

Symbols and Vocabulary

+

add
plus
sum
total
more
altogether

-

take-away
subtract
minus
less

X

multiply
times
lots of

÷

divide
share

=

Equals

This policy shares the core strategies used in our schools to teach calculation from Reception through to Year Six. Representations in **bold** identify the first time the children would have been exposed to it. Other representations can also be used to further support the teaching of key concepts, these are found in the **White Rose Scheme of Learning** at the start of each block as well as the **White Rose Slides**.

The core strategies are progressive, starting with concrete methods, moving through pictorial and then abstract. Each time a new skill is taught, concrete methods will help the children to embed the skill. As children progress at different rates, some children may need to use strategies from previous year groups. It is good practise to continue to visit prior representations. Use the small steps outlined in the **White Rose** planning to build up these skills.

Eventually, we want our children to be able to select an efficient method of their choice (concrete, pictorial or abstract) that is appropriate for a given task.

Helpful Hooks



There are ten **chewits** in a packet. This is a useful way of introducing place value, and the relationship between ten ones and one ten. When more ones are needed to solve a problem, you can **open a packet** of tens to use the ten ones.

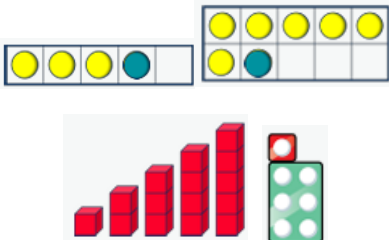
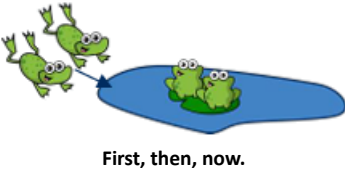
To help understand the role of equals, an **equals mountain** can be used to help show that both sides of the mountain need to equal the same amount, otherwise the calculation will 'tip over'.

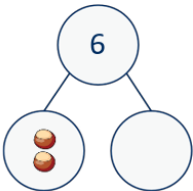
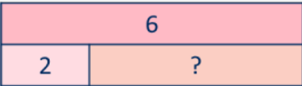
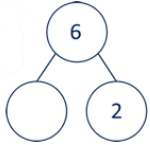
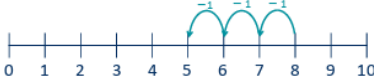
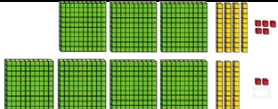
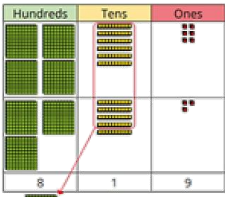
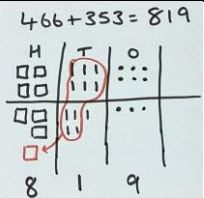


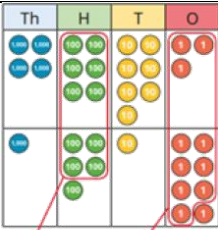
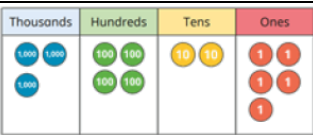
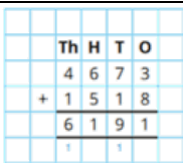
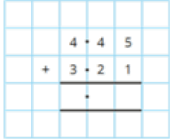
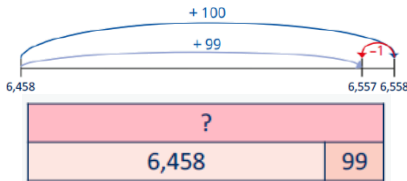
To help children understand the role of X, it can be introduced as 'lazy multiply', when you add the same number over and over, it 'gets tired' and falls on its side, turning into a multiply.

