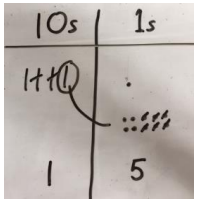
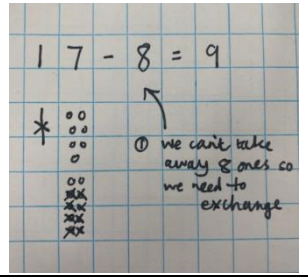
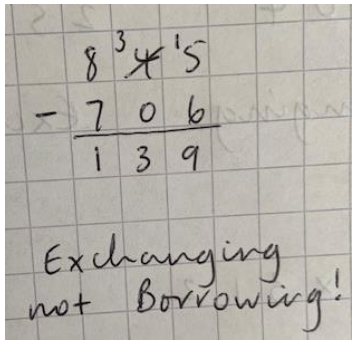


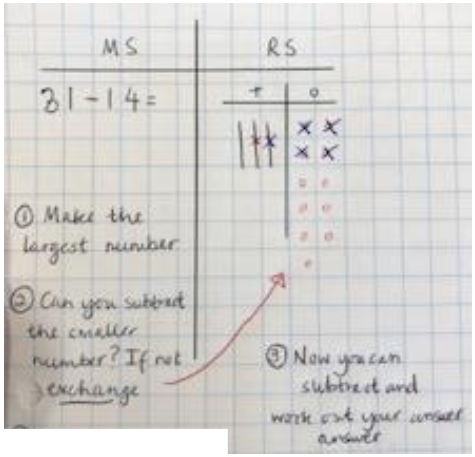




Progression in Subtraction				
Objective and Strategies	**Concrete** Build it	**Pictorial** Draw it	**Abstract** Solve it	**Vocabulary**
Taking away ones EYFS - onwards	Use physical objects, counters, cubes etc. to show how objects can be taken away. 	Cross out drawn objects to show what has been taken away. 	4- 3 = 	- Take (away) How many are left over? How many have gone? One less, two less etc. How many fewer is… than….? How much less is….? Difference between
Counting back using number lines or number tracks EYFS – onwards	Children start with 6 and count back 2. 6 – 2 = 4  Use cubes to subtract a number from the bar. 	Children to represent what they see pictorially e.g.  Use the bar  Part + Part = Whole Whole – Part = Part	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line.  	Subtract Subtraction minus (commutative) calculate column subtraction estimate inverse operation

Find the difference Year 1 - onwards	Compare amounts and objects to find the difference. Use cubes to make bars to find the difference.  Use basic bar models with items to find the difference  	Count on to find the difference.  Draw bars to find the difference between 2 numbers.  	Find the difference between 8 and 5. 8 – 5, the difference is ……. Hannah has 23 sandwiches, Helen has 15 sandwiches. Find the difference between the number of sandwiches. Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.	
Part Part Whole Model Year 1 - onwards	 Link to addition- use the part whole model to help explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts. What is the other part? 10 - 6 =	Use a pictorial representation of objects to show the part part whole model. 	 Move to using numbers within the part whole model.	
Tens frames Year 1 - onwards	Using ten frames 14 – 9 =  Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	 Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 10 – 1 = 9 16 – 8= How many do we take off to reach the next 10? How many do we have left to take off?	

TO – TO Column method without exchanging Year 2 - onwards	48-7  **2 digit – 2 digit** Use Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Again make the larger number first.  	Children to represent the base 10 pictorially.  54 – 22 =  	Column method ***Note – children should be encouraged to use the most efficient method for calculating. 48 – 7 can be solved easily on a number line by counting back.***  	
Column method using base 10 and having to exchange. Year 2 - onwards	41 – 26  	Represent the base 10 pictorially, remembering to show the exchange.  Using the MS/RS to draw the dienes to calculate the answer.  	 	Exchanging not borrowing

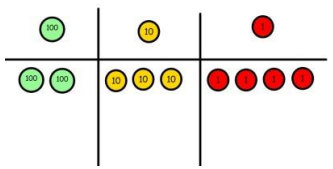
		 MS RS 31 - 14 = T O ① Make the largest number ② Can you subtract the smaller number? If not exchange ③ Now you can subtract and work out your unsure answer		

Column method using place value counters.

