



St Gregory's Catholic Academy

This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added. It is a working document and will be revised and amended as necessary.





Objective	Concrete	Pictorial	Abstract
Understand the 'one more than' relationship between consecutive numbers.	Use counters, cubes, five/tens frames, fingers etc. to explore adding one more.		One more than 3 is 4.
			5 + 1 = 6
Explore the composition of numbers to 10.	Use physical objects (as above) to combine two groups within 10.		5 + 2 = 7
			5 + 5 = 10
		3 Balts 2 Dails	



Automatically recall number bonds for numbers 0-5 and begin to recall facts to 10.			It is 5 because there are 3 and 2.
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<u>Year 1 - Addition</u>



Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	Use part part whole model. Use cubes to add two numbers together as a group or in a bar.	Use pictures to add two numbers together as a group or in a bar.	4 + 3 = 7 5 5 3 10 = 6 + 4 Use the part-part whole diagram as shown above to move into the abstract.
Starting at the bigger number and counting on	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	12 + 5 = 17 10 11 12 13 14 15 16 17 18 19 20 Start at the larger number on the number line and count on in ones or in one jump to find the answer.	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10. This is an essential skill for column addition later.		3 + 9 = Use pictures or a number line. Regroup or partition the smaller number using the part part whole model 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?



		9 + 5 = 14 $1 4$ $+1$ $+1$ $+4$ $+1$ $+1$ $+4$ $+1$ $+1$ $+1$ $+1$ $+1$ $+1$ $+1$ $+1$	
Represent & use number bonds and related subtraction facts within 20			Emphasis should be on the language '1 more than 5 is equal to 6.' '2 more than 5 is 7.' '8 is 3 more than 5.'
	2 more than 5.	Image: Second	Emphasis should be on the language '1 more than 5 is equal to 6.' '2 more than 5 is 7.' '8 is 3 more than 5.'

<u>Y2 Addition</u>

Objective & Strategy	Concrete	Pictorial	Abstract
Add a two digit number and ones	17 + 5 = 22 Use ten frame to make 'magic ten Children explore the pattern. 17 + 5 = 22 27 + 5 = 32	Use part part whole and number line to model. 17 + 5 = 22 3 2 16 + 7 16 + 7 16 + 7 16 + 20 16 + 20	17 + 5 = 22 Explore related facts 17 + 5 = 22 5 + 17 = 22 22-17 = 5 22-5 = 17
Add a 2 digit number and tens	25 + 10 = 35 Explore that the ones digit does not change	27 + 30 +10 +10 +10 27 37 47 57	27 + 10 = 37 27 + 20 = 47 27 + □ = 57



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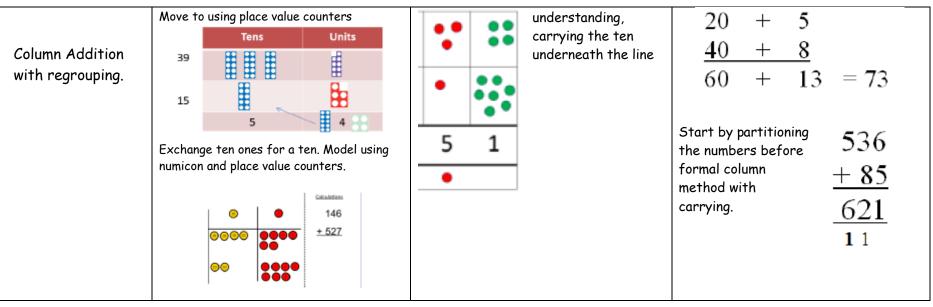
Add two 2-digit numbers	Model using dienes , place value counters and numicon	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	25 + 47 $20 + 5$ $40 + 7$ $20 + 40 = 60$ $5 + 7 = 12$ $60 + 12 = 72$
Add three 1-digit numbers		Regroup and draw representation.	4 + 7 + 6 = 10 + 7 = 17
	Combine to make 10 first if possible, or bridge 10 then add third digit	+ + = 15	Combine the two numbers that make/bridge ten then add on the third.