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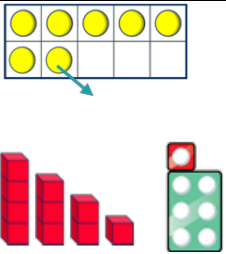
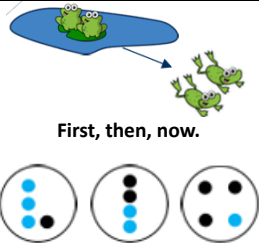
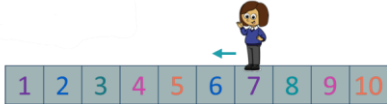
Addition

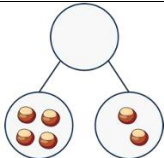
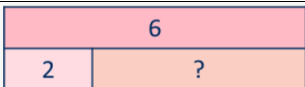
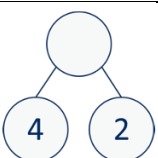
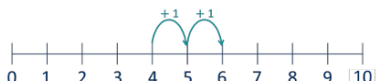
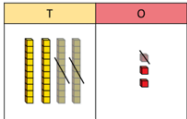
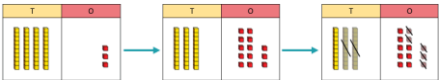
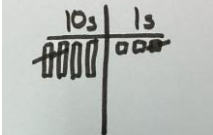
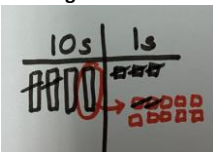
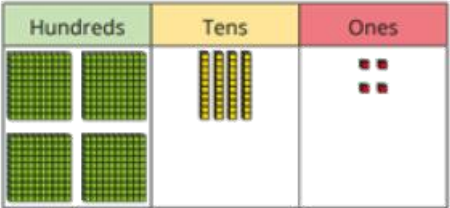
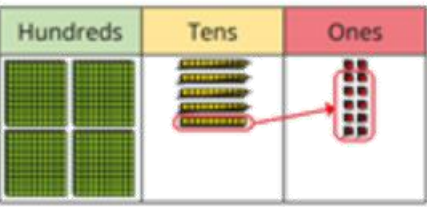
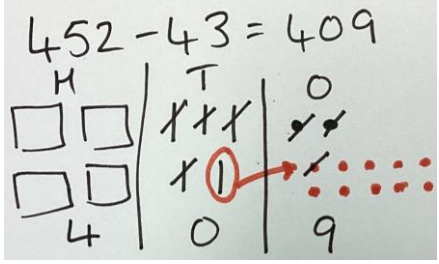
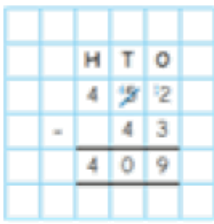
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Reception		 First, then, now.  Subitise to notice parts that make a whole	Introduce + and =  Number tracks	___ and ___ make ___. I have ____. I add ____ more. Now I have ____. First ____ then ____ now ____.

	Use of five frame , ten frame , Numicon and other manipulatives.	Plus pictorial versions of concrete representations.		
Year One	Continue with the manipulatives used in Reception, plus:  Part-whole model	 Pictorial versions of a five frame and ten frame.  Bar model to introduce missing number problems.	Introduce number sentences e.g. $6-2=4$  Part-whole model  Number line	This is a part. This is a part. This is the whole. One part is _____. One part is _____. The whole is _____.
Year Two	 Base 10 when not bridging  Base 10 when bridging	 Drawing tens and ones when not bridging. Drawing tens and ones when bridging (make ten).	Partition tens and ones. $43 + 21 =$ $40 + 20 = 60$ $3 + 1 = 4$ $60 + 4 = 64$ Partition tens and ones. $45 + 37 =$ $5 + 7 = 12$ $12 = 10 + 2$ $40 + 30 + 10 = 80$ $80 + 2 = 82$	First I partition the ____ into ____ and ____. ____ plus ____ is equal to ____.
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Year Three	 Base 10 when not bridging  Base 10 when bridging	 Drawing hundreds, tens and ones when not bridging. Drawing hundreds, tens and ones when bridging (bonds to 100)	 no exchange one exchange two exchanges Column method	There are ____ hundreds, ____ tens and ____ ones. ____ tens plus ____ tens is equal to ____ tens. The tens column will increase by ____.