Year 3 - onwards

234 – 88

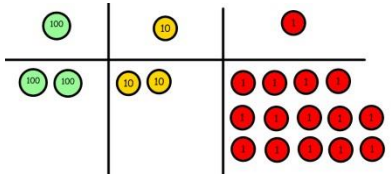
Make the larger number with the place value counters Start with the ones, can I take away 8 from 4 easily?



Calculations

234
- 88

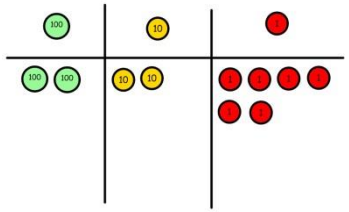
I need to exchange one of my tens for ten ones.



Calculations

234
- 88

Now I can subtract my ones.

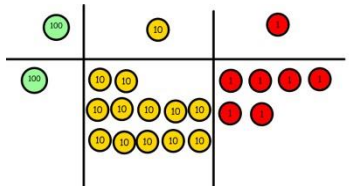


Calculations

234
- 88

Now look at the tens, can I take away 8 tens easily?

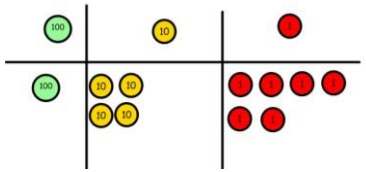
I need to exchange one hundred for ten tens.



Calculations

234
- 88

Now I can take away eight tens and complete my subtraction

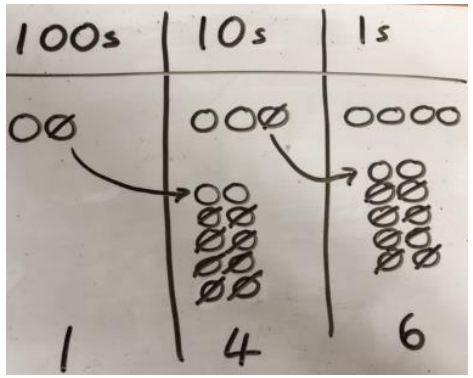


Calculations

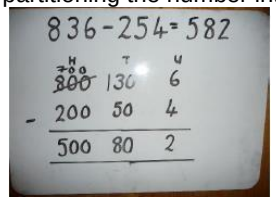
~~2~~1~~3~~4
- 88
146

Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.

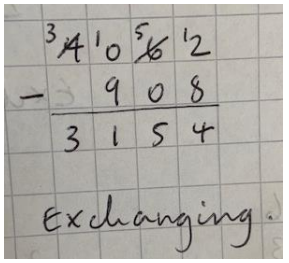
Represent the place value counters pictorially; remembering to show what has been exchanged.



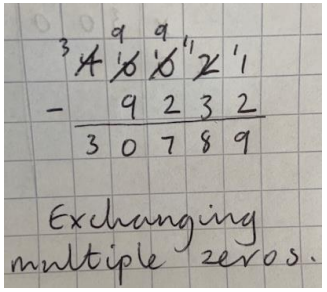
If needed, children can start their formal written method by partitioning the number into clear place value columns.



Moving forward the children use a more compact method.



This will lead to an understanding of subtracting any number including decimals.



Subtract Fractions

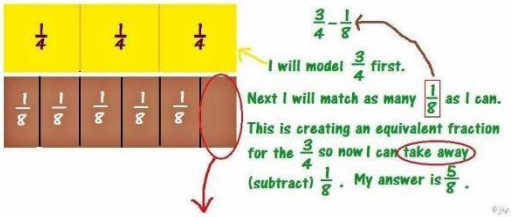
Year 4 - onwards

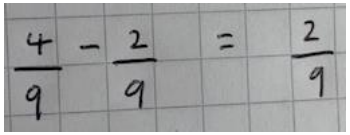
The cake has been divided into five slices. Each part is one fifth of the whole cake.

