The Good Shepherd Catholic Primary School

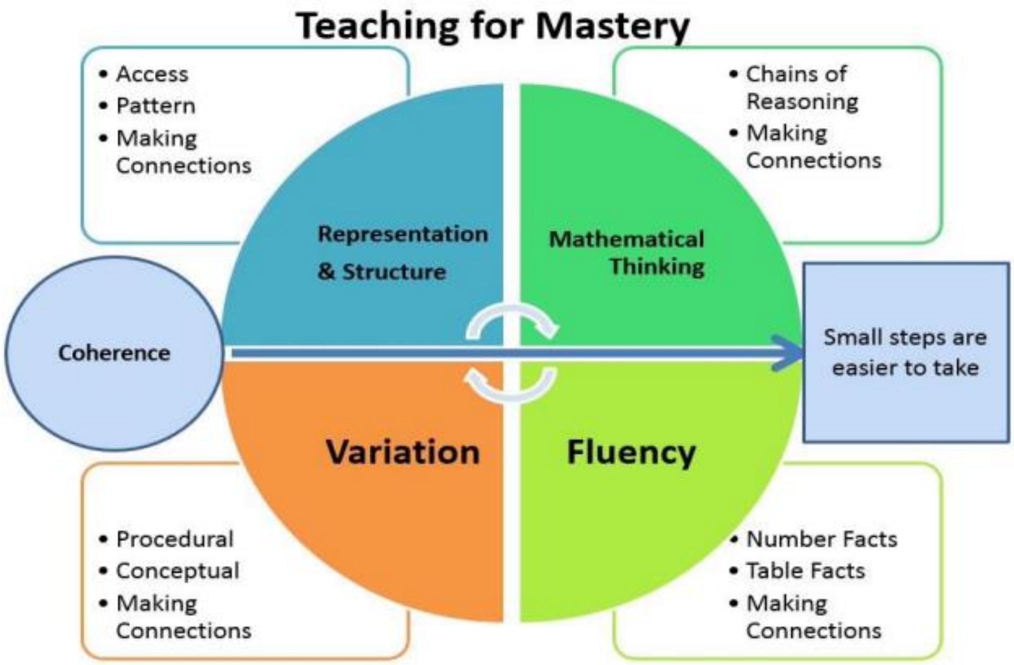
Following Jesus,

The Good Shepherd,

in all we say and do

Maths Calculation Policy

2022-2023



This policy has been largely adapted from the Pixl Calculation Policy with further material added. It is a working document and will be revised and amended as necessary. Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum. This calculation policy is used to support children to develop a deep understanding of number and calculation. This policy has been designed to teach children through the use of concrete, pictorial and abstract representations to give pupils a consistent and smooth progression of learning in calculations across the school.

Maths Mastery

At the centre of the mastery approach to the teaching of maths is the belief that all children have the potential to succeed. They should have access to the same curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling challenging and varied problems. Similarly, with calculation strategies, children must not simply rote learn procedures but demonstrate their understanding of these procedures through the use of concrete materials and pictorial representations. This policy outlines the different calculation strategies that should be taught and used across the school, which is in line with the requirements of the 2014 Primary National Curriculum.

Mathematical Language

The 2014 National Curriculum is explicit in articulating the importance of children using the correct mathematical language as a central part of their learning (reasoning). In certain year groups, the non-statutory guidance highlights the requirement for children to extend their language around certain concepts. It is therefore essential that teaching using the strategies outlined in this policy is accompanied by the use of appropriate and precise mathematical vocabulary. New vocabulary should be introduced in a suitable context (for example, with relevant, real objects, apparatus, pictures of diagrams) and explained carefully. High expectations of the mathematical language used are essential, with teachers only accepting what is correct 'The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematically justification, argument or proof.' - 2021 Mathematics Programme of Study.

Concrete Pictorial Abstract approach

One of the key learning principles in Maths is the concrete pictorial abstract approach, often referred to as the CPA approach. The concrete pictorial-abstract approach, based on research by psychologist Jerome Bruner, suggests that there are three steps (or representations) necessary for pupils to develop understanding of a concept. Reinforcement is achieved by going back and forth between these representations.

Concrete representation (Build It! / Use It!)

The active stage - a student is first introduced to an idea or a skill by acting it out with real objects. In division, for example, this might be done by separating apples into groups of red ones and green ones or by sharing 12 biscuits amongst 6 children. This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.

Pictorial representation (Draw It!)

The iconic stage - a student has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem. In the case of a division exercise this could be the action of circling objects.

Abstract representation (Solve it)

The symbolic stage - a student is now capable of representing problems by using mathematical notation, for example: $12 \div 2 = 6$ this is the ultimate mode, for it is clearly the most mysterious of the three.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014 and the method(s) shown for each year group should be modelled to the vast majority of pupils. However, it is vital that pupils are taught according to the pathway that they are currently working at and are showing to have 'mastered' a pathway before moving on to the next one. Of course, pupils who are showing to be secure in a skill can be challenged to the next pathway as necessary.

Choosing a calculation method:

Before pupils opt for a written method, they should first consider these steps:

- **Can I do it in my head using a mental strategy?**
- **Could I use some jottings to help me?**
- **Should I use a formal written method to work it out?**

Calculation Guidance Principles

- *Develop children's fluency with basic number facts*
- *Develop children's fluency in mental calculation*

- *Develop children's understanding of the = symbol*
- *Teach inequality alongside teaching equality*
- *Use empty box problems*
- *Use intelligent practice*
- *Expose mathematical structure and work systematically*
- *Move between the concrete and the abstract*
- *Contextualise the mathematics*

Exemplification

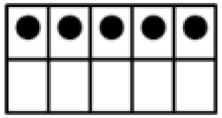
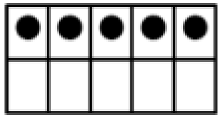
You will see that throughout this document, calculations are presented in a variety of ways. It is important for pupils' mathematical understanding to experience and work with calculations and missing numbers in different positions relative to the = symbol. Examples used in classwork and independent work should reflect this.

Estimation

Pupils are expected to use their developing number sense from Year 1 to make predictions about the answers to their calculations. As their range of mental strategies increases, these predictions and, later, estimates should become increasingly sophisticated and accurate. All teaching of calculation should emphasise the importance of making and using these estimates to check, first, the sense and, later, the accuracy of their calculations.

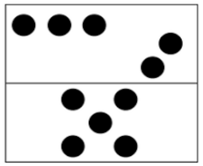
Concrete materials- Use it!