Year Four	 Place Value Counters	 Understanding pictorial representation of counters.	 Continue column method with four-digit numbers.	___ ones added to ___ ones is equal to ___ ones. ___ added to ___ is equal to ___. I have ___ hundreds, so I do/do not need to make an exchange.
Year Five	No new concrete methods introduced.	 Continue with pictorial representation of place value counters.	 Continue column method with decimal numbers.  Drawn methods to help understand mental strategies.	In column addition, we start from the place value column that has the ___ value. There are not enough __, so I need to exchange 1 __ for 10 __.
Year Six	No new concrete methods introduced. Consolidate Previous Strategies	No new pictorial methods introduced. Consolidate Previous Strategies	Continue with drawn methods to help understand mental strategies.	In column addition, we start with the ___ place value column. The is in the ___ column. It represents ___.

Subtraction

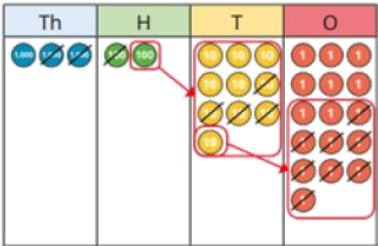
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Reception	 Use of five frame, ten frame, Numicon and other manipulatives.	 First, then, now. Subitise to notice parts that make a whole Plus pictorial versions of concrete representations.	Introduce - and =  Number tracks	I have ____. I take ____ away. Now I have ____. First ____ then ____ now ____.
Year One	Continue with the manipulatives used in Reception, plus:	 Pictorial versions of a five frame and ten frame.	Introduce number sentences e.g. 5+2=7	___ is the whole. ___ is a part. ___ is a part. ___ minus ___ is equal to ___

	 Part-whole model	 Bar model to introduce missing number problems.	 Part-whole model  Number line	___ less than ___ is ___.
Year Two	 Base 10 when not bridging  Base 10 when bridging	 Drawing tens and ones when not bridging.  Drawing tens and ones when bridging (make ten).	Partition tens and ones. $43 - 21 =$ $40 - 20 = 20$ $3 - 1 = 2$ $20 \text{ and } 2 = 22$ Partition tens and ones. $43 - 25 =$ 3 - 5 (I need to exchange 1 ten for 10 ones) so $13 - 5 = 8 \text{ ones}$ 4 tens 3 tens - 2 tens = 1 ten 1 ten and 8 ones = 18	I need to exchange 1 ten for 10 ones. The whole is _____. I subtract one part that is _____. The other part is _____.
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Year Three	 Base 10 when not bridging  Base 10 when bridging		 Column Method with hundreds, tens and ones.	There are ___ hundreds, ___ tens and ___ ones. ___ tens minus ___ tens is equal to ___ tens. The tens column will decrease by _____.

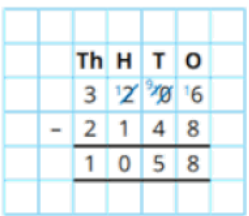
Year Four



Place Value Counters for exchanging practically.



Place Value Counters for exchanging.



Column Method with hundreds, tens and ones.

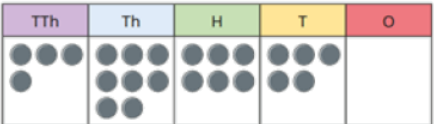
Flexible Partitioning

___ ones added to ___ ones is equal to ___ ones.

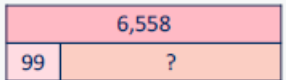
___ added to ___ is equal to ___.

I have ___ hundreds, so I do/do not need to make an exchange.

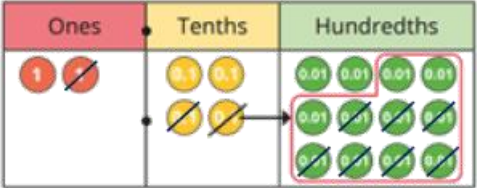
Year Five



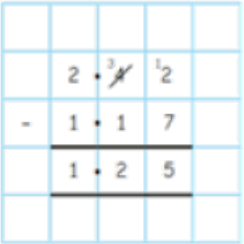
Place Value Counters without units written.