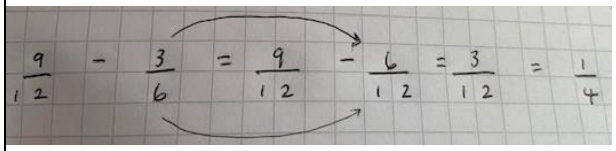
If there are five fifths and I eat one fifth, what fraction of the cake is left?

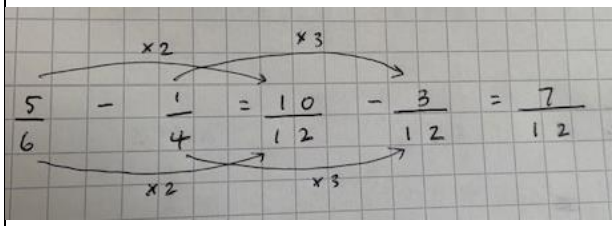
Draw a bar model to represent the cake.

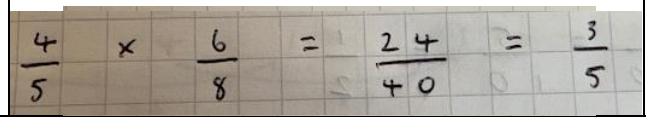
Progress onto subtracting fractions with different denominators.

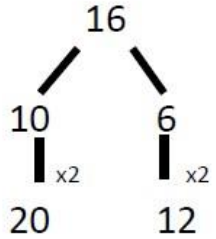


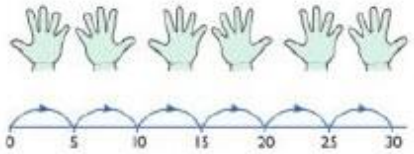
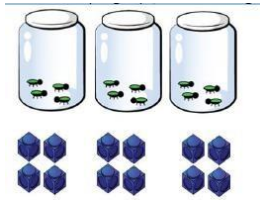
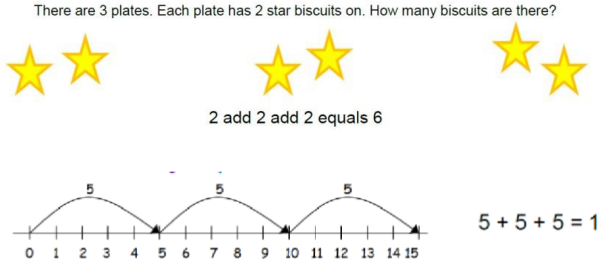
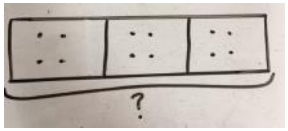


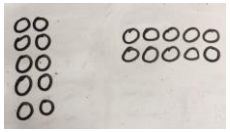
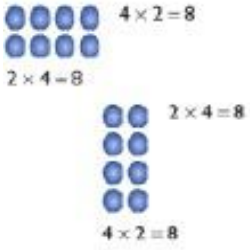
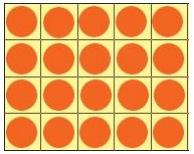
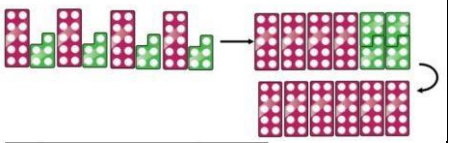
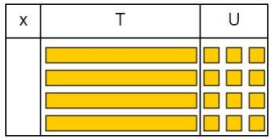
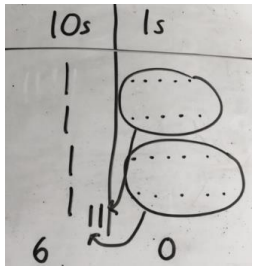