Progression in the use of manipulatives to support learning

Reception	**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 track to 10	Number track to 10	Number track to 10	Number track to 10	Number track to 10	Number track to 10
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 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-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/pictorial objects/representative objects eg. 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
Bead strings – ten	Bead strings - twenty	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred	Bead strings - hundred
Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes	Numicon shapes
Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters	Double sided counters
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

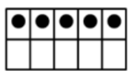
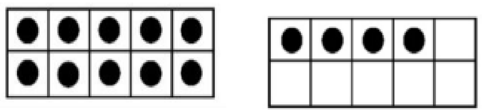
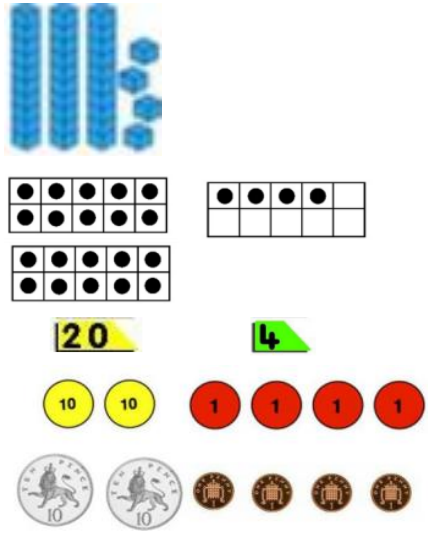
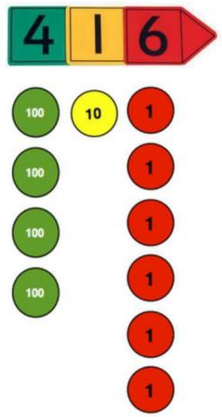
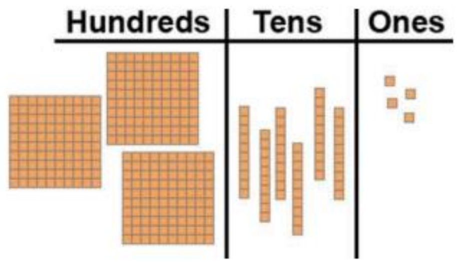
Progression in the teaching of counting in the foundation stage			
Pre-counting The key focus in pre-counting is an understanding of the concepts more, less and the same and an appreciation of how these are related. Children at this stage develop these concepts by comparison and no counting is involved.	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/kinaesthetic resources eg. 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
Subitising (recognise small numbers without counting them) Children need to recognise small amounts without counting them eg. dot patterns on dice, dots on tens frames, dominoes and playing cards as well as small	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	Conservation of number – MASTERY! 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

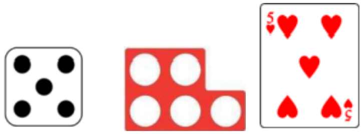
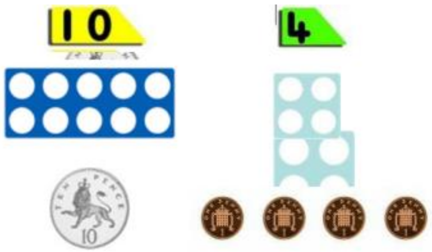
groups of randomly arranged shapes stuck on cards.	(they are at a distance), see, that move around. Children also find it difficult to count a mix of different objects, or similar objects of very different sizes		• estimate a number of objects then check by counting • use ordinal numbers in context eg first, second, third • count in twos, fives and tens • order numbers 1-20 • say 1 more/ 1 less than a given number to 2
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 5 and it does not change. 	

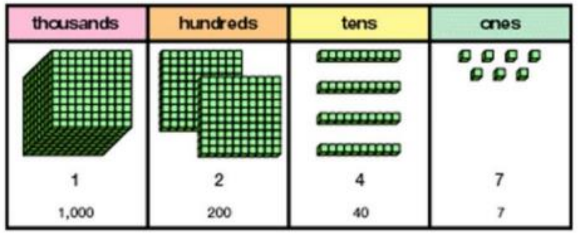
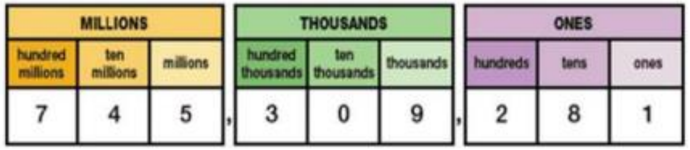
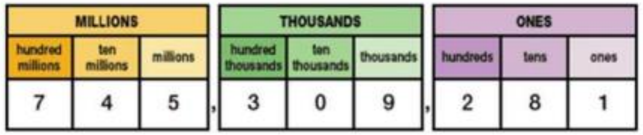
Progression in the teaching of calculations						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on. Regrouping to make 10	Adding three single digits. Column method – no regrouping.	Column method regrouping. (up to 3 digits)	Column method regrouping. (up to 4 digits)	Column method regrouping. (with more than 4 digits) (Decimals- with the same amount of decimal places)	Column method regrouping. (Decimals with different amounts of decimal places)
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10	Counting back Find the difference Part whole model Make 10 column method - no regrouping	Column method with regrouping (up to 3 digits)	Column method with regrouping (up to 4 digits)	Column method with regrouping (with more than 4 digits) (Decimals with same amount of decimal places)	Column method with regrouping. (Decimals with same amount of decimal places)
Multiplication	Doubling Counting in multiples Arrays (with support)	Doubling Counting in multiples Repeated addition Arrays- showing	Counting in multiples Repeated addition Arrays- showing commutative	Column multiplication (2 and 3 digit multiplied by 1 digit)	Column multiplication (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplicatio n (multi digit up to 4 digits by a 2 digit number)

		commutative multiplication	multiplication Grid method			
Division	Sharing objects into groups Division as grouping	Division as grouping Division within arrays	Division within arrays Division with a remainder Short division (2 digits by 1 digit- concrete and pictorial)	Division within arrays Division with a remainder Short division (up to 3 digits by 1 digit concrete and pictorial)	Short division (up to 4 digits by a 1 digit number interpret remainders appropriately for the context)	Short division Long division (up to 4 digits by a 2 digit number- interpret remainders as whole numbers, fractions or round)