<u>Year 3 - Addition</u>



Objective & Strategy	Concrete	Pictorial	Abstract
Column Addition— no regrouping (friendly	T O Model using Dienes or numicon	Children move to drawing the counters using a tens and one frame.	223
numbers) Add two or three 2 or 3-digit numbers.	Add together the ones first, then the tens. $ \begin{array}{c c} \hline Tens & Units \\ \hline 45 & \hline 1 &$	tens ones	$\frac{+114}{337}$ Add the ones first, then the tens, then the hundreds.
	Image: Second	Children can draw a representation of the grid to further support their	







Objective & Strategy	Concrete				Pictorial			Abstract
Y4—add numbers with up to 4 digits	Children continue to use dienes or Place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.		• •	• 88 • •	:	3517		
			::		•		+ 396	
	Hundreds	Tens	Ones	7	1	5	1	
		010111		•		٠		Continue from previous work to carry
		1111		Draw repre grid.	sentatio	ons usi	ng place v	hundreds as well as tens.



Y5—add numbers with	As year 4		72.8
more than 4 digits. Add decimals with 2 decimal places, including money.	tens ones tenths hundredths		$ \frac{+54.6}{1274} \\ $
Y6—add several numbers of increasing complexity Including adding money, measures and decimals Extend to numbers with different decimal places.	As Y5	As Y5	$ \begin{array}{c} 8 & 1, 0 5 & 9 \\ 3, 6 6 & 8 \\ 15, 3 0 & 1 \\ + 20, 5 5 & 1 \\ 1 & 20, 5 7 9 \\ \hline 2 & 3 \cdot 3 6 & 1 \\ 9 \cdot 0 & 8 & 0 \\ 5 & 9 \cdot 7 & 7 & 0 \\ + & 1 \cdot 3 & 0 & 0 \\ \hline 9 & 3 \cdot 5 & 1 & 1 \\ \hline 2 & 1 & 2 \\ \end{array} $ Insert zeros for place holders.



EYFS Subtraction

Concrete	Pictorial	Abstract
Use cubes, counters, fingers etc. to explore taking one away to make one less.		One less than 4 is 3.
5-1-		5 - 1 = 4 10 - 5 = 5
Build on above to take away amounts within 10.	0 1 2 3 4 5 6	
Begin with concrete resources as above, but progress to abstract for 'automatic' recall.	10 - 3 = 7 3 2 5	I know there is 1 left because I had 4 and took away 3.
	Use cubes, counters, fingers etc. to explore taking one away to make one less. Build on above to take away amounts within 10. Begin with concrete resources as above, but progress to abstract for 'automatic'	Use cubes, counters, fingers etc. to explore taking one away to make one less. Build on above to take away amounts within 10. Begin with concrete resources as above, but progress to abstract for 'automatic'



<u>Y1 Subtraction</u>

Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones.	Use physical objects, counters , cubes etc to show how objects can be taken away. 6-4=2 4-2=2	$\begin{array}{c} & & & & & & \\ & & & & & & \\ & & & & & $	7—4 = 3 16—9 = 7
Counting back	Move objects away from the group, counting backwards. Move the beads along the bead string as you count backwards.	been taken away.	Put 13 in your head, count back 4. What number are you at?
Find the Difference	Compare objects and amounts T am 2 years older than my sister' S Pencis S Pencis T am 2 years older than my sister' S Pencis	Count on using a number line to find the difference. +6 0 1 2 3 4 5 6 7 8 9 10 11 12	Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister.?



Year 1 Subtraction

Objective & Strategy	Concrete	Pictorial	Abstract
Represent and use number bonds and related subtraction facts within 20 Part Part Whole model	Link to addition. Use PPW model to model the inverse. If 10 is the whole and 6 is one of the arts, what s the other part? 10 - 6 = 4	Use pictorial representations to show the part.	Move to using numbers within the part whole model. 5 12 7
Make 10	14 - 9	13 - 7 = 6	16 - 8 How many do we take off first to get to 10? How many left to take off?
	Make 14 on the ten frame. Take 4 away to make ten, then take one more away so that you have taken 5.	Jump back 3 first, then another 4. Use ten as the stopping point.	
Bar model			8 2
	5 - 2 = 3		10 = 8 + 2 10 = 2 + 8 10 - 2 = 8 10 - 8 = 2



Year 2 Subtraction

Objective & Strategy	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	Use a Place value chart to show how to	00000 00000 20 - 4 =	20 - 4 = 16
	change a ten into ten ones, use the term 'take and make'		
Partitioning to subtract without	34 - 13 = 21	Children draw representations of Dienes and cross off.	43 - 21 = 22
regrouping.	Use Dienes to show how to partition the number when subtracting without regrouping.		
	- × ×	43—21 = 22	
Make ten strategy Progression should be crossing one ten, crossing		76 80 90 93 'counting on' to find 'difference'	93 - 76 = 17
more than one ten, crossing the hundreds.	34 - 28 = Use a bead bar or bead strings to model counting to next ten and the rest.	Use a number line to count on to next ten and then the rest.	