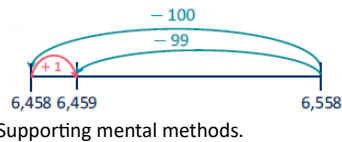
Bar Model for exposure



Place Value Counters to exchange with decimals.



Column Method with decimal places.



Supporting mental methods.

In column subtraction, we start from the place value column that has the ___ value.

There are not enough ___, so I need to exchange 1 ___ for 10 ___.

Year Six

No new concrete methods introduced.
Consolidate Previous Strategies

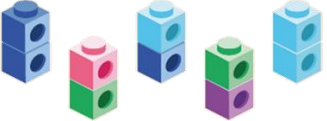
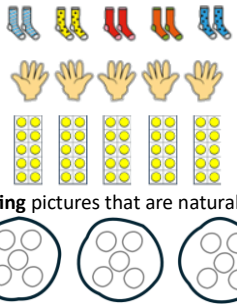
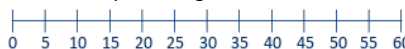
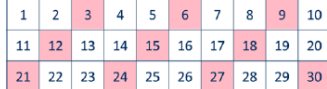
No new pictorial methods introduced.
Consolidate Previous Strategies

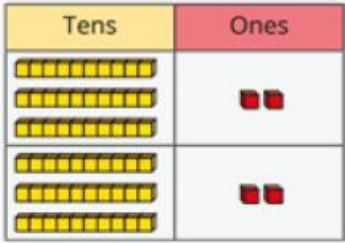
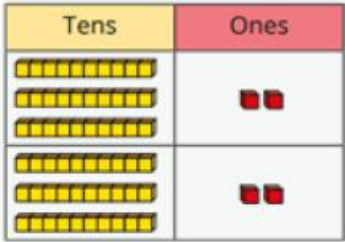
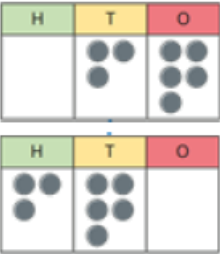
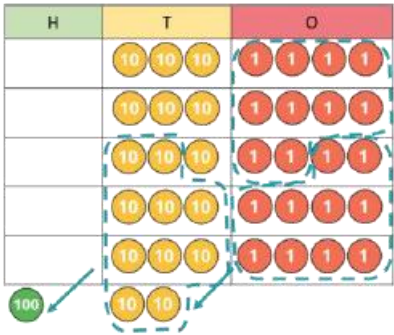
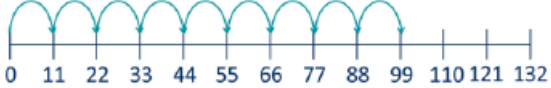
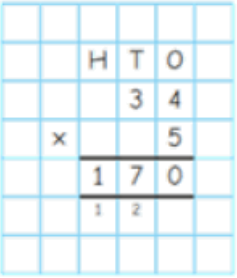
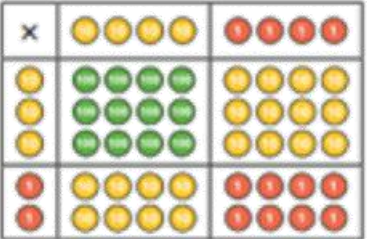
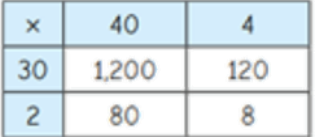
Continue with drawn methods to help understand mental strategies.

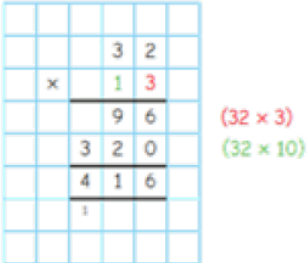
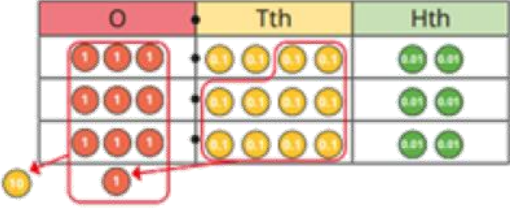
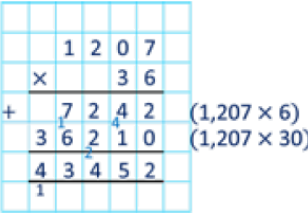
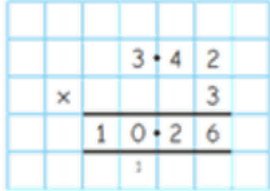
In column subtraction, we start with the ___ place value column.