Progression in the teaching of place value

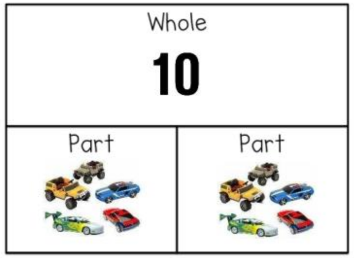
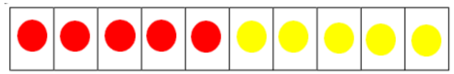
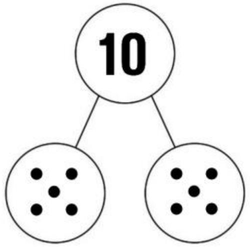
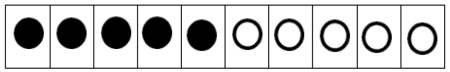
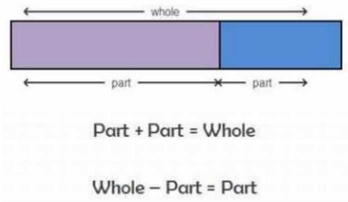
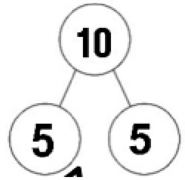
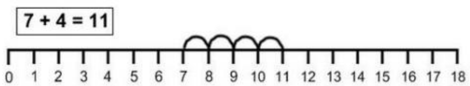
Foundation	Year 1	Year 2	Year 3 onwards
Understanding ten	**Understanding numbers up to 20**	**Understanding numbers up to one hundred**	**Understanding numbers up to one thousand**
A TENS FRAME is a simple maths tool that helps children: • Keep track of counting • See number relationships • Learn addition to 10 • Understand place value 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.  Setting the counters in pairs, naturally allows the children to see addition concepts.	'Ten' is the building block of our Base 10 numeration system. Young children can usually 'read' two-digit numbers long before they understand the effect the placement of each digit has on its numerical value. A child might be able to correctly read 62 as sixty-two and 26 as twenty-six, and even know which number is larger, without understanding why the numbers are of differing values. Ten-frames can 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 and dienes. 	Continue developing place value through the use of manipulatives.  Use Dienes blocks and place value charts. 

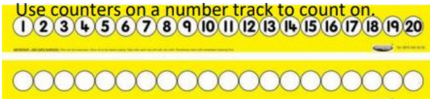
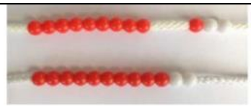
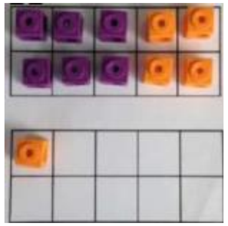
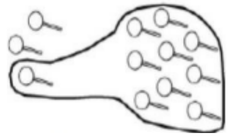
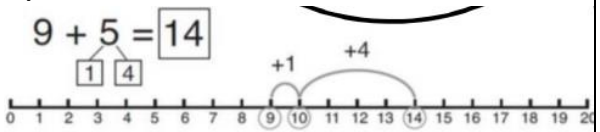
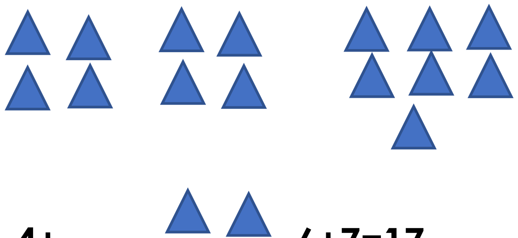
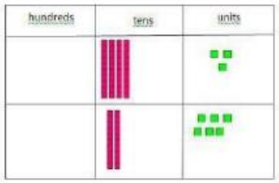
Include other visual images such as dice, cards, dominoes etc. 			

Progression in the teaching of place value		
Year 4	**Year 5**	**Year 6**
Understanding numbers up to ten thousand	**Understanding numbers up to one million including decimals**	**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 • Place value chart 	Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters (including decimal counters) • Dienes blocks • Place value charts 	Continue developing place value through the use of manipulatives. • Place value arrow cards • Place value counters (including decimals counters) • Dienes blocks • Place value charts 

Progression in the teaching of calculations

ADD IT!

Objective and strategies	Concrete **BUILD IT/USE IT!**	Pictorial **DRAW IT!**	Abstract **SOLVE IT!**
Combine two parts to make a whole model. Part-part-whole model Teach the children that the cubes/counters represent the real-life objects. Use cubes to add two numbers together as a group or in a bar.	   	  	 Use the part-part whole diagram as shown above to move into the abstract. Use the term 'number sentence' 5 + 5 = 10 10 = 5 + 5
Start at the larger number and count on. Start with the larger number on the bead string then count on 1		 Start at the larger number on the number line and count on in ones or in one jump to find the answer.	4 + 7 = 11 Place the larger number in your head and count on the smaller number to find your answer

by 1 to find the answer.			
Regrouping to make 10. Start with the bigger number and use the smaller number to make 10.	 6+5=11 	 **3+9=11** Use pictures or a number line. Regroup or partition the smaller number to make 10 	**7+4= 11** If I am at seven, how many more do I need to make 10. How many more do I add on now?
Adding three single digits. Encourage children to use known facts.	**4 + 7 + 6= 17** Put 4 and 6 together to make 10. Add on 7.	Add together three groups of objects. Draw a picture to recombine the groups to make 10  **4+** **6+7=17**	**4 + 6 + 7** **10 +7= 17** Combine the two numbers that make 10 and then add
Column method- no regrouping Use Dienes to add tens and ones before moving on to place value counters.	 43 + 26	After practically using the base 10 blocks and place value counters, children can draw the Dienes to help them to solve addition calculations.	**42 +36= 78** **42** **+36** **78**

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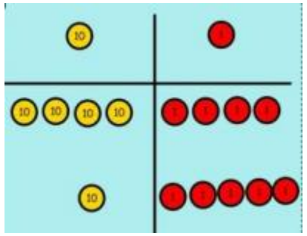
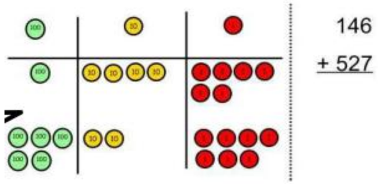
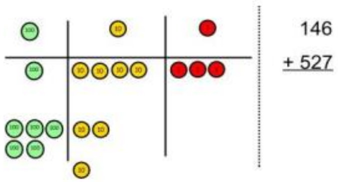
<td></td>
<td>
<table>
<tr><th>hundreds</th><th>tens</th><th>ones</th></tr>
<tr><td></td><td>////</td><td>□ □ □</td></tr>
<tr><td></td><td>//</td><td>□ □ □
□ □ □</td></tr>
<tr><td></td><td>6</td><td>9</td></tr>
</table>
After practically using Dienes, children can draw the ‘tens’ and ‘ones’.
</td>
<td>Only select numbers which do not involve regrouping.</td>
</tr>
<tr>
<td>Column method regrouping
Make both numbers on a place value grid.</td>
<td>Add up the units and exchange 10 ones for one 10 and so on.




