

## St Thomas More Catholic School Calculation Policy

### Aims:

Children should be able to use an efficient method, mental or written appropriate to the given task, with understanding. By the end of year 6, children will have been taught, and be secure with, a compact standard method for each operation.

### To develop efficient written calculation strategies children need:

- \* Secure mental methods which are developed from early years
- \* A solid understanding of the number system
- \* Practical hands on experience including a range of manipulatives
- \* Visual models and images including number lines and arrays
- \* Experience of expanded methods to develop understanding and avoid rote learning
- \* Secure understanding of each stage before moving onto the next.

### Before carrying out a calculation, children will be encouraged to consider:

- \* Can I do it in my head? (using rounding, adjustment)
- \* The size of an approximate answer (estimation)
- \* Could I use jottings to keep track of the calculation?
- \* Do I need to use an expanded or compact written method?

### Pre requisite skills for written calculations

#### *Addition and subtraction:*

- \* Do they know all the addition and subtraction facts for all numbers to 20?
- \* Do they understand place value and can they partition and then re-partition numbers?
- \* Can they add three single digit numbers mentally?
- \* Can they add and subtract any pair of two digit numbers mentally?
- \* Can they explain their mental strategies orally and record them using informal jottings?

#### *Multiplication and Division:*

- \* Do they know the 2, 5 and 10 times tables and corresponding division facts?
- \* Do they know the result of multiplying by 1 and 0?
- \* Do they understand 0 as a place holder?
- \* Can they multiply two and three digit numbers by 10 and 100?
- \* Can they double and halve two digit numbers mentally?

\* Can they use multiplication and division facts they know to derive mentally other multiplication and division facts that they do not know?

\* Can they explain their mental strategies orally and record them using informal jottings?

These lists are not exhaustive but are a guide for the teacher as they structure the move from informal to formal methods of calculation. It is vitally important that children's mental methods of calculation are continued to be practised and secured alongside their learning and use of an efficient written method for each operation.

### **Progression of learning in addition, subtraction, multiplication and division across KS1 and KS2**

	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 the same amount of decimal places)	Column method with regrouping. (Decimals- with different amounts of decimal places)
Multiplication	Doubling Counting in multiples Arrays (with support)	Doubling Counting in multiples Repeated addition Arrays- showing commutative multiplication	Counting in multiples Repeated addition Arrays- showing commutative multiplication Grid method	Column multiplication (2 and 3 digit multiplied by 1 digit)	Column multiplication (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication (multi digit up to 4 digits by a 2 digit number)
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)

### **A pathway to teaching calculation methods:**

Expanded methods should be viewed as steps towards a standard method and not as methods in themselves.

Before beginning to record in a more refined written format children must have had significant practical work reinforced with appropriate manipulative, models and images.


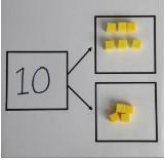

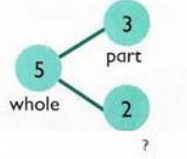

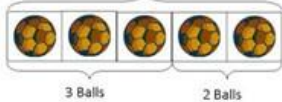

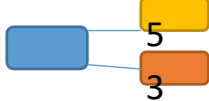




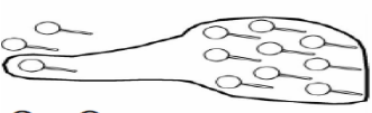
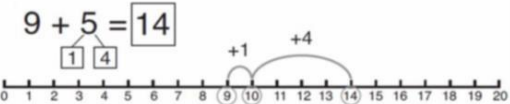

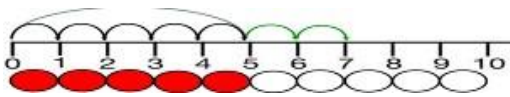
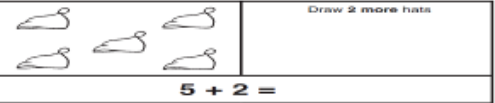
Teachers will guide pupils to refine their written methods of recording by modelling and asking questions such as “What is the same? What’s different?”

Learning will be planned to ensure pupils are encouraged to use and apply what they have learnt to problem solving tasks.

As children move along the pathway it is vital that they practice, reinforce, consolidate, use and apply it to mathematical learning and NOT simply move onto the next step.


