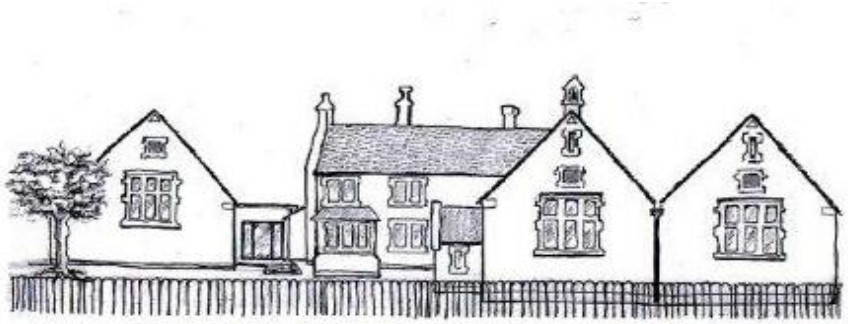
Whitminster C of E Primary School

Maths and Progression in Calculation Policy

December 2021



Why do we do mathematics at Whitminster?

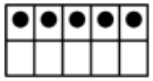
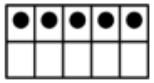
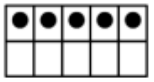
Our aim in maths is to **ensure that the children become fluent in the fundamentals, can reason mathematically** and can solve problems by applying their learning to varied situations with confidence. We want the children to see that maths is an interconnected subject, to make connections across the different areas to develop their fluency.

What does maths look like?

Through careful planning and preparation, we aim to ensure that throughout the school children are given opportunities for:

- √ practical activities and mathematical games
- √ problem solving
- √ individual, group and whole class discussions and activities
- √ open and closed tasks
- √ a range of methods of calculating eg. mental, pencil and paper and using a calculator
- √ working with computers as a mathematical tool

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	Dienes	Dienes	Dienes	Dienes	Dienes
		Place value counters	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	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes
			Cuisenaire rods	Cuisenaire rods	Cuisenaire rods	Cuisenaire rods
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 totaling 10 Number pairs totaling 20	Multiples of 10 totaling 100	Number pairs totaling 10 Multiples of 10 totaling 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 Vocabulary

This is our progression in vocabulary for all aspects of the primary maths curriculum. Only new vocabulary is listed for each year group.

	Numbers	Place Value	Addition	Subtraction	Multiplication	Division
EYFS	zero number one, two, three … to twenty and beyond teens numbers, eleven, twelve … twenty first, second, third… twentieth count, count (up) to, count on (from, to), count back (from, to) count in ones, twos, fives, tens is the same as more, less odd, even few pattern pair	ones the same number as, as many as more, larger, bigger, greater fewer, smaller, less fewest, smallest, least most, biggest, largest, greatest one more, ten more one less, ten less compare last, last but one before, after next between guess how many …? about the same as just over, just under too many, too few enough, not enough teens	number sentence add, more, and make total altogether double one more how many more to make …? how many more is … than …? how much more is …?	number sentence take away how many are left/left over? how many have gone? one less how many fewer is … than …? how much less is …? difference between	double doubling sets of pairs number patterns objects groups	half of halving share between sharing equal groups sets

	Numbers	Place Value	Addition	Subtraction	Multiplication	Division
Y1	twenty-one, twenty-two … one hundred numeral thirty forty fifty sixty seventy eighty ninety (one) hundred	digit number/ numeral same tens and ones more than/less than less most/least count from ... count in .... forwards/backwards number pattern odd even equal sign = greater than/ smaller than fewer/ fewest largest smallest least equal to many number bonds/pairs missing numbers estimate ordinal cardinal nearly close to	Add + addition sum total altogether double one more two (ten) more plus equals near double is the same as number bonds/pairs missing number count up	how many more? leave how many left? two less ten less how many fewer minus subtract subtraction count up count back	multiplication multiplied by multiply lots of groups of scaling twice times as ... array multiple count up	share into division dividing grouping count back unequal equal

	Numbers	Place Value	Addition	Subtraction	Multiplication	Division
Y2	two hundred … one thousand count on in 3s, tally twenty-first, twenty-second …	greater than, >
less than, <
equal (to), =
column
partition
most/greatest
number pattern
equivalent to
multiple of
compare
order	increase
tens boundary
commutative
partition
fact family
regrouping
partitioning
bridging
empty box
inverse
ten more
number bonds for 20
number bonds within 20	difference
between
equals
is the same as
minus
order
exchanging
partition
ten less
check
inverse	times table
multiplication
row
column
fact family
odd
even
commutative
multiplication fact
multiplication table
repeated addition
multiple of 2
multiple of 5
multiple of 10
multiply	array
inverse
divide, divided by,
divided into
left, left over
repeated subtraction

	Numbers	Place Value	Addition	Subtraction	Multiplication	Division
Y3	ones tens hundreds thousand three digit number tenths	exact position estimate decimal approximate descending ascending integer round represent ascending descending	100 more increase column digit columnar column addition mental method formal method adjusting estimate written method near double combine rounding empty box	100 less decrease exchanging number sentence calculate column subtraction estimate mental method formal method adjust empty box	missing number scaling multiplied by ... times larger/smaller product times table facts partition grid empty box positive integer	missing number times table remainder partition fact family inverse operation empty box
Y4	1 I 2 II 3 III 4 IV 5 V 6 VI 7 VII 8 VIII 9 IX 10 X 50 L 100 C 500 D 1000 M 4 digit number thousand ten thousand hundred thousand hundredths	Roman Numerals round negative convert positive factor factor pair multiple	decimal addition	decimal subtraction	factor factor pair compact method short multiplication distributive law	quotient divisor dividend factors