This can also be done with Dienes to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

Continue using place value counters as children begin to work with decimals.</td>
<td>If necessary children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.
<table>
<tr><th>hundreds</th><th>tens</th><th>ones</th></tr>
<tr><td>/</td><td>////</td><td>□ □ □ □ □
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</td>
<td>657
+84
741
11

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

84.5
+ 68.7
153. 2
11

Then move onto decimals with a different number of decimal places.
56.159
7.150
2.520</td>
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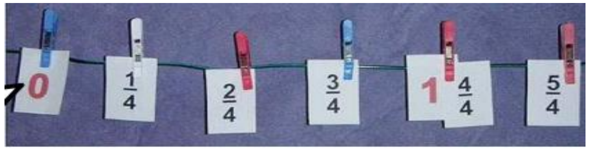
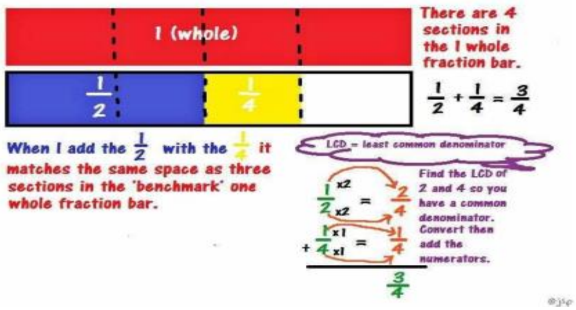
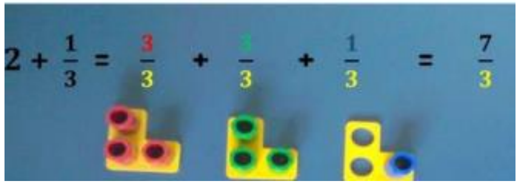
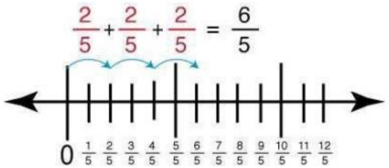
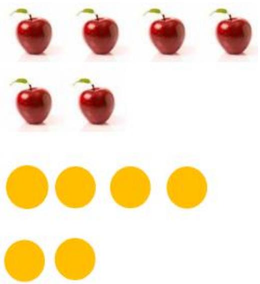
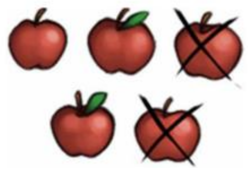
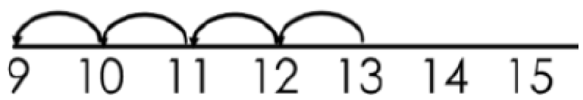
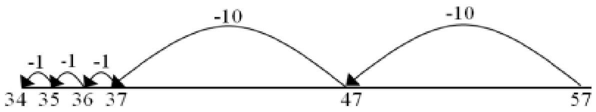
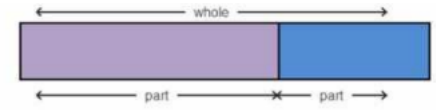
</table>

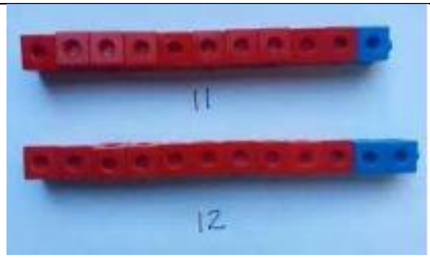
			$+\ 4.1\color{red}{00}$ 69.929 1 1
Add fractions Count in fraction steps using real objects and a number line. Use Numicon to add fractions	    	$\frac{1}{4} + \frac{1}{3}$ 	$\frac{1}{4} + \frac{1}{3} =$ $\frac{1\text{x}3}{4\text{x}3} + \frac{1\text{x}4}{3\text{x}4}$ $\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$

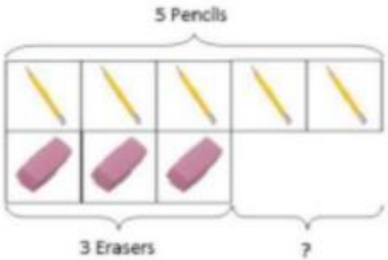
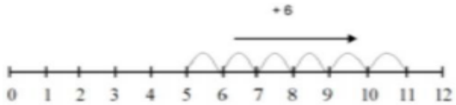
Progression in Calculations Policy			
SUBTRACT IT!			
Objective and strategies	**Pictorial** **BUILD IT/USE IT**	**Concrete** **I DRAW IT!**	**Abstract** **SOLVE IT!**
Taking away ones	Use real-life physical objects, counters, cubes etc. to show how objects can be taken away. 6-2= 4 	Cross out drawn objects to show what has been taken away.  5-2= 3	4 = 6 – 2 18 - 3= 15 8 – 2 = 6
Counting back Use counters and move them away from the group	Make the larger number in the subtraction calculation. Move the beads along the bead string whilst counting backwards in ones. 	Count back on a number line or number track  Start at the bigger number and count back the smaller number showing the jumps on the number line.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.