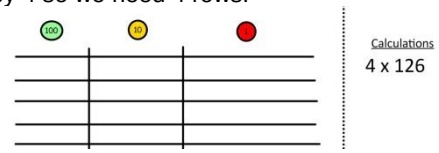
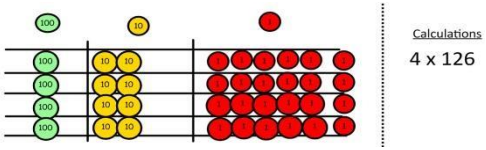
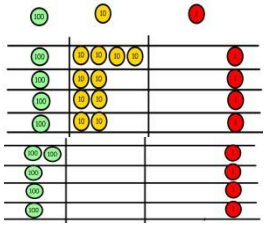
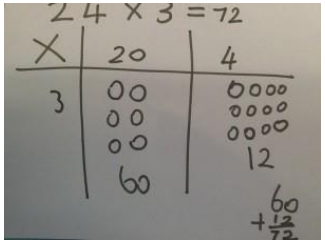
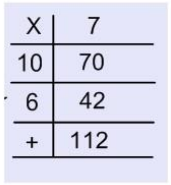
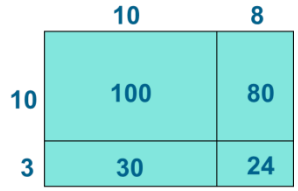
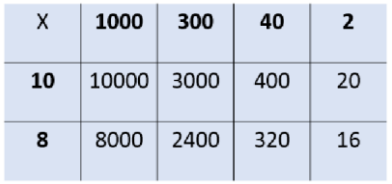
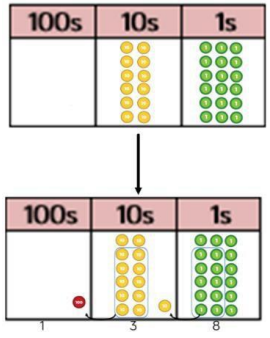
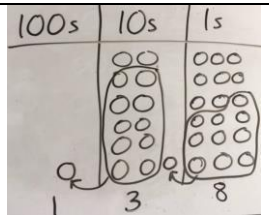
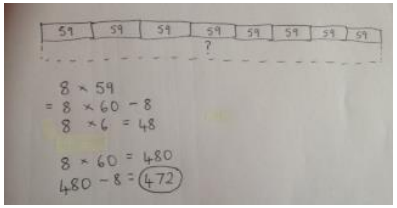
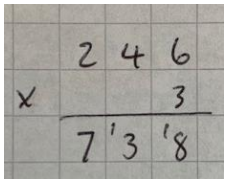
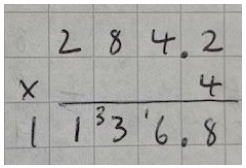




Progression in Multiplication				
Objective and Strategies	**Concrete** Build it	**Pictorial** Draw it	**Abstract** Solve it	**Vocabulary**
Doubling Year 1 – onwards	Use practical activities to show how to double a number.  Double 5 is 10. Two lots of five is 10. 5+5=10 5 x 2 = 10	Draw pictures to show how to double a number. Double 4 is 8 	Partition a number and then double each part before recombining it back together. 	X Double pairs Doubling Multiplication Multiply Multiplied by Multiple Common multiple Array Row

Counting in multiples Year 1 – onwards	Count in multiples supported by concrete objects in equal groups. 	Use a number line or pictures to continue support in counting in multiples.  	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30	column Number pattern Groups of Lots of Sets of Times Once, twice, three times…..twelve times Repeated addition How many altogether?
Repeated grouping - repeated addition Year 1 – onwards	Use different objects to add equal groups. 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and on a number line.  When confident, use a bar model.  	3 × 4 = 12 4 + 4 + 4 = 12	Multiplication table Multiplication fact Fact family partition Scaling Scaled up/down Scale factor ratio Times larger/smaller Factor