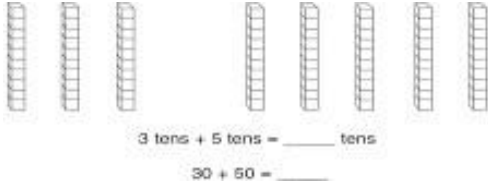
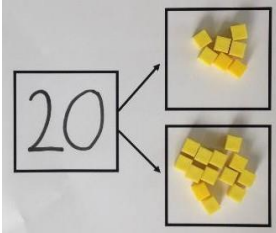
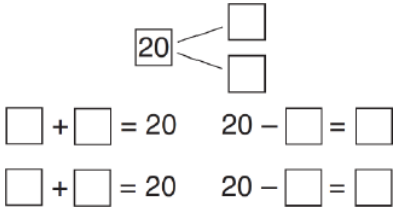
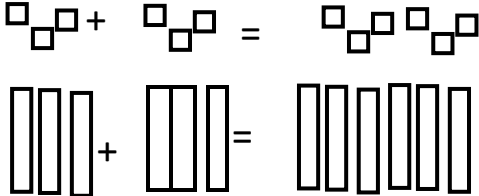
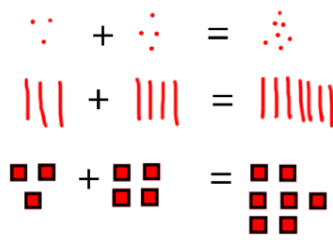


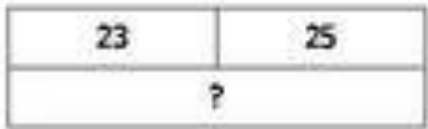




Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	  <p>Use part part whole model.</p> <p>Use cubes to add two numbers together as a group or in a bar.</p> 	   <p>Use pictures to add two numbers together as a group or in a bar.</p> 	$4 + 3 = 7$  <p>Use the part-part whole diagram as shown above to move into the abstract.</p> $10 = 6 + 4$
Starting at the bigger number and counting on	 <p>Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.</p>	$12 + 5 = 17$  <p>Start at the larger number on the number line and count on in ones or in one jump to find the answer.</p>	$5 + 12 = 17$ <p>Place the larger number in your head and count on the smaller number to find your answer.</p>
Regrouping to make 10.  <i>This is an essential skill for column addition later.</i>	 <p><math>6 + 5 = 11</math></p>  <p>Start with the bigger number and use the smaller number to make 10.</p> <p>Use ten frames.</p>	 <p><math>3 + 9 =</math></p> <p>Use pictures or a number line. Regroup or partition the smaller number using the part part whole model to make 10.</p>  <p><math>9 + 5 = 14</math></p>	$7 + 4 = 11$ <p>If I am at seven, how many more do I need to make 10. How many more do I add on now?</p>
Represent & use number bonds and related subtraction facts within 20	 <p>2 more than 5 is 7</p> <p>Bead strings used for number bonds for ALL numbers to 20</p>	  <p>Draw 2 more hats</p> <p><math>5 + 2 =</math></p>	<p>Emphasis should be on the language</p> <p>'1 more than 5 is equal to 6.'</p> <p>'2 more than 5 is 7.'</p> <p>'8 is 3 more than 5.'</p>

# Y1

# ADDITION +

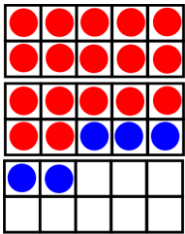
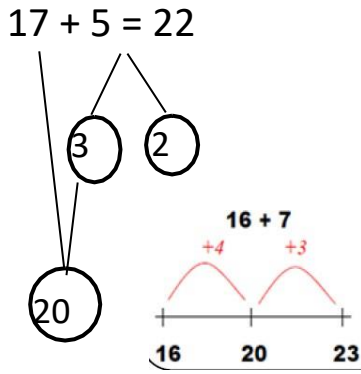
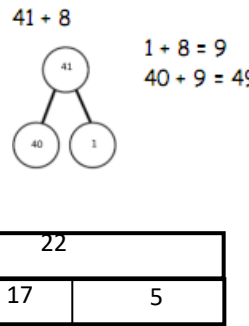
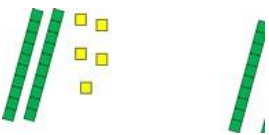
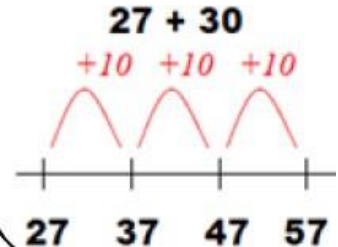
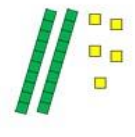
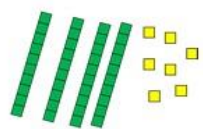
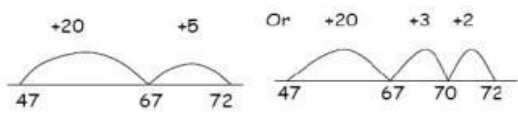
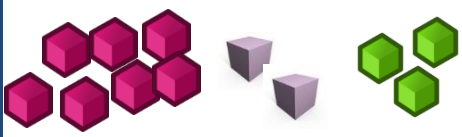