	Numbers	Place Value	Addition	Subtraction	Multiplication	Division
Y5	millions thousandths 5 and 6 digit number mixed number decimal fraction square number cube number prime number composite number decimals with 2 and 3 decimal places	prime common factor common multiple squared cubed integer decimal improper fraction mixed number percentage %	approximate	approximate	prime number composite number multiple common factor common multiple square number cube number squared, cubed long multiplication expanded method multiplier	compact short scale down test of divisibility
Y6	millions	sequence pattern term first term etc. rule proportion ratio power digital root	formula term order of operations mean brackets average	formula term order of operations brackets	approximate formula term order of operations precedence brackets degree of accuracy	brackets balance order of operations degree of accuracy

	Algebra
Y6	formulae linear sequence express unknowns equations equivalent expression number pattern express generate symbols variables enumerate

	Fractions	Decimals	Percentage	Ratio & proportion
EYFS	Share group			
Y1	half two quarters, quarter, three quarters equal parts equal groups quantity object one whole			
Y2	third equivalence			
Y3	fifth, sixth, seventh, eighth, ninth, tenth two thirds tenths divided by ten unit fraction numerator denominator equivalent fraction discrete set diagram add/subtract within one whole			
Y4	hundredth divided by 100 non- unit fraction common equivalent fractions	decimal equivalent decimal places rounding decimal point		

	Fractions	Decimals	Percentages	Ratio and Proportion
Y5	improper fraction mixed number proper fractions thousandths convert	decimal fraction nearest whole number	per cent symbol % number of parts per hundred percentage percentage equivalent	
Y6	simplest form	degree of accuracy		relative size quantity scale factor comparison ratio proportion unequal sharing unequal grouping similar shapes

	2-D Shape	3-D shape	Position and Direction	Angle	Coordinates
EYFS	square circle rectangle triangle side	cube cuboid sphere pyramid Face Vertices	in front behind on top of under above below next to		
Y1	pentagon hexagon edge corner pattern sort	cylinder square based pyramid triangular based pyramid face sort	underneath orientation left right	turn whole turn half a turn quarter of a turn three quarters of a turn	
Y2	vertices heptagon nonagon octagon decagon semi-circle line of symmetry vertical line reflection symmetry compare	vertices edges prism surface compare	clockwise anticlockwise rotation	right angle 90 degrees	

	2-D Shapes	3-D Shapes	Position and Direction	Angle	Coordinates
Y3	perpendicular line parallel line polygon diagonal axis of symmetry regular / irregular	nets base dimensions polyhedron	orientation horizontal line vertical line	greater than less than protractor	
Y4	geometric shapes quadrilateral tetragon (4 sided shape) trigon (3 sided shape) kite trapezium rhombus (lozenge) parallelogram isosceles triangle scalene triangle equilateral triangle dodecagon hendecagon dissect classify breadth width		translation congruent oblique	acute obtuse degrees	first quadrant coordinate points
Y5	regular polygon irregular polygon bisect congruent dimension quindecagon rotational symmetry		adjacent intersection rotational	reflex base angles interior exterior	
Y6	radius diameter circumference		enlargement equidistant		fourth quadrants positive negative

	Money	Time	Length and Height	Weight and Mass	Volume/capacity	Area and perimeter
EYFS	coin note one pence	quicker slower before after next first today morning afternoon evening clock Monday Tuesday Wednesday Thursday Friday Saturday Sunday	long short tall/ short longest shortest	heavy light	full empty more less	

	Money	Time	Length/Height	Mass/Weight/Temperature	Capacity/Volume	Area and perimeter
Y1	pound pence 2p,5p,10p	long hand short hand hour o'clock half past half hour months of the year quicker than slower than quickest quicker than slower than slowest tomorrow yesterday day week month year minute second calendar chronological order tell the time	longer than shorter than taller than smaller than double/half ruler tape measure metre stick trundle wheel scale	heavier than lighter than hot cold hotter than colder than temperature thermometer scales scale	half full half empty more than less than quarter half jug measuring cylinder scale	
Y2	20p,50p,£1,£2,£5,£10 total cost change	minute hand hour hand quarter past quarter to 5 past, 10 past,20 past, 25 past 5 to , 10 to , 20 to, 25 to 24 hours in a day	standard unit cm metre half a metre quarter of a metre estimate measure length	standard unit kilogram half a kilogram quarter of a kilogram grams degrees positive/negative estimate measure	standard unit litre half a litre quarter of a litre estimate measure millilitre measuring vessel	

	Money	Time	Length/Height	Mass/Weight/Temperature	Volume/Capacity	Area/Perimeter
Y3	decimal notation of money	12 hour 24 hour decade leap year century noon midnight am pm Roman numerals Estimate duration	metric millimetre kilometre perimeter breadth width convert	metric convert difference	metric convert	centimetre perimeter millimetre metre
Y4		analogue digital 24 hour				area square centimetres rectilinear shape counting
Y5			imperial inches feet approximate	imperial pounds ounces stones approximate	imperial pints approximate cuboids cubic centimetres	standard units square metres
Y6			miles		formulae cubic kilometres cubic millimetres	formulae

	Statistics
EYFS	chart tally
Y1	tally chart pictogram sort
Y2	block graph / bar charts venn diagram carroll diagram table category total compare scale calendar How many more? How many fewer?
Y3	axis interpret key subset timetable information graph
Y4	discrete data continuous data time graphs comparison sum difference
Y5	frequency chart line graph
Y6	mean median mode average pie chart scatter graph

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

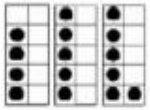
Ultimately children need to realise that when objects are rearranged the number of them stays the same.