Arrays – showing commutative multiplication Year 1 - onwards	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.   Link arrays to area of rectangles. 	Use an array to write multiplication sentences and reinforce repeated addition.  15 = 3 × 5 5 × 3 = 15 3 + 3 + 3 + 3 + 3 = 15 15 = 5 + 5 + 5	Factor pair Product multiplier Inverse Square/squared Cube/cubed Commutative Short/long multiplication
Partition to multiply Year 3 - onwards	Use Numicon, base 10, place value counters 4 x 15  4 x 13 	Children to represent the concrete manipulatives pictorially. 	Children to be encouraged to show the steps they have taken. 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60	

	Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.  Fill each row with 126.  Add up each column, starting with the ones making any exchanges needed. 	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.  	Start with multiplying by one digit numbers:  Move forward, multiply by 2 digit number:   	
Column multiplication Year 4 - onwards	Children can continue to be supported by place value counters at the stage of multiplication  	 Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.  	  Decimal point stays in line.	

<table>
<tr>
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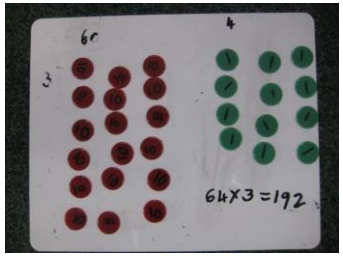

It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.
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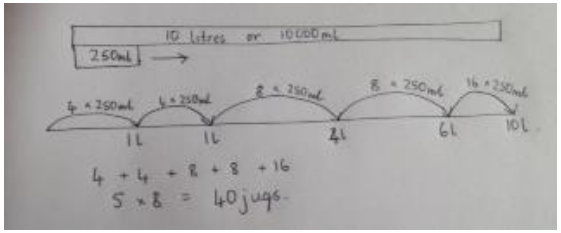

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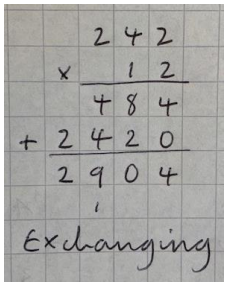

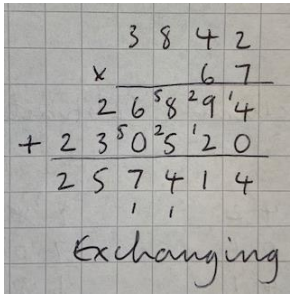

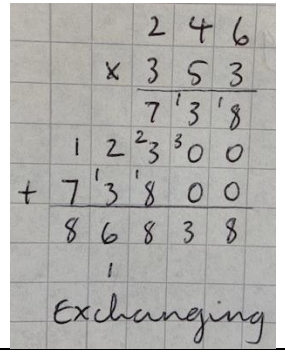

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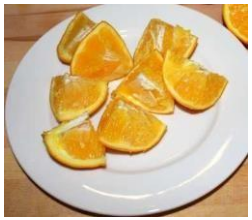
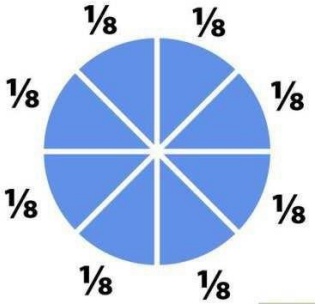
Multiplication of Fractions

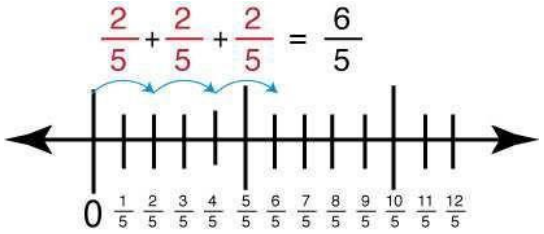
Year 5 - onwards

Count in fraction steps (repeated addition)

What would three lots of one eighth be?