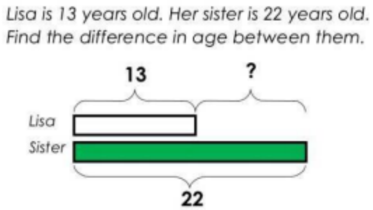
<table>
<tr>
<td>whilst counting backwards</td>
<td></td>
<td>
</td>
<td>Children will need regular practice counting backwards.</td>
</tr>
<tr>
<td>Use cubes to subtract a number from the bar.</td>
<td></td>
<td>Use the bar


Part + Part = Whole
Whole – Part = Part</td>
<td></td>
</tr>
<tr>
<td>Find the difference

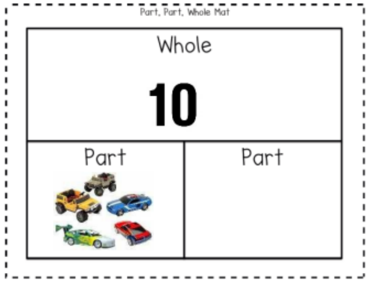
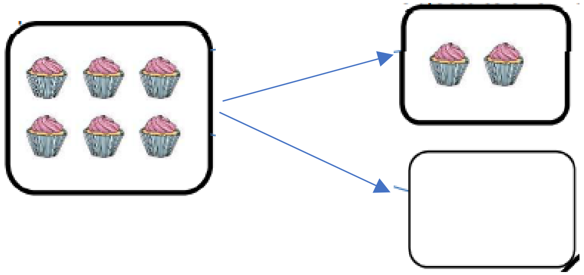
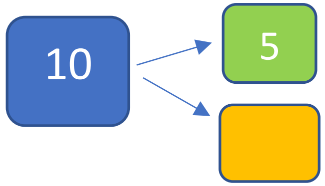
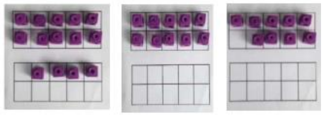
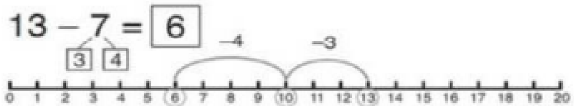
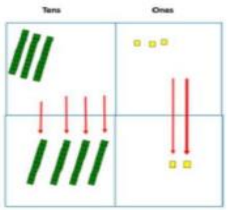
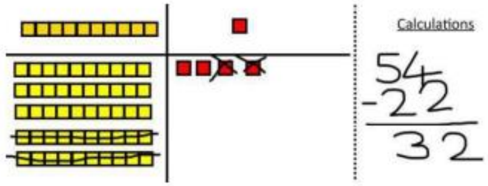
Use cubes to build towers or make bars to find the difference.

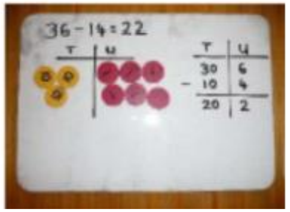
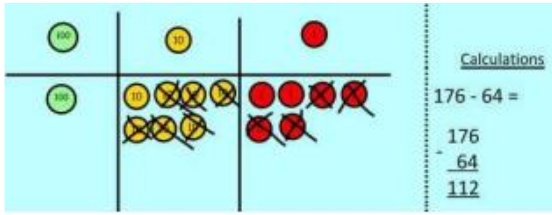
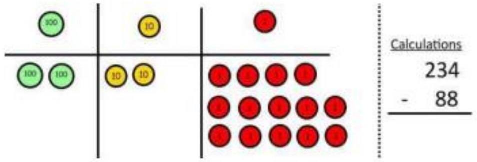
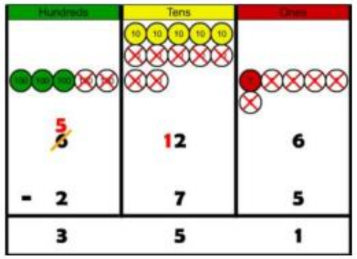
Use basic bar models with items to find the difference.</td>
<td>

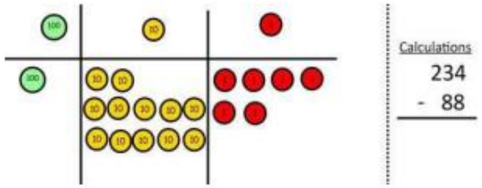
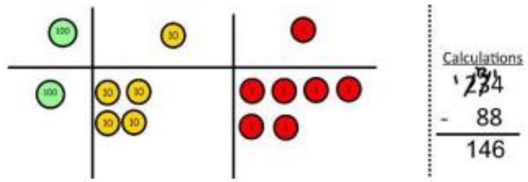

</td>
<td>Count on to find the difference.


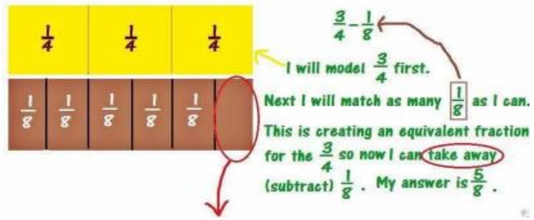
Comparison bar modelling


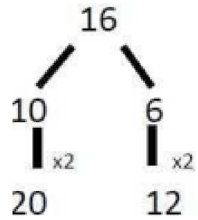
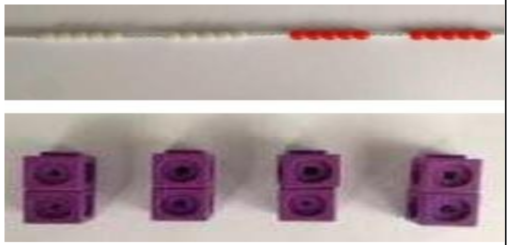
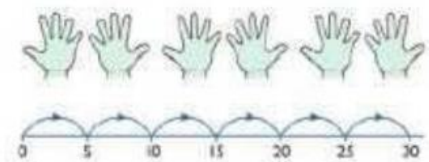
Draw bars to find the difference between two numbers.</td>
<td>Hannah has 23 pencils, Helen has 15 pencils. Find the difference between the number of pencils.</td>
</tr>
</table>

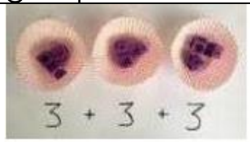
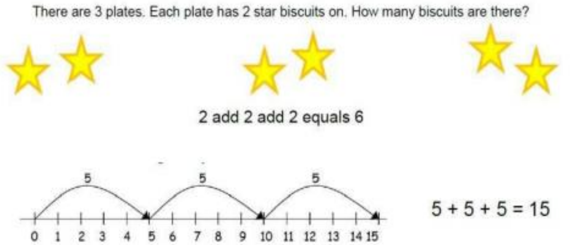
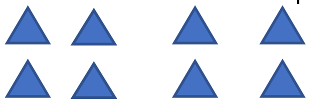
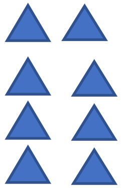
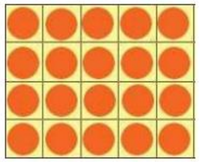
Part-part-whole. model Link to addition use whole model to help explain the inverse.	 If 10 is the whole and 5 is one of the parts. What is the other part?	Use a pictorial representation of objects to show the part-part-whole model. 	10 - 5= 10 -? = 5 
Make 10	14-5  Make 14 on the ten frame. Take away 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. 	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 regrouping	75-42= Use Dienes to make the bigger number then take the smaller number away. 	Draw the Dienes or place value counters alongside the written calculation to help to show working. 	This will lead to a clear written column subtraction. 73 – 52= 21 - 70+3= - 50+2= 20+1= 21