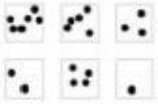
End of year counting expectations

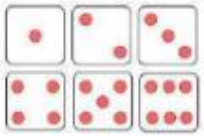
- count reliably to 20
- count reliably up to 10 everyday objects
- estimate a number of objects then check by counting
- use ordinal numbers in context e.g. first, second, third
- count in twos, fives and tens
- order numbers 1-20
- say 1 more/ 1 less than a given number to 20

Subitising ideas

Provide children with opportunities to count by recognising amounts







Abstraction ideas

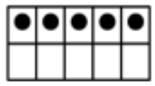
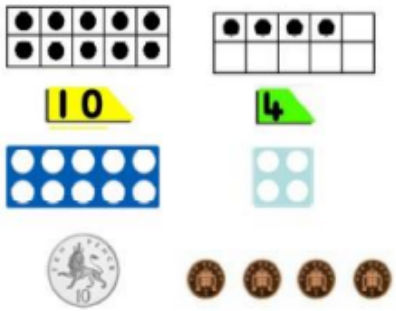
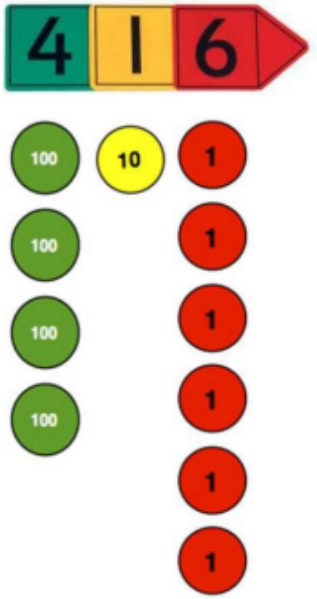
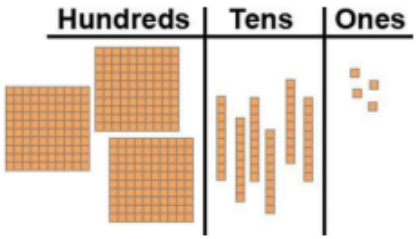
How many pigs are in this picture?

Provide children with a variety of objects to count

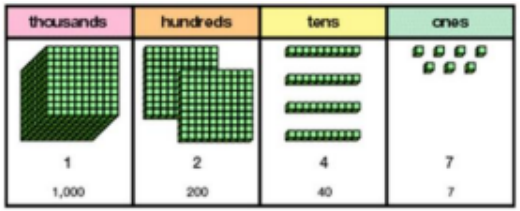
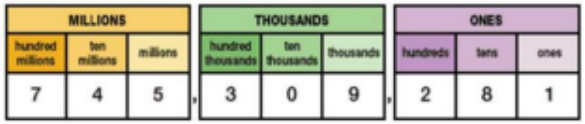
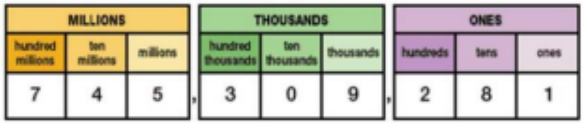
Conservation of number

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

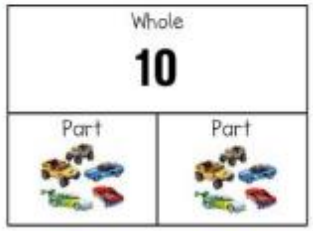
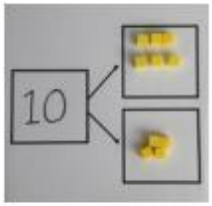
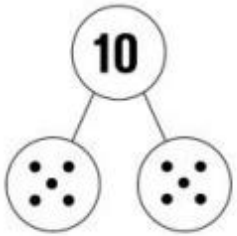
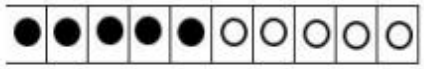
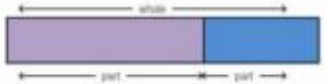
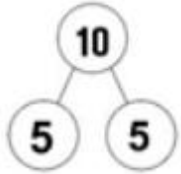
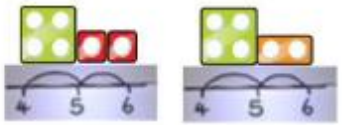
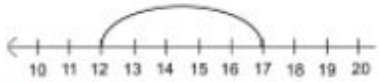
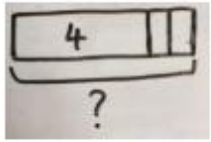
Progression in the teaching of place value

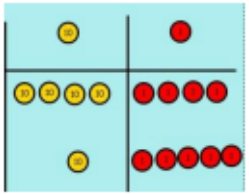
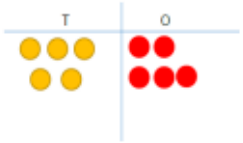
Foundation Understanding ten	Y1 Understanding numbers up to 20	Y2 Understanding numbers up to one hundred	Y3 Understanding numbers up to one thousand
Use ***tens frames*** flash cards daily to ensure children recognise amounts. Use empty ***tens frames*** to fill with counters to enable children to understand 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 

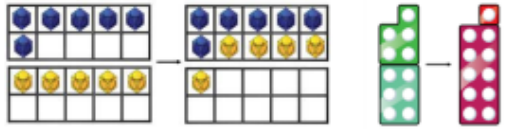
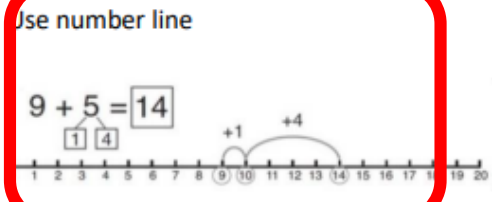
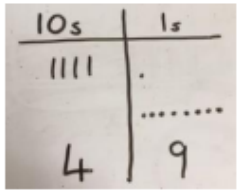
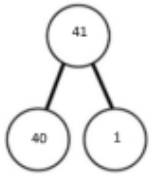
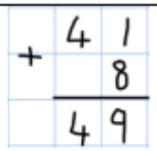
Progression in the teaching of place value