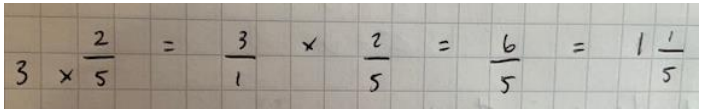
Use of bar model

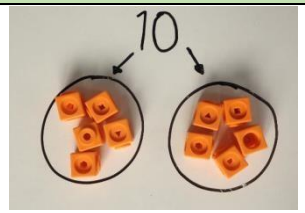
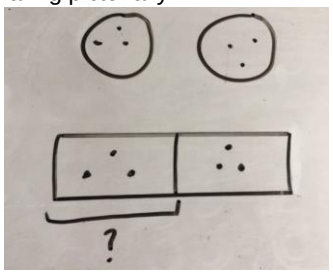
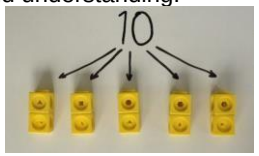
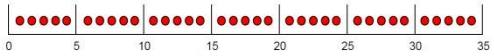
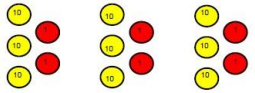
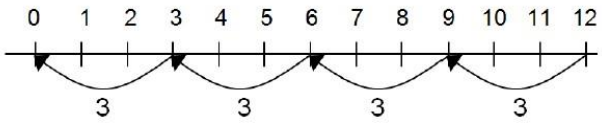
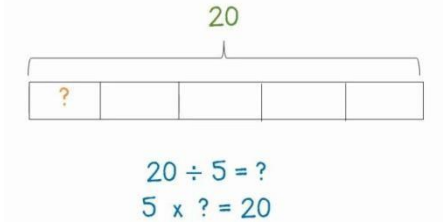
Three times one eighth

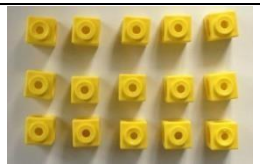
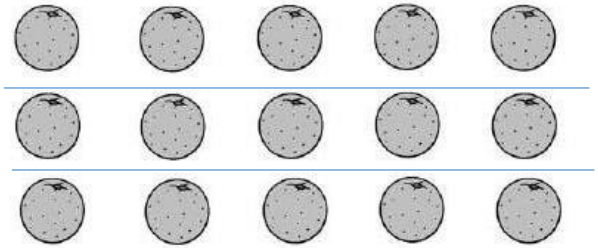
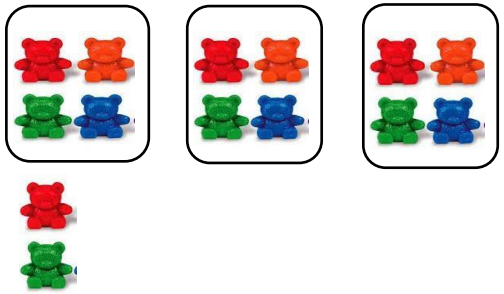
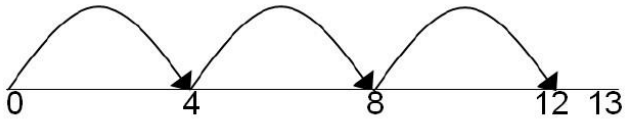
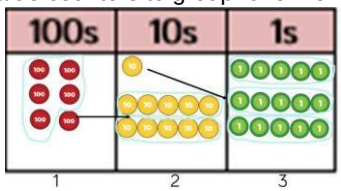
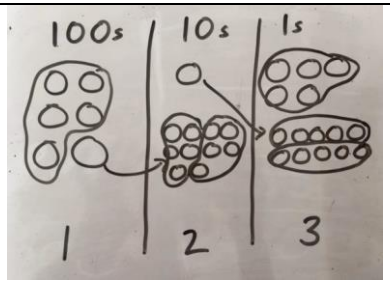
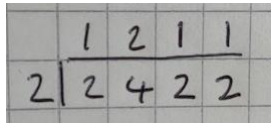
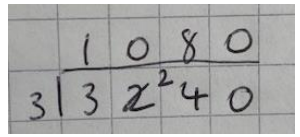
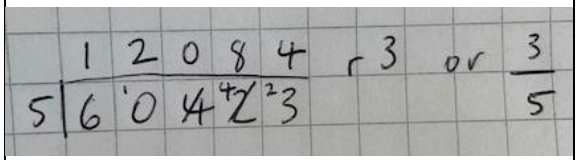
1/8	1/8	1/8					