Year 3 Subtraction

Objective & Strategy	Concrete	Pictorial	Abstract
Column subtraction without regrouping	47—32 Use base 10 or Numicon to model	Cakulations 544 -222 -32	
Column subtraction with regrouping	Tens Units Image: Constraint of the state	Tens Ones 737277 10 + 6 = 16 Children may draw base ten or Place value counters and cross off.	$\begin{array}{c} 836-254 \cdot 582 \\ \hline 300 & 130 & 6 \\ \hline 200 & 50 & 4 \\ \hline 500 & 80 & 2 \end{array}$ Begin by partitioning into Place value columns $\begin{array}{c} 728-582=146 \\ \hline 77 & 12 & 8 \\ \hline 582 & 146 \\ \hline 77 & 12 & 8 \\ \hline 14 & 6 \end{array}$ Then move to formal method.



Year 4-6 Subtraction

Objective & Strategy	Concrete	Pictorial	Abstract
Subtracting tens and ones	234 – 179	Children to draw place value counters and show their exchange—see Y3	
Year 4 subtract with			$2 \times 5 4$
up to 4 digits.			-1562
Introduce decimal subtraction through context of money			
	Model process of exchange using Numicon, base ten and then move to Place value counters.		Use the phrase 'take and make' for ex- change
Year 5- Subtract with at least 4 digits, including money and measures.	As Year 4	Children to draw Place value counters and show their exchange—see Y3	2 8,9 2 8
Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal			Use zeros for place- holders. $7^{\prime} \times 6^{\prime} \times 0^{\prime}$ $- 372 \cdot 5^{\prime}$ $6796 \cdot 5^{\prime}$
Year 6—Subtract with increasingly large and more complex numbers and decimal			* * * 10,699 - 89,949 60,750
values.			$\frac{1}{10} \frac{10}{5} \cdot \frac{3}{14} \frac{1}{19} \frac{9}{kg}$ $- 36 \cdot 080 \frac{1}{kg}$ $- 69 \cdot 339 \frac{1}{kg}$





Objective	Concrete	Pictorial	Abstract
Automatically recall double facts within 10.	Use cubes, counters etc. to explore adding the same number to itself. Progression to abstract for 'automatic'		Double 2 is 4
	recall.		2 + 2 = 4
		0 + 0	

Year 1 Multiplication 🔀



Objective & Strategy	Concrete	Pictorial	Abstract
Doubling	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling	Draw pictures to show how to double numbers	Partition a number and then double each part before recombining it back together.
		Double 4 is 8	
	$double 4 is 8$ $4 \times 2 = 8$ $double 4 is 8$		$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
Counting in multiples	Count the groups as children are skip counting, children may use their fingers as they are skip counting.	Children make representations to show	Count in multiples of a number aloud. Write sequences with multiples of numbers.
		counting in multiples.	2, 4, 6, 8, 10



		$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5, 10, 15, 20, 25 , 30
Making equal groups and counting the total		Draw \bigcirc to show 2 x 3 = 6	2 × 4 = 8
		Draw and make representations	
	Use manipulatives to create equal groups.		

Year 1 Multiplication 💥

Objective & Strategy	Concrete	Pictorial	Abstract
Repeated addition		Use pictorial including number lines to solve problems There are 3 sweets in one bag. How many sweets are in 5 bags altogether?	Write addition sentences to describe objects and pictures.
	Use different objects to add equal groups		



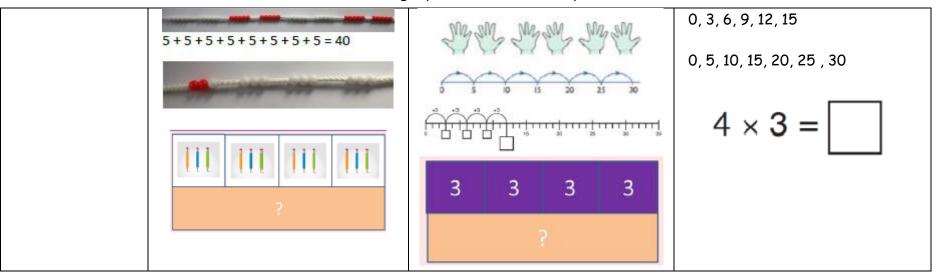
Understanding arrays	Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.	Draw representations of arrays to show understanding	3 × 2 = 6 2 × 5 = 10
	***** ****		