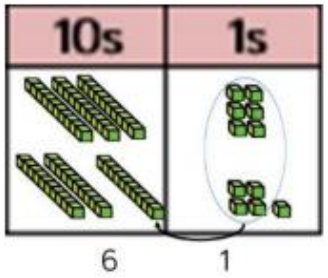
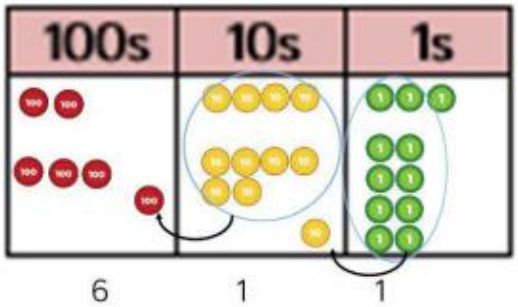
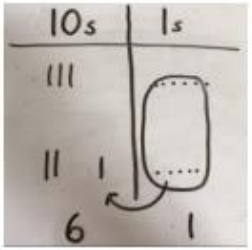
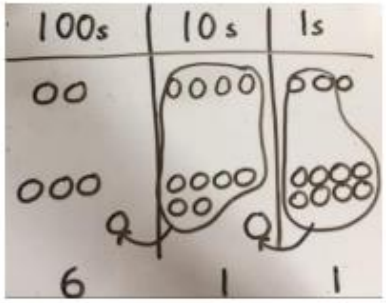
Y4 Understanding numbers up to ten thousand	Y5 Understanding numbers up to one million including decimals	Y6 Understanding numbers beyond one million including decimals
Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters • Dienes blocks • Gattegno Charts  	Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters (including decimal counters) • Dienes blocks • Gattegno Charts  	Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters (including decimals counters) • Dienes blocks • Gattegno Charts 

Progression in Addition

Objective and Strategies	Concrete Build it	Pictorial Draw it	Abstract Solve it
Combining two parts to make a whole: part-whole model	   Counters represent real-life objects.  Use cubes to add two numbers together as a group or in a bar. 	   Part + Part = Whole Whole – Part = Part	 5 + 5 = 10 10 = 5 + 5 Five is a part, 5 is a part and the whole is 10.
Counting on using a number line	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 

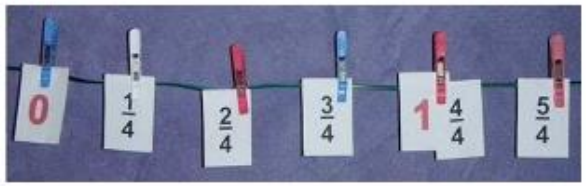
Column method- no regrouping	 43 + 26 _____ Use Dienes to add tens and ones before moving on to place value counters. 	After practically using the base 10 blocks and place value counters, children can draw the counters/Dienes to help them to solve additions. 	Calculations 21 + 42 = 21 + 42	

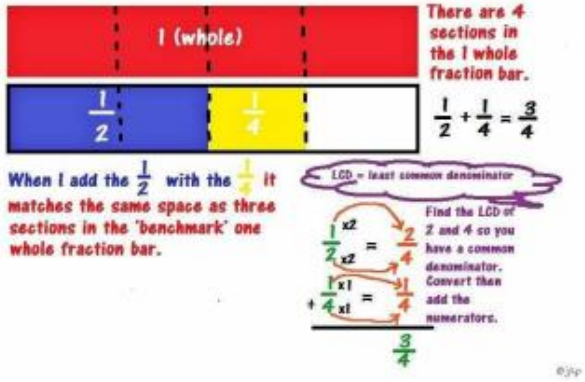
Regrouping to make 10	Using ten frames and counters/cubes alongside Numicon 6 + 5 	Children to draw tens frame and counters. Use number line  	7 + 4 = 11 If am I at seven, how many more do I need to make 10? (Partitioning of numbers is a key skill) How many more do I add on now?	
TO + O	Continue to develop 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  	

Column method- regrouping	 When there are 10 ones in 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. 	Looking for ways to make 10. 36 + 25= 1 5 30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 Formal method: 36 +25 61 1 243 +368 611 1 1 As the children move on, introduce decimals with the same number of decimal places. 72.8 + 54.6 127.4 1 1 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	

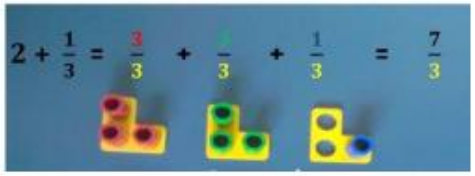
Add Fractions

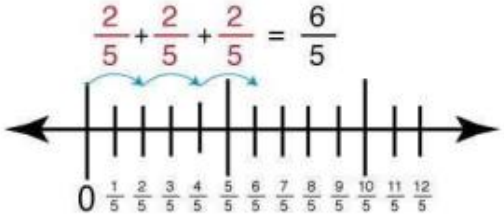
Count in fraction steps using real objects and a number line.





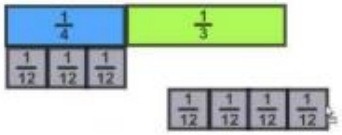
Use Numicon to add fractions.





Use the bar model to add fractions.