10/8 = 1 2/8
9/8 = 1 1/8
/8 = 1
7/8
6/8 = ¾
5/8
4/8 = 1/2
3/8
2/8 = 1/4
1/8

Multiply the numerators together then multiply the denominators.



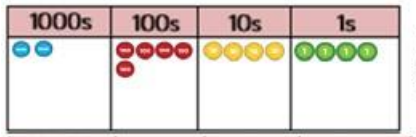
Progression in Division				
Objective and Strategies	**Concrete** Build it	**Pictorial** Draw it	**Abstract** Solve it	**Vocabulary**
Sharing objects in to groups Year 1 - onwards	 I have 10 cubes, can you share them equally in 2 groups? If we are dividing by 2 we are finding a half.	Represent sharing pictorially  	One half of 14 is 7 ½ of 14 = 7 14 ÷ 2 = 7 Share 9 buns between three people. 9 ÷ 3 = 3	÷ divided by divided into divisible by repeated subtraction grouping and sharing shared between share equally equal equal groups equal to groups of quotient divisor dividend remainder factor common factor factor pairs short division long division proportion fair fraction of percentage of
Division as grouping – repeated subtraction Year 1 - onwards	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.   96 ÷ 3 = 32 	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group.  	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?	

Division with arrays Year 1 - onwards	 Link division to multiplication by creating an array and thinking about the number sentences that can be created Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences (fact families). 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder Year 2 GD - onwards	14 ÷ 3 = Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find  a remainder. Draw dots and group them to divide an amount and clearly show a remainder. 	Complete written divisions and show the remainder using r. 
Short division Year 3 GD - onwards	Place value counters to group. 615 ÷ 5  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?		  

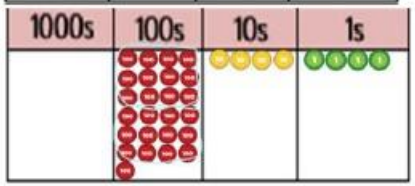
Long Division

Year 5 - onwards

Use place value counters
2544 ÷ 12

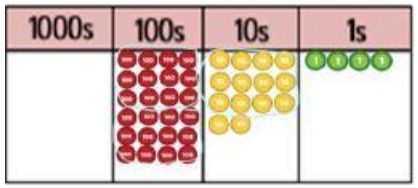


We can't group 2 thousands into groups of 12 so will exchange them.