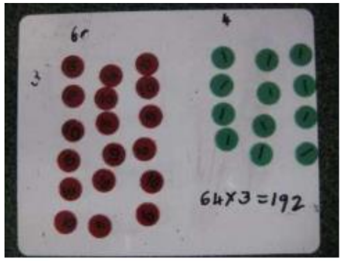
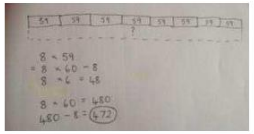
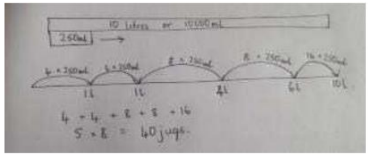
	Show how you partition numbers to subtract. Again, make the larger number first.  	 	$\begin{array}{r} 69 \\ -\underline{47} \\ 22 \end{array}$
Column method with regrouping	Make the larger number with the Dienes or place value counters. Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones. Now I can subtract my ones.  Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.	Draw the counters onto a place value grid and show what has been taken away by crossing the counters out as well as clearly showing the exchanges made.  When confident, children can find their own way to record the exchange/regrouping.	

	 Now I can take away eight tens and complete my subtraction.  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.		

Subtract fractions If there are five fifths and I eat one fifth, what fraction of the cake is left?	The cake has been divided into five slices. Each part is one fifth of the whole cake. 	Draw a bar model to represent the cake.  Progress onto subtracting fractions with different denominators. 	$\frac{5}{5} - \frac{1}{5} = \frac{4}{5}$ $\frac{3}{4} - \frac{1}{8} =$ $\frac{3\times2}{4\times2} - \frac{1}{8}$ $\frac{6}{8} - \frac{1}{8} = \frac{5}{8}$

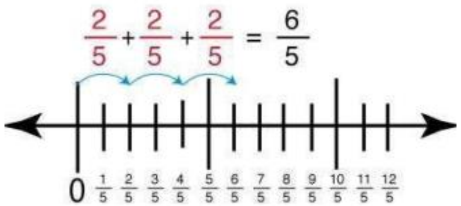
Progression in Calculations Policy			
MULTIPLY IT !!!			
Objective and strategies	**Concrete** **BUILD IT/USE IT!**	**Pictorial** **DRAW IT!**	**Abstract** **SOLVE IT!**
Doubling Double five is ten.	Use practical activities to show how to double a number.  5 x 2 = 10	Draw pictures to show how to double a number. Double 4 is 8 	Double 16 Double the 10, then double the 6.  Partition a number and then double each part before recombining it back together.
Counting in multiples		 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

	Count in multiples supported by concrete objects in equal groups.		
Repeated addition	   Use different objects to add equal groups.		Write addition sentences to describe objects and pictures. 
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find commutative multiplication sentences.  4 x 2 = 8 2 X 4=8  2 x 4 = 8 4 x 2= 8 	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

		Link arrays to area of rectangles	
Column multiplication	Children can continue to be supported by place value counters at the stage of multiplication.  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.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.  	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768 7 4 x 6 3 1 2 2 1 0 2 4 0 + 4 2 0 0 4 6 6 2 This moves to the more compact method 3 2 7 x 5 3 9 8 1 ← 327 x 3 1 6 3 5 0 ← 327 x 50 1 7 3 3 1

<table>
<tr>
<td>Multiplication of fractions

What would three lots of one eighth be?</td>
<td>Count in fraction steps (repeated addition)

</td>
<td>Three times one eighth.
<table><tr><td>1/8</td><td>1/8</td><td>1/8</td><td></td><td></td><td></td><td></td><td></td></tr></table>
<table>
<tr><td>$^{10}/_{8} = 1\,^{2}/_{8}$</td></tr>
<tr><td>$^{9}/_{8} = 1\,^{1}/_{8}$</td></tr>
<tr><td>$^{8}/_{8} = 1$</td></tr>
<tr><td>$^{7}/_{8}$</td></tr>
<tr><td>$^{6}/_{8}$</td></tr>
<tr><td>$^{5}/_{8}$</td></tr>
<tr><td>$^{4}/_{8} = {}^{1}/_{2}$</td></tr>
<tr><td>$^{3}/_{8}$</td></tr>
<tr><td>$^{2}/_{8} = {}^{1}/_{4}$</td></tr>
<tr><td>$^{1}/_{8}$</td></tr>
</table></td>
<td>$3 \times \frac{1}{8} =$
$\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$

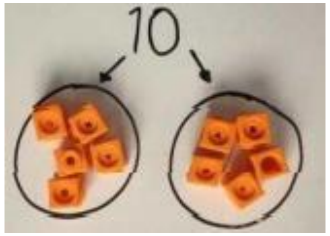
Multiply the numerators together then multiply the denominators</td>
</tr>
</table>

Progression in Calculations Policy

DIVIDE IT!

It is important to make links with fractions

<table>
<tr><th>Objective and strategies</th><th>Concrete
BUILD IT/USE IT!</th><th>Pictorial
DRAW IT!</th><th>Abstract
SOLVE IT!</th></tr>
<tr><td>Sharing objects into groups.

If we are dividing by two we are finding one half.</td><td>

I have 10 cubes; can you share them equally into 2 groups?</td><td>Children use pictures or shapes to share quantities.

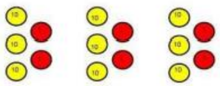
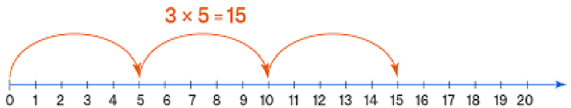
$8 \div 2 = 4$</td><td>One half of 14 is 7
½ of 14 = 7
$14 \div 2 = 7$
Share 9 cakes between three people.

$9 \div 3 = 3$</td></tr>
<tr><td>Division as grouping.

If we are dividing by three we are finding one third.</td><td>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.