$\frac{1}{4} + \frac{1}{3}$



$\frac{1}{4} + \frac{1}{3} =$

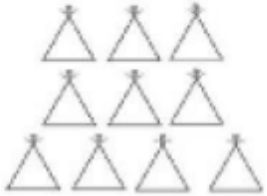
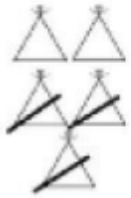
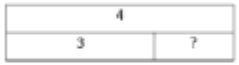
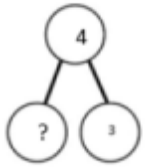
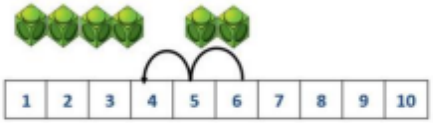
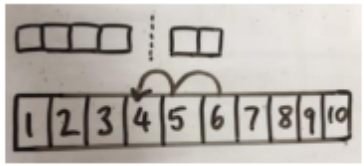
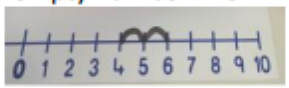
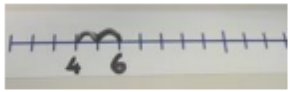
$\frac{1 \times 3}{4 \times 3} + \frac{1 \times 4}{3 \times 4}$

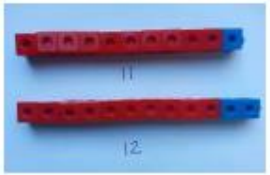
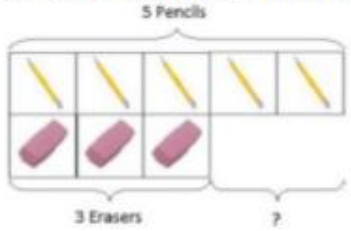
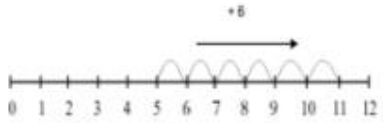
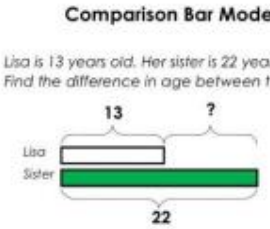
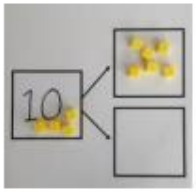
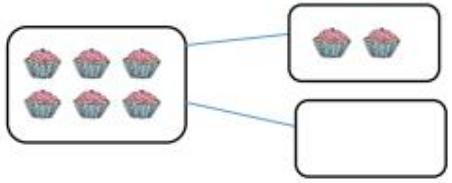
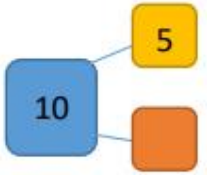
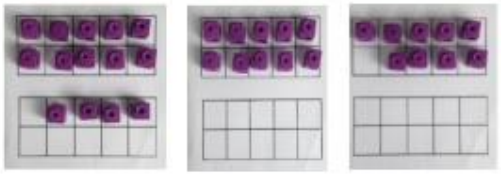
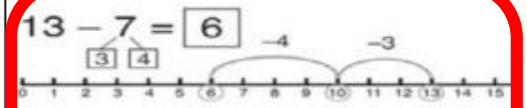
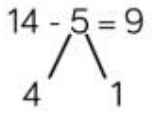
$\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$

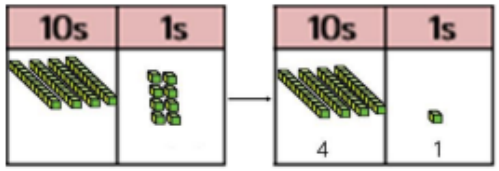
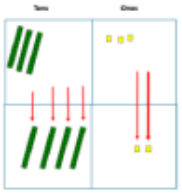
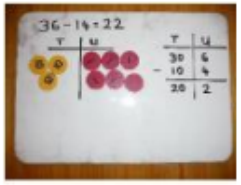
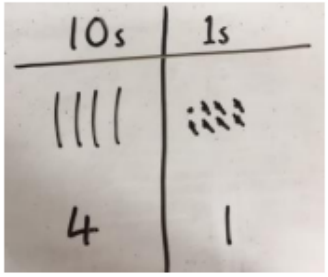
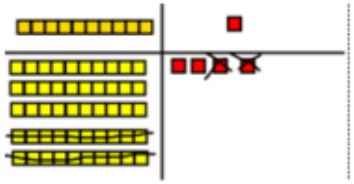
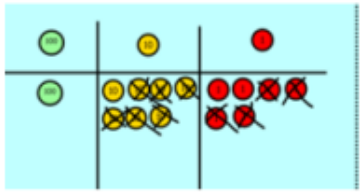
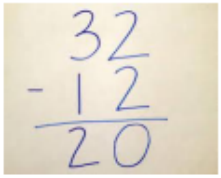
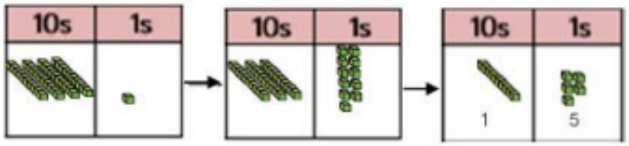
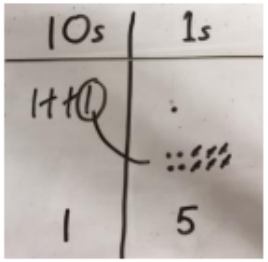
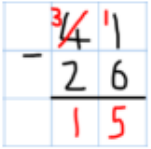
$\frac{1}{3} + \frac{1}{2}$ x3