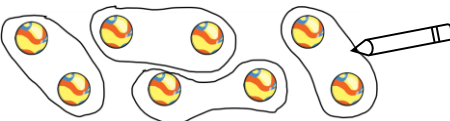
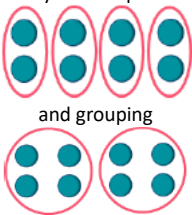
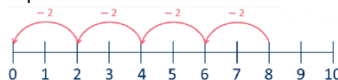
The is in the ___ column. It represents ___.

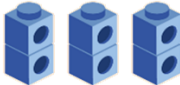
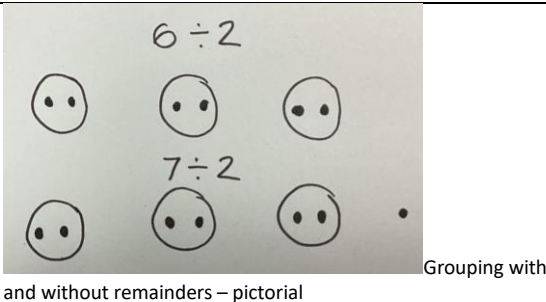
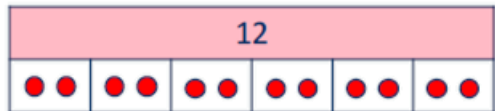
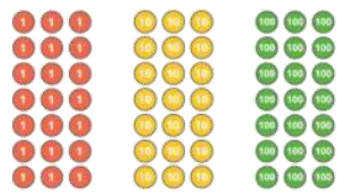
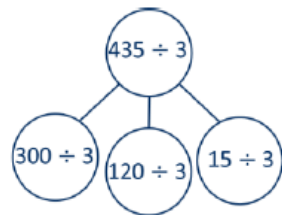
Multiplication

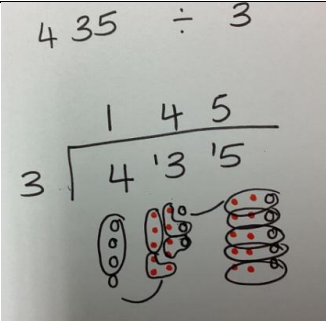
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Reception	 Make equal groups of 'real life' problems in class. Using hands to show doubles to five	<i>Not necessary for exposure at this stage.</i>	<i>Not necessary for exposure at this stage.</i>	Double ___ is ___.
Year One	Equal groups of objects  Physically making equal groups of objects using any manipulative.	 Step counting pictures that are naturally grouped. Draw groups of objects	 Introduce arrays, rows and columns $2 + 2 + 2 =$ $5 + 5 + 5 =$ $10 + 10 + 10 =$ Introduce repeated addition	There are ___ groups of ___ There are ___ altogether. There are ___ rows. There are ___ columns. There are ___ altogether.
Year Two	Arranging equal groups of objects as arrays. 	Draw arrays 	 Introduce patterns on a number square.  Step counting number tracks Step counting on a number line $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ Write repeated addition and multiplication $1 \times 5 = 5 \quad 5 = 1 \times 5$ $2 \times 5 = 10 \quad 10 = 2 \times 5$ $3 \times 5 = 15 \quad 15 = 3 \times 5$ Times tables	There are ___ equal groups with ___ in each group. There are ___ altogether. ___ lots of ___ is equal to. ___ times ___ is equal to.
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Year Three	 Unifix to show 3s, 4s, 8s	 Pictorial representations for 3s, 4s, 8s	 $4 \times 3 = 12 \quad 12 = 4 \times 3$  Hundred Square, and number line to show 3s, 4s, 8s	There are ___ lots of ___. ___ x ___ = ___ x ___