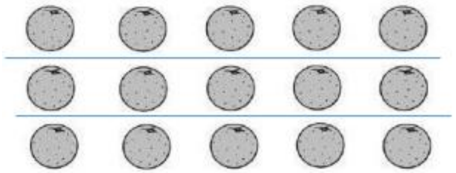
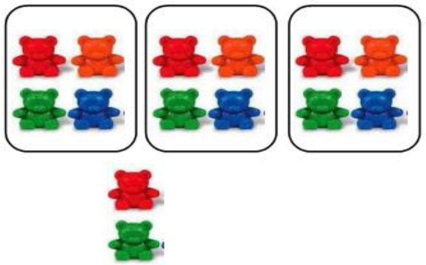
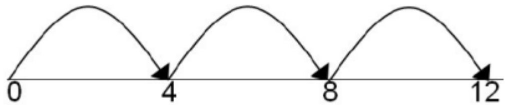
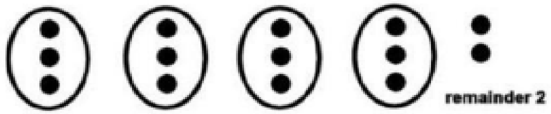


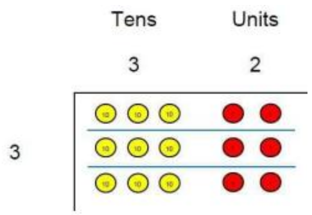
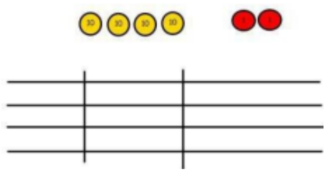
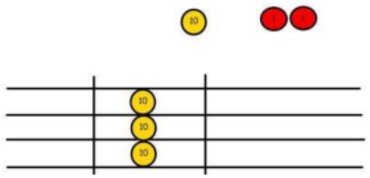
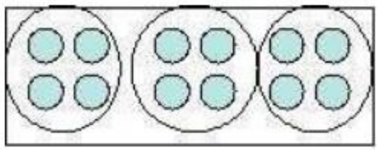
4 x 6 = 24   6 x 4 = 24

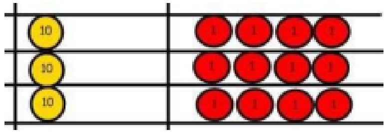
96 ÷ 3 = 32
</td><td>Use a number line to show jumps in groups. The number of jumps equals the number of groups.


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.
<table><tr><td colspan="5">20</td></tr><tr><td>?</td><td>?</td><td>?</td><td>?</td><td>?</td></tr></table>
$20 \div 5 = ?$</td><td>$28 \div 7 = 4$

Divide 28 into 7 groups. How many are in each group?</td></tr>
</table>

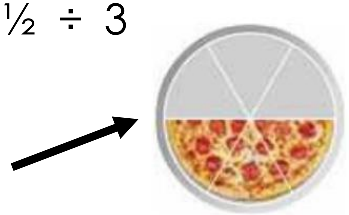
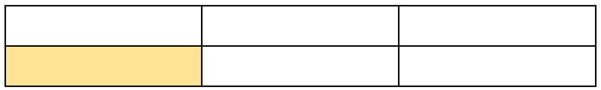
		5 X ? = 20	
Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. For example 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 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 Find one third of 96.	$96 \div 3 =$  Use place value counters to divide using the bus stop method alongside  $42 \div 3=$ Start with the biggest place value; share 40 into three groups. Put 1 ten in each group then 1 ten left over. 	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.  Encourage them to move towards counting in multiples to divide more efficiently.	Begin with divisions that divide equally with no remainder. $\begin{array}{r\|l} & 2\ \ 1\ \ 8 \\ \hline 4 & 8\ \ 7\ \ {}^{3}2 \end{array}$ Move onto divisions with a remainder. $\begin{array}{r\|l} & 8\ \ 6\ \ \text{r}\ 2 \\ \hline 5 & 4\ \ {}^{3}3\ \ 2 \end{array}$ Finally move into decimal places to divide the total accurately. $\begin{array}{r\|l} & 1\ \ 4\ .\ 6 \\ \hline 3\ 5 & 5\ \ 1\ \ {}^{16}1\ .\ {}^{21}0 \end{array}$

	Exchange this ten for ten ones and then share the ones equally among the groups.  Look how much is in 1 group so the answer is 14.		

Times Table Policy

TIMES IT!

Long division (chunking method) Divide by single digit then progress to dividing by two digit			86 r2 5 | 432 200 (40 x 5) 232 200 (40 x 5) 32 30 (6 x 5) 2 13 | 1 9 3 7 - 1 3 0 0 13 x 100 6 3 7 - 5 2 0 13 x 40 1 1 7 - 1 1 7 13 x 9 0
Division of fractions Half of the pizza divided into three equal parts.	$\frac{1}{2} \div 3 =$ 	$\frac{1}{2} \div 3$  Half of the bar divided into three equal parts.	$\frac{1}{2} \div 3 =$ $\frac{1}{2} \div 3/1 =$ $\frac{1}{2} \times 1/3 = 1/6$

Times Tables are at the heart of mental arithmetic, which in itself helps form the basis of a child's understanding and ability when working with number. Once the children have learnt their times tables by heart, they are then able to work far more confidently and efficiently through a wide range of more advanced calculations. At The God Shepherd Catholic Primary School, we believe that through a variety of interactive, visual, engaging and rote learning techniques, all children can achieve the full times table knowledge by the time they enter Year 5

Reception	Year 1	Year 2	Year 3	Year 4	Year 5 & 6
I can count in steps of 1 I can count in steps of 2 I can count in steps of 5 I can count in steps of 10	I can count in steps of 1 I can count in steps of 2 I can count in steps of 5 I can count in steps of 10	I know my 2 times table I know my 5 times table I know my 10 times table I can count in steps of 3	I know my 3 times table I know my 6 times table I know my 4 tables times I know my 8 tables times	I know my 7 times table I know my 9 times table I know my 11 tables times I know my 12 tables times	I know my 7 times table I know my 9 times table I know my 11 tables times I know my 12 tables times

Rote learning

Times tables will be recited daily. Chant as: 'One times two is two, two times two is four, three times two is six …..'

Also chant as 'one multiplied by two is two, once two is two, one lot of two is two, one group of two is two, the product of one

and two is two etc.'