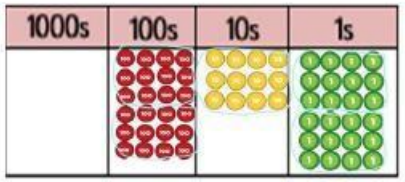
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

```
  02
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.

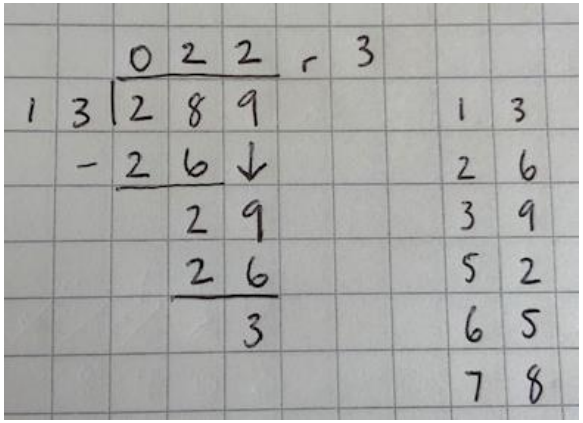
```
  021
12|2544
  24
   14
   12
    2
```

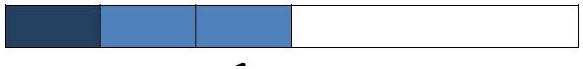
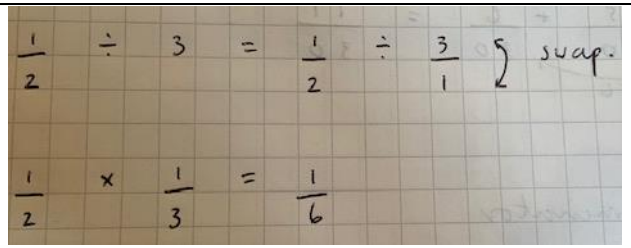
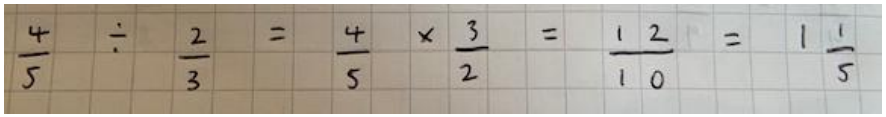


After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

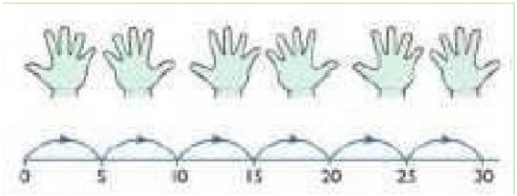
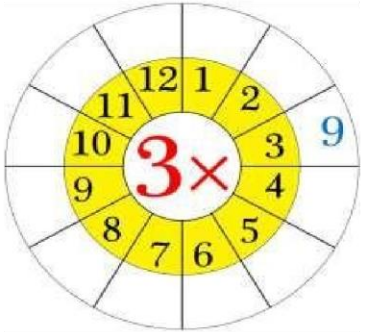
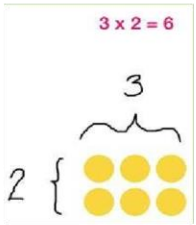
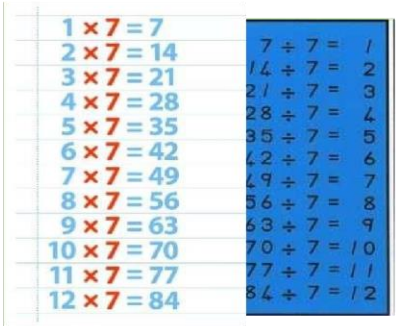
```
  0212
12|2544
  24
   14
   12
    24
    24
     0
```

Children to write a fact box to help them with the calculation.



Division of Fractions Year 5 - onwards	½ ÷ 3 =  Half of the pizza divided into three equal parts.	½ ÷ 3 =  Half of the bar divided into three equal parts.	 

Progression in Times Tables

Concrete - Children will be taught the concept of multiplication using practical resources.	**Pictorial** - Children will progress on to using number lines or pictures.	**Abstract 1** - Children will count in multiple steps.	**Abstract 2** - Children will recite times tables by rote. Links will be made with 'grouping' and division whilst times tables are being taught
Count in multiples supported by concrete objects in equal groups. 	 Use a number line or pictures to continue support in counting in multiples	Count in multiples of a number aloud. Use a counting stick. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10 15, 20, 25, 30	Recite times tables by rote orally. 3 times 3 equals 9 so 9 divided by 3 equals 3. One third of 9 equals 3. 
Use real-life arrays or build arrays.  	 	 Record multiplication number sentences. Link multiplication and division facts.	If you know 3 times 3 equals 9, what else do you know? 3 x 30 = 90 etc.

Year 2 – 2, 5, 10, (3) Year 3 – 3, 4, 8 Year 4 – 6, 7, 9, 11, 12