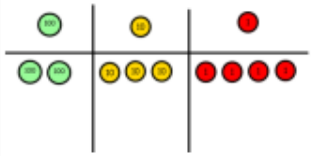
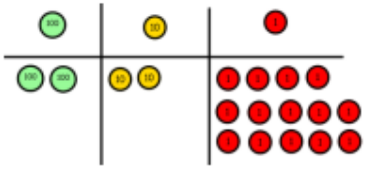
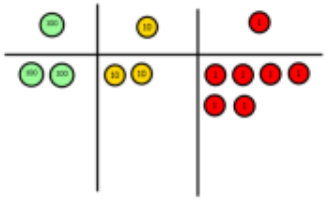
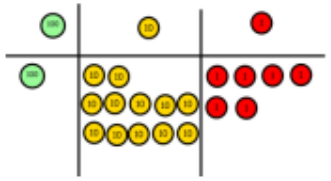
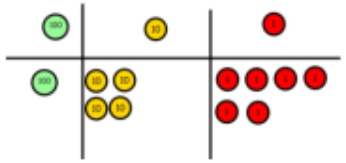
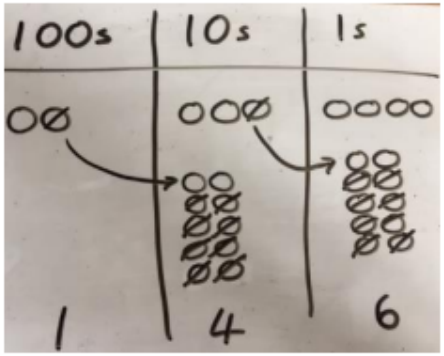
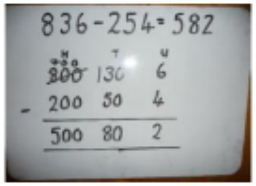
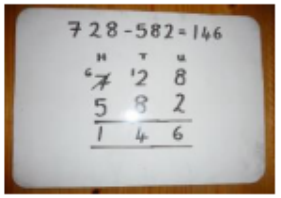
$\frac{2}{6} + \frac{3}{6} = \frac{5}{6}$

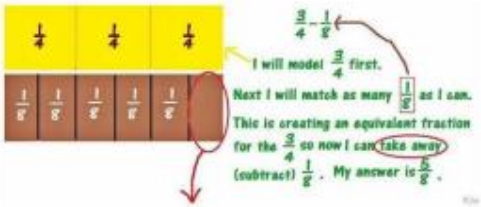
Progression in Subtraction

Objective and Strategies	Concrete Build it	Pictorial Draw it	Abstract Solve it
Taking away ones	Use physical objects, counters, cubes etc. to show how objects can be taken away.  6 – 2 = 4   	Cross out drawn objects to show what has been taken away.   15 – 3 = 12	4- 3 = □ = 4 – 3  
Counting back using number lines or number tracks	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.  

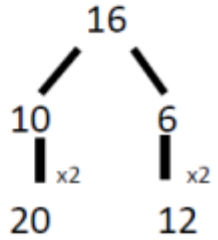
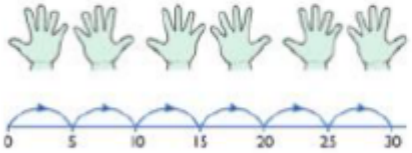
Find the difference	Compare amounts and objects to find the difference. Use cubes to make bars to find the difference.  Use basic bar models with items to find the difference 	Count on to find the difference.  Draw bars to find the difference between 2 numbers. 	Find the difference between 8 and 5. 8 – 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	 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.	
Make 10	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?	

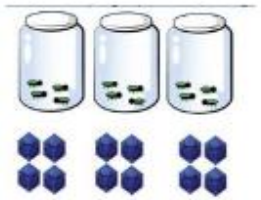
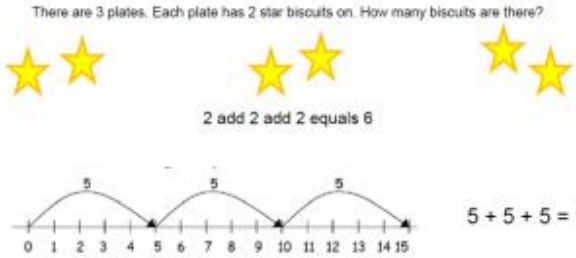
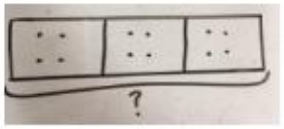
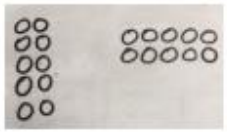
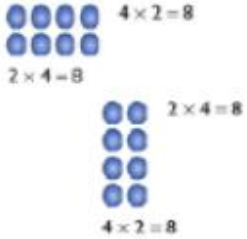
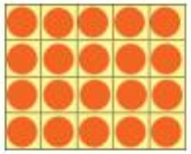
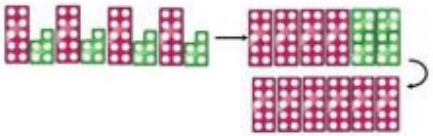
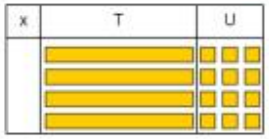
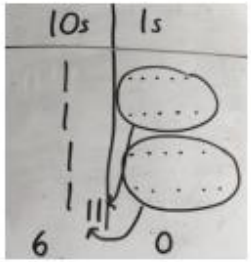
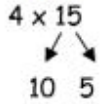
Column method without exchanging	48-7  **2 digit – 2 digit** Use Base 10 to make the bigger number then take the smaller number away.  Show how you partition numbers to subtract. Again make the larger number first.  	Children to represent the base 10 pictorially.   	Column method ***Note – children should 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.	41 – 26  	Represent the base 10 pictorially, remembering to show the exchange.  	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11.  	