<u>Year 2 Multiplication</u> 关



Objective & Strategy	Concrete	Concrete Pictorial		
Doubling	Model doubling using dienes and Place value counters. 40 + 12 = 52	Draw pictures and representations to show how to double numbers	Partition a number and then double each part before recombining it back together.	
Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition)	Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.	Number lines, counting sticks and bar models should be used to show representation of counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 0, 2, 4, 6, 8, 10	





Year 2 Multiplication 🔀

Objective & Strategy	Concrete	Pictorial	Abstract
Multiplication is commutative	Create arrays using counters and cubes and Numicon. Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.	Use representations of arrays to show different calculations and explore commutativity.	12 = 3×4 12 = 4×3 Use an array to write multiplication sentences and reinforce repeated addition. 0 0 0 0 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 $5 \times 3 = 15$ $3 \times 5 = 15$

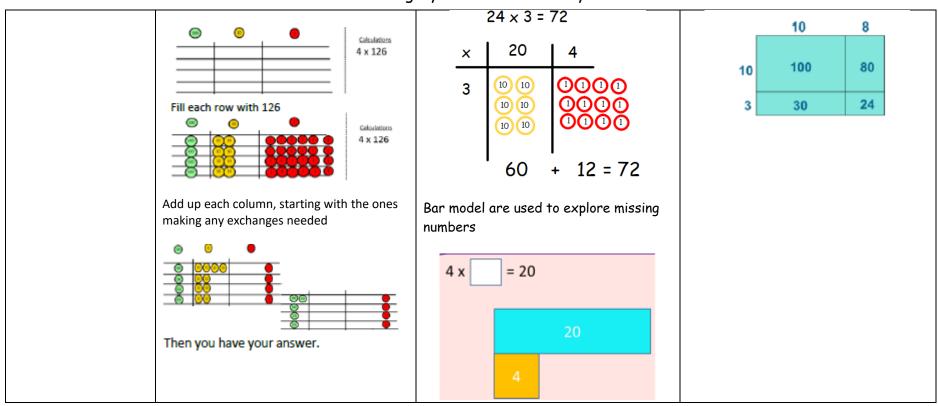


Using the Inverse This should be taught alongside division, so pupils learn how they work alongside each other.	$\begin{vmatrix} 4 & 2 \\ \hline 4 & 2 \\ \hline \times & = \\ \hline \times & = \\ \hline \times & = \\ \hline \div & = \\ \hline \div & = \\ \hline \div & = \\ \end{vmatrix}$	2 x 4 = 8 4 x 2 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 ÷ 4 4 = 8 ÷ 2 Show all 8 related fact family sentences.

Year 3 Multiplication 🔀

Objective & Strategy	Concrete	Pictorial	Abstract			
Grid method	Show the links with arrays to first introduce the grid method. 4 rows of 10 4 rows of 3 Move onto base ten to move towards a more compact method.	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below.	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. X 30 5 7 210 35 210 + 35 = 245			
	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		Moving forward, multiply by a 2 dig number showing the different rows within the grid method.			