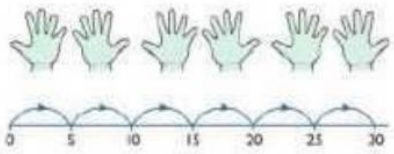
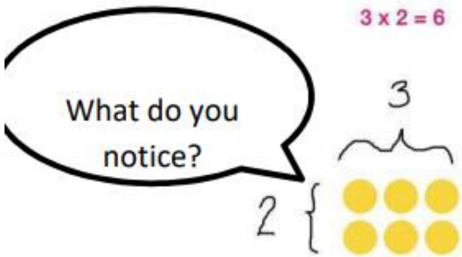
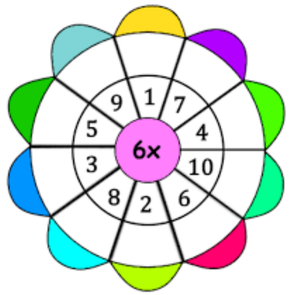
Also chant as factor, factor, product such as 2, 2, 4 and the 2, 3, 6 etc.

Homework

Children are encouraged chant, practice and complete multiplication skills on IXL at home.

1 x 1 = 1	2 x 1 = 2	3 x 1 = 3	4 x 1 = 4	5 x 1 = 5
1 x 2 = 2	2 x 2 = 4	3 x 2 = 6	4 x 2 = 8	5 x 2 = 10
1 x 3 = 3	2 x 3 = 6	3 x 3 = 9	4 x 3 = 12	5 x 3 = 15
1 x 4 = 4	2 x 4 = 8	3 x 4 = 12	4 x 4 = 16	5 x 4 = 20
1 x 5 = 5	2 x 5 = 10	3 x 5 = 15	4 x 5 = 20	5 x 5 = 25
1 x 6 = 6	2 x 6 = 12	3 x 6 = 18	4 x 6 = 24	5 x 6 = 30
1 x 7 = 7	2 x 7 = 14	3 x 7 = 21	4 x 7 = 28	5 x 7 = 35
1 x 8 = 8	2 x 8 = 16	3 x 8 = 24	4 x 8 = 32	5 x 8 = 40
1 x 9 = 9	2 x 9 = 18	3 x 9 = 27	4 x 9 = 36	5 x 9 = 45
1 x 10 = 10	2 x 10 = 20	3 x 10 = 30	4 x 10 = 40	5 x 10 = 50
1 x 11 = 11	2 x 11 = 22	3 x 11 = 33	4 x 11 = 44	5 x 11 = 55
1 x 12 = 12	2 x 12 = 24	3 x 12 = 36	4 x 12 = 48	5 x 12 = 60

Process of teaching times tables

Children will be taught the concept of multiplication using practical resources.	Children will progress on to using number lines or pictures.	Children will count in multiple steps.	Children will recite times tables by rote. Links will be made with 'grouping' and division whilst times tables are being taught.
Concrete **BUILD IT! / USE IT!**	**Pictorial** **DRAW IT!**	**Abstract stage 1** **SOLVE IT!**	**Abstract stage 2** **PRACTISE IT!**
Count in multiples supported by concrete objects in equal groups.  Use real-life arrays or build   arrays.	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 Record multiplication number sentences.  1 × 7 = 7 2 × 7 = 14 3 × 7 = 21 4 × 7 = 28 5 × 7 = 35 6 × 7 = 42 7 × 7 = 49 8 × 7 = 56 9 × 7 = 63 10 × 7 = 70 11 × 7 = 77 12 × 7 = 84 7 ÷ 7 = 1 14 ÷ 7 = 2 21 ÷ 7 = 3 28 ÷ 7 = 4 35 ÷ 7 = 5 42 ÷ 7 = 6 49 ÷ 7 = 7 56 ÷ 7 = 8 63 ÷ 7 = 9 70 ÷ 7 = 10 77 ÷ 7 = 11 84 ÷ 7 = 12 Link multiplication and division facts.	Recite times tables by rote orally. 6 times 2 equals 12, so 12 divided by 2 equals 6. One sixth of 12 equals 2.  If you know 6 times 2 equals 12, what else do you know? 6 x 20 = 120

TENS FRAME IDEAS	
LIFE SIZE TEN FRAME	Create a life-size ten frame in the classroom and outdoor play area. Use counters, pennies, teddies, gingerbread men, children etc.
FLASH	Flash ten frame briefly and have children write the number on a whiteboard. Using whiteboards, rather than having children say the number, ensures that all children attempt to respond and allows the teacher to assess class progress. When the response is oral, not all child responses are audible. Encourage children to share the different strategies used to find the total number of dots for cards, "How did you see it?" This can be varied by asking children to write the number and draw the pattern they saw, or by having them build the number flashed on their own blank frame
FLASH: ONE MORE	Once children are familiar with the basic patterns, and know them automatically, flash a 10 frame or dot card and ask them to name the number that is one more than the number flashed. Variation: ask children to give the number that is two more/one less/double/ten more than the number flashed.
I WISH I HAD TEN	Flash a dot card or ten frame showing 9 or less and say, "I wish I had 10". Children respond with the part that is needed to make ten. The game can focus on a single whole, or the "wish I had" number can change each time. Variation: teacher flashes card and children write the complement of ten on individual whiteboards with dry erase markers.
I WISH I HAD 12	As above but children respond with how many more are needed to make twelve. Children should be confident in facts of 10 before this is attempted. For example to go from 8 to 12, they should realise they need 2 more to get to 10, then 2 more to 12. 2 and 2 is 4. Variation: Children draw an empty number line on their whiteboards to show the two jumps used to get to the target number.
1 MORE **1 LESS** **10 MORE** **10 LESS**	The following four prompts are written on the board: one more one less ten more ten less The teacher flashes a dot or ten frame card as the 'starting number'. The first child selects one prompt. For example, if the teacher flashes a card showing '5' the first child might say, "one more than 5 is 6", the second child might say, "ten more than 6 is 16", and the third child might say, "one less than 16 is 15". Continue until all children have had a turn.
TEEN FRAME FLASH (11-20)	**Teen Frame Flash (11-20)** Once children are subitizing **ten frame** patterns 0- 10, cards showing larger numbers (i.e. more than one ten frame) should be introduced. Use mental math sessions with the following key questions: How many? How many more than 10? As children become familiar with the 'teen' patterns introduce further questions to develop number relationships. • What is one more/two more than the number I flashed? • What is one less/two less than the number I flashed? • How far away is the number I flashed from twenty?

	• Double the number I flash. • What is the near Doubles fact? (i.e., if 15 is flashed, children answer 7+8)
MULTIPLES	Flash a ***tens frame*** and ask children to give you the product if the number you flash was multiplied by 2, 5 etc.