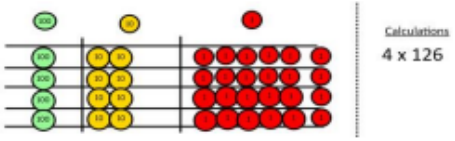
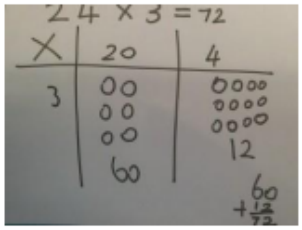
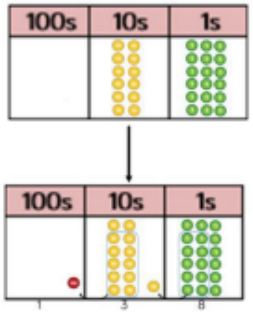
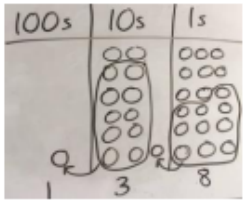
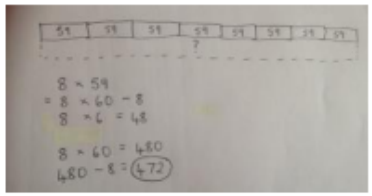
Column method using place value counters.	234 – 88 Make the larger number with the place value counters  Calculations 234 - 88 Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.  Calculations 234 - 88 Now I can subtract my ones.  Calculations 234 - 88 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. 5 12 1 2 ~~6~~ ~~3~~ . 0 - 2 6 . 5 2 3 6 . 5	

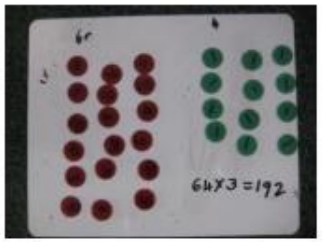
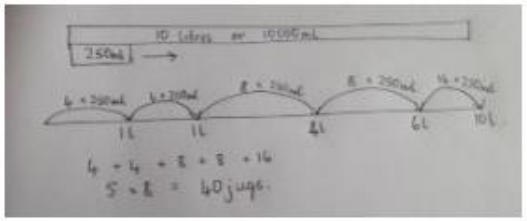
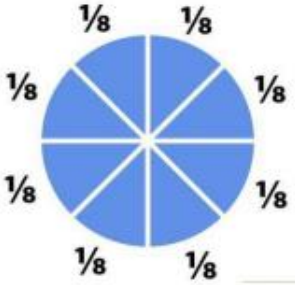
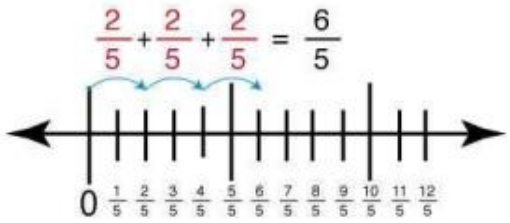
Subtract Fractions	 The cake has been divided into five slices. Each part is one fifth of the whole cake. If there are five fifths and I eat one fifth, what fraction of the cake is left?	Draw a bar model to represent the cake.  Progress onto subtracting fractions with different denominators. 	$\frac{5}{5} - \frac{1}{5} = \frac{4}{5}$ $\frac{3}{4} - \frac{1}{8} =$ $\frac{3x2}{4x2} - \frac{1}{8}$ $\frac{6}{8} - \frac{1}{8} = \frac{5}{8}$	
			X2 $\left(\frac{2}{3} - \frac{1}{2}\right)$ x3 $= \frac{1}{6}$ $\left(\frac{4}{6} - \frac{3}{6}\right)$	

Progression in Multiplication

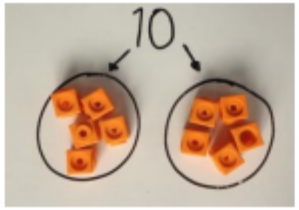
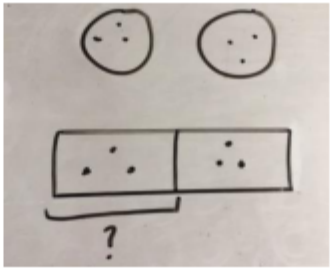
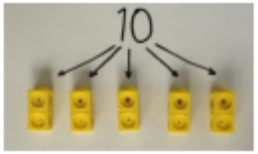
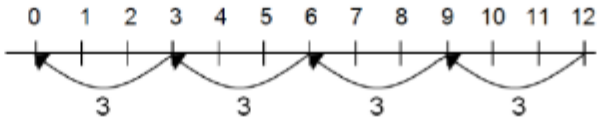
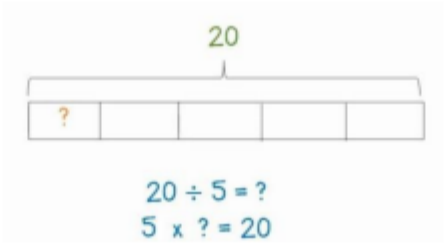
Objective and Strategies	Concrete Build it	Pictorial Draw it	Abstract Solve it
Doubling	Use practical activities to show how to double a number.  Double 5 is 10. 5 x 2 = 10	Draw pictures to show how to double a number. Double 4 is 8 	Partition a number and then double each part before recombining it back together. 
Counting in multiples	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