Year 4 Multiplication 🔀

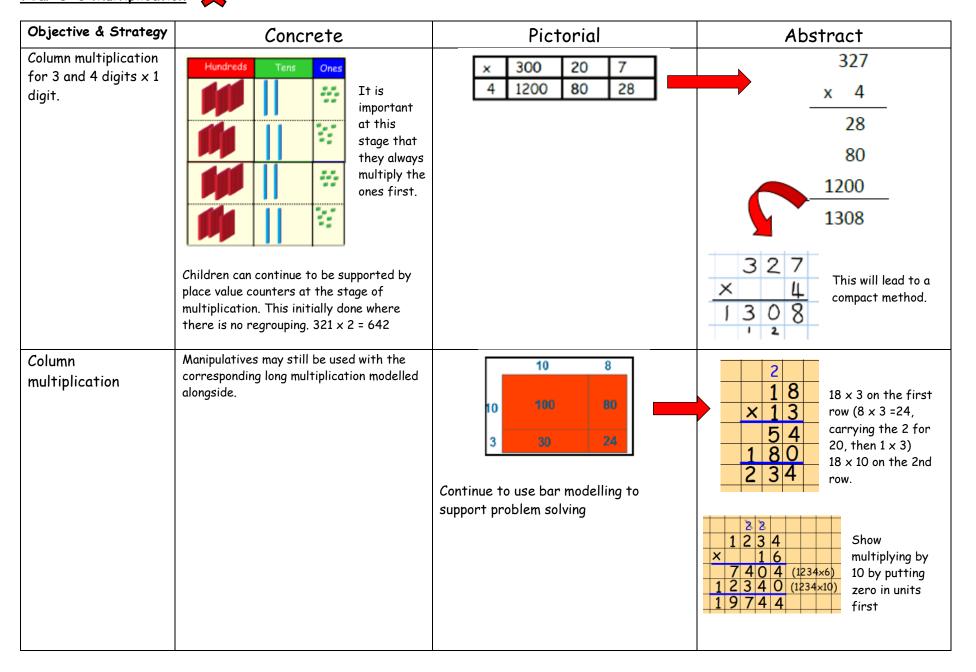
Objective & Strategy	Concrete	Pictorial	Abstract
Grid method recap from year 3 for 2 digits x 1 digit Move to multiplying 3 digit numbers by 1 digit. (Year 4 expectation)	Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below.	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. X 30 5 7 210 35 210 + 35 = 245



		24 × 3 = 72	
Column	Children can continue to be supported by	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	227
multiplication	Place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$ Image: the stage of multiplication is modelled alongside	× 300 20 7 4 1200 80 28 The grid method may be used to show how this relates to a formal written method. 59	327 $x 4$ 28 80 1200 1308 $3 2 7$ $x 4$ $1 3 0 8$ $x 4$













Objective & Strategy	Concrete	Pictorial	Abstract
Multiplying decimals up to 2 decimal places by a single digit.			Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer. $ \begin{array}{r} 3 \cdot 1 & 9 \\ $





Objective	Concrete	Pictorial	Abstract
Explore how quantities can be distributed equally.	Use cubes, counters etc to share amounts in to equal groups.		6 shared in to 2 groups is 3

Year1 Division

Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing		Children use pictures or shapes to	
Use ITPs for modelling https://garyhall.org.uk/national-	00	share quantities.	12 shared between 3 is 4
numeracy-strategy-itps.html	COMPANY AND	<u></u> – – – – – – – – – – – – – – – – – – –	
		8 shared between 2 is 4	
		Sharing:	
		12 shared between 3 is 4	



	10,	
I have 10 cubes, c equally in 2 groups	can you share them s?	



Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing Use Gordon ITPs for modelling	I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities.	12 ÷ 3 = 4



•		12 •••• ••• ••• 12 ÷ 4 = 3	
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.	Use number lines for grouping 123458739101112 123458739101112 $12\div3=4$ 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. 20 $12 \div 5 = ?$ $5 \times ? = 20$	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

Year 3 Division

Objective & Strategy	Concrete	Pictorial	Abstract
Division as grouping	Use cubes, counters, objects or place value counters to aid understanding.	Continue to use bar modelling to aid solving division problems.	How many groups of 6 in 24?
		20 ? 20 ÷ 5 = ?	24 ÷ 6 = 4
	24 divided into groups of 6 = 4	5 X ? = 20	



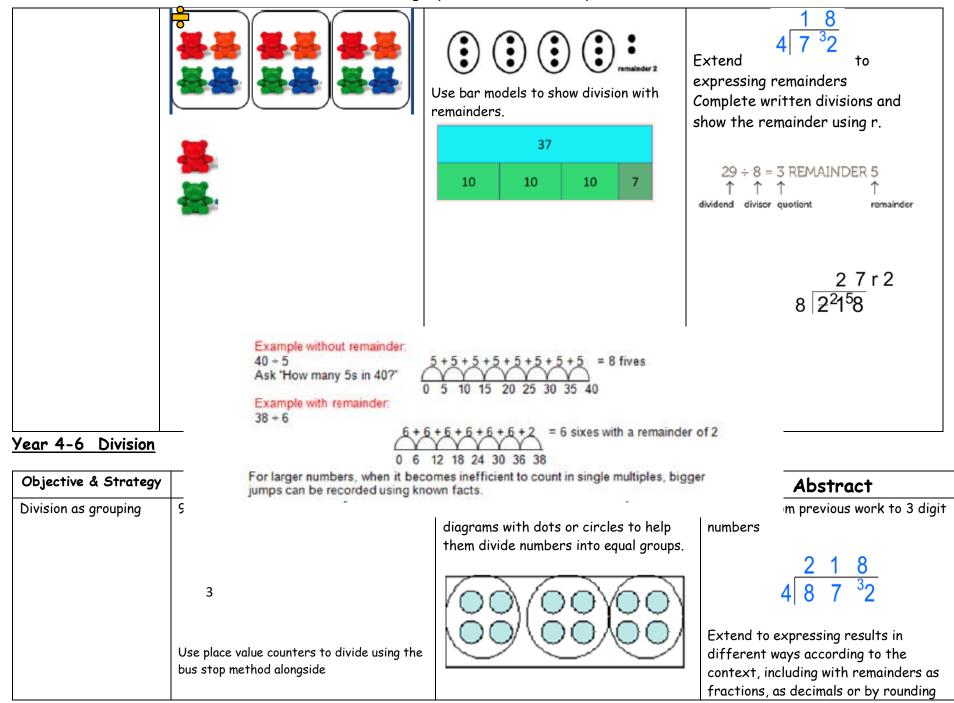
	96 ÷ 3 = 32		
Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. E.g. $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	Draw an array and use lines to split the array into groups to make multiplication and division sentences	Find the inverse of multiplication and division sentences by creating eight linking number sentences. $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$