	 32 X 2 = Base 10 Grid for multiplication.	 Place Value Counters to show related facts.  Pictorial Version 32 X 2 =	$30 \times 2 = 60$ $2 \times 2 = 4$ $32 \times 2 = 64$ Partitioning tens and ones	
Year Four	As above but extending 12 X 12	 Place Value Counters for multiplying by 10 or 100  Pictorial representation of column method.	 Extending to 12 X 12 $3 \times 7 = 21$ $3 \times 70 = 210$ $3 \times 700 = 2,100$ Related facts  Column Method to multiply 2-digit by 1-digit	6 lots of ___ is ____. ___ shared into 6 equal groups is ____. Multiplying by 6 is the same as multiplying by ___ twice. ___ x 6 = double ___ x 3
Year Five			 Numerical Grid Method	A multiple is the result of multiplying a number by ____. The first multiple of a number is always ____. ___ is a multiple of ____ because _ x _ =

		Grid Method exposure.	 Column Method to multiply 2-digit by 2-digit	
Year Six		 Grid Method when multiplying decimals.	 Column Method to multiply 4-digit by 2-digit.  Column Method for decimal places.	The first multiple of a number is always ____. ____ is a multiple of ____ because ____ x ____ = ____. ____ is a common multiple of ____ and ____.

Division				
Year Group	Concrete	Pictorial	Abstract	Stem sentences
Reception	 Fair sharing of 'real life' problems in class.	<i>Not necessary for exposure at this stage.</i>	<i>Not necessary for exposure at this stage.</i>	There are ____ altogether. They are shared equally between ____ groups.
Year One	Make equal groups Sharing  Divide equally between the groups to see how many are in a group. Grouping   Divide into equal groups to see how many groups are made.	 Share groups of objects by drawing them one at a time.  Circle groups of objects.	<i>Not necessary for exposure at this stage.</i>	There are ____ altogether. How many groups of ____ can you make? ____ has been shared equally between ____. There are ____ on/in each ____.
Year Two	 Beadstring to show repeated subtraction. Compare sharing and grouping 	Draw arrays to compare sharing and grouping 	Repeated subtraction on a number line.  Times tables facts $4 \times 2 = 8$ $8 \div 2 = 4$	____ divided into equal groups of ____ is equal to ____. ____ shared between ____ groups is equal to ____.

Year Group	Concrete	Pictorial	Abstract	Stem sentences
Year Three		  	$14 \div 2 = 7$ $10 \div 2 = 5$ $4 \div 2 = 2$ Partitioning $34 \div 2 = 17$ $20 \div 2 = 10$ $14 \div 2 = 7$ Flexible Partitioning	___ has been shared equally into ___ equal groups. There are ___ groups of ___ in ____. This question is sharing/ grouping because _____.
Year Four	No new concrete...	 Bar model  Pictorial Representation of related facts.  Pictorial Representation of carrying.	$2 \times 6 = 12$ $12 \div 6 = 2$ Fact family $21 \div 7 = 3$ $210 \div 7 = 30$ $2,100 \div 7 = 300$ Related facts  $300 \div 3 = 100$ $120 \div 3 = 40$ $15 \div 3 = 5$ $435 \div 3 = 145$ Flexible partitioning into factors.	___ tens divided by ___ = ___ tens each. ___ ones divided by ___ = ___ ones each. I cannot share all of the tens equally, so I need to...

Year Five	No new concrete...		Bus stop method Mental Strategies...	__ divided by 10/100/1000 is equal to __. __ is one-tenth/one-hundredth/one-thousandth the size of __. There were __ tens/hundreds. Now there are __ ones/tens.
Year Six	No new concrete...	Pictorial Examples of Bus Stop method No new pictorial	Long division strategies	__ thousands divided by __ is equal to __. thousands with a remainder of __. The remainder is exchanged into __ hundreds. __ hundreds divided by __ is equal to __ hundreds with a remainder of __. The remainder is exchanged into __ tens.