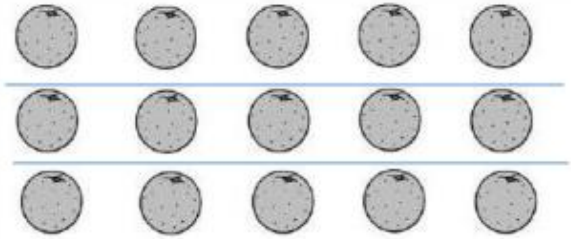
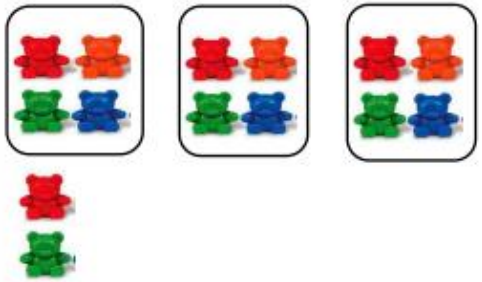
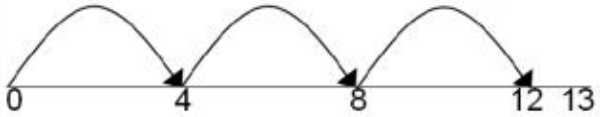
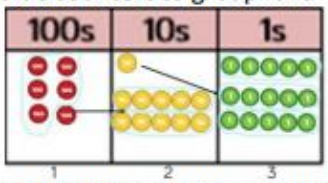
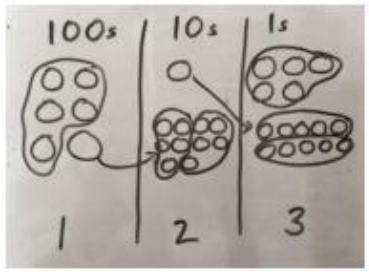
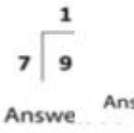
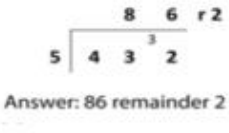
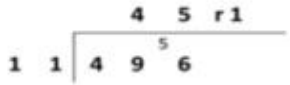
Repeated grouping - repeated addition	Use different objects to add equal groups. 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and on a number line.  5 + 5 + 5 = 15 When confident, use a bar model. 	3 × 4 = 12 4 + 4 + 4 = 12
Arrays – showing commutative multiplication	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
Partition to multiply	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.  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: X | 7 10 | 70 6 | 42 + | 112 Move forward, multiply by 2 digit number: 10 | 8 10 | 100 | 80 3 | 30 | 24 X | 1000 | 300 | 40 | 2 10 | 10000 | 3000 | 400 | 20 8 | 8000 | 2400 | 320 | 16	
Column multiplication	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.  	16 x 7 112 1 4 1 8 × 1 3 1 8 0 5 4 2 3 4	

	 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.	 	1 2 1 2 4 × 2 6 2 4 8 0 7 4 4 3 2 2 4 1 1 Answer: 3224	0.2 X 1 5
Multiplication of Fractions	Count in fraction steps (repeated addition) What would three lots of one eighth be?    	Use of bar model Three times one eighth  $^{10}/_{8} = 1\,^{2}/_{8}$ $^{9}/_{8} = 1\,^{1}/_{8}$ $^{8}/_{8} = 1$ $^{7}/_{8}$ $^{6}/_{8}$ $^{5}/_{8}$ $^{4}/_{8} = ^{1}/_{2}$ $^{3}/_{8}$ $^{2}/_{8} = ^{1}/_{4}$ $^{1}/_{8}$	Multiply the numerators together then multiply the denominators. $3 \times {}^{1}/_{8} =$ $\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$	

Progression in Division

Objective and Strategies	Concrete Build it	Pictorial Draw it	Abstract Solve it
Sharing objects in to groups	 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
Division as grouping – repeated subtraction	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?

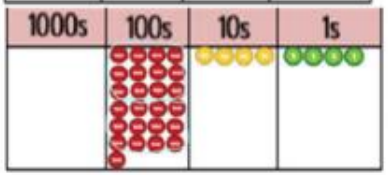
Division with arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse 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	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	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?		98 ÷ 7 be Answe  432 ÷ 5 becomes  Answer: 86 remainder 2 496 ÷ 11 becomes  Answer: 45 $\frac{1}{11}$

Long Division

Use place value counters

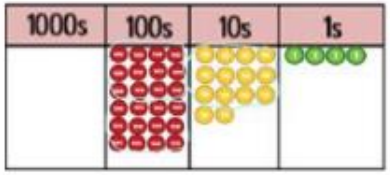
2544 ÷ 12

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



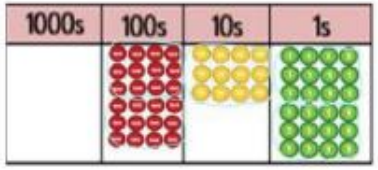
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$\begin{array}{r} 02 \\ 12\overline{)2544} \\ 24 \\ \hline 1 \end{array}$$



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

$$\begin{array}{r} 021 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$$



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

$$\begin{array}{r} 0212 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$$

432 ÷ 15 becomes

$$\begin{array}{r} 28\ \text{r}\ 12 \\ 15\overline{)432} \\ 300 \\ \hline 132 \\ 120 \\ \hline 12 \end{array}$$

Answer: 28 remainder 12

432 ÷ 15 becomes

$$\begin{array}{rl} 28 & \\ 15\overline{)432} & \\ 300 & 15\times 20 \\ \hline 132 & \\ 120 & 15\times 8 \\ \hline 12 & \end{array}$$

$\frac{12}{15} = \frac{4}{5}$

Answer: $28\frac{4}{5}$

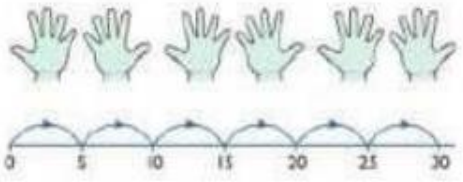
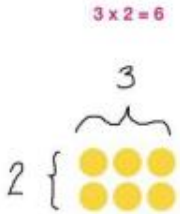
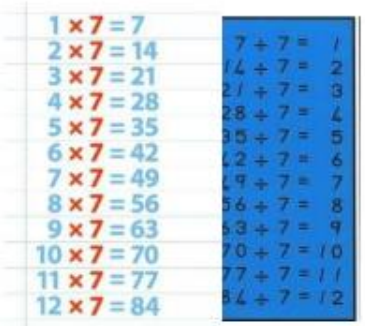
432 ÷ 15 becomes

$$\begin{array}{r} 28\cdot 8 \\ 15\overline{)432\cdot 0} \\ 300 \\ \hline 132 \\ 120 \\ \hline 120 \\ 120 \\ \hline 0 \end{array}$$

Answer: 28·8

Division of Fractions	½ ÷ 3 =  Half of the pizza divided into three equal parts.	½ ÷ 3 =  Half of the bar divided into three equal parts.	½ ÷ 3 = ½ ÷ $^{3}/_{1}$ = ½ x $^{1}/_{3}$ = $^{1}/_{6}$	

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.