Year 3 Division

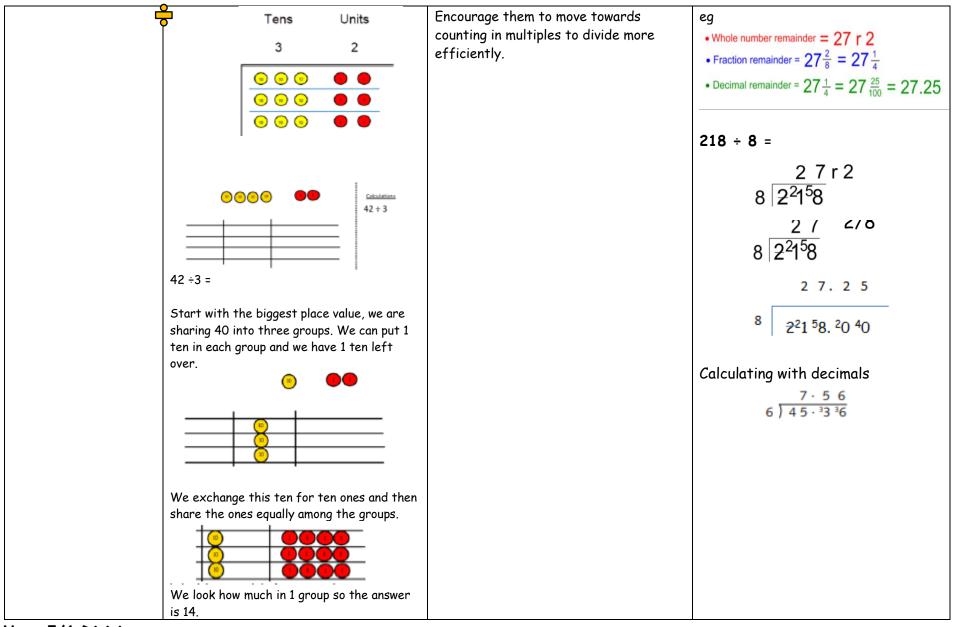
Objective & Strategy	Concrete	Pictorial	Abstract
Division with remainders.	14 ÷ 3 = Divide objects between groups and see how much is left over	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.	
			Move onto remainders occurring
		Draw dots and group them to divide an amount and clearly show a remainder.	within the calculation.



St Gregory's Catholic Academy







Year 5/6 Division

Objective & Strategy	Concrete	Pictorial	Abstract
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Long Division		Use long division to divide numbers up
Long Division		to 4 digits by a 2-digit whole number.
		re raigns by a 2 aight whole humber.
		Expanded written method of long
		division
		GIVISION
		324r4
		18)5836
		- <u>5 4 0 0</u> (300 × 18)
		³ 4 ¹³ 3 6
		- <u>360</u> (20 × 18)
		7 6
		- <u>7 2</u> (4 × 18)
		4
		$5836 \div 18 = 324 \text{ r} 4 \text{ or } 324\frac{2}{9}$
		Formal written method of long division
		3 2 4 r 4
		18)5836
		- <u>5 4</u> ↓
		4 3
		- 36
		7 6
		- 72
		4
		5836 ÷ 18 = 324 r 4 or 324 ² / ₉