Objective & Strategy	Concrete	Pictorial	Abstract
Adding multiples of ten	$50 = 30 + 20$  Model using dienes and bead strings	 $3 \text{ tens} + 5 \text{ tens} = \underline{\quad} \text{ tens}$ $30 + 50 = \underline{\quad}$ Use representations for base ten.	$20 + 30 = 50$ $70 = 50 + 20$ $40 + \square = 60$
Use known number facts  Part part whole	 Children explore ways of making numbers within 20	 $\square + \square = 20$ $20 - \square = \square$ $\square + \square = 20$ $20 - \square = \square$	$\square + 1 = 16$ $16 - 1 = \square$ $1 + \square = 16$ $16 - \square = 1$
Using known facts - understanding flexibility of numbers	 Lots of work on understanding partitioning using dienes, e.g 47 can be partitioned into 40 and 7, 30 and 17, 20 and 27, 45 and 2, 36 and 11 etc.	 Children draw representations of H,T and O	$3 + 4 = 7$ <i>leads to</i> $30 + 40 = 70$ <i>leads to</i> $300 + 400 = 700$
Bar model	 $3 + 4 = 7$	 $7 + 3 = 10$	 $23 + 25 = 48$

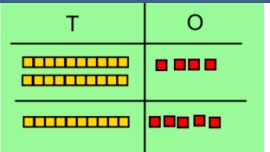

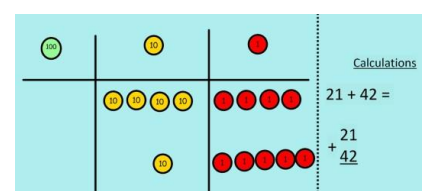
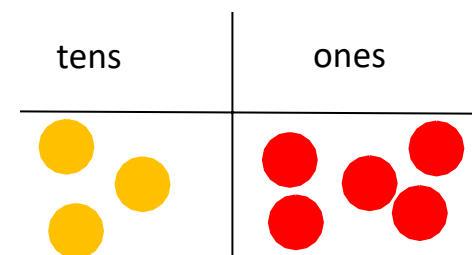
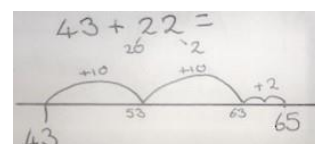
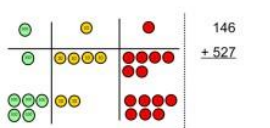
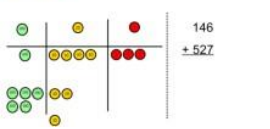
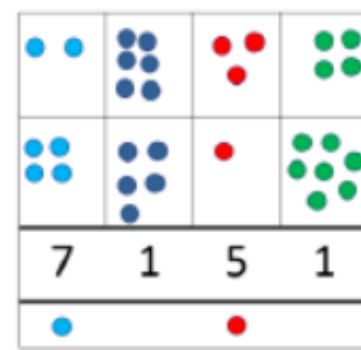
Y2

# ADDITION +

Y2

## ADDITION +

Objective & Strategy	Concrete	Pictorial	Abstract
Add a two digit number and ones  Children explore the pattern. $17 + 5 = 22$ $27 + 5 = 32$	 <p>Use ten frame to make 'magic ten'</p>	$17 + 5 = 22$ Use part part whole and number line to model. 	$41 + 8$ 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		$27 + 30$ 	$27 + 10 = 37$ $27 + 20 = 47$ $27 + \square = 57$
Add two 2-digit numbers  Model using dienes, place value counters and numicon	 	 <p>Use number line and bridge ten using part whole if necessary.</p>	$25 + 47$ $20 + 40 = 60$ $5 + 7 = 12$ $60 + 12 = 72$
Add three 1-digit numbers  Combine to make 10 first if possible, or bridge 10 then add third digit		 <p>Regroup and draw representation.</p> 	$4 + 7 + 6 = 10 + 7 = 17$ Combine the two numbers that make/ bridge ten then add on the third.

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Column Addition—no regrouping (friendly numbers)</p> <p>Add two or three 2 or 3-digit numbers.</p>	<p>Model using Dienes or Numicon</p>  <p>Add together the ones first, then the tens.</p>   <p>Move to using place value counters</p>	<p>Children move to drawing the counters using a tens and one frame.</p>  <p>use an empty number line to solve the calculation</p> 	$223 + 114 =$ $200 + 20 + 3$ $+ 100 + 10 + 4$ <hr/> $300 + 30 + 7 = 337$ <p>Add the ones first, then the tens, then the hundreds.</p>
<p>Column Addition with regrouping.</p>	<p>Column method – regrouping using place value counters and Base 10:</p> <p>Make both numbers on a place value grid.</p>  <p>Add up the units and exchange 10 ones for one 10.</p>  <p>Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.</p> <p>This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.</p> <p>As children move on to decimals, money and decimal place value counters can be used to support learning.</p>	<p>Children can draw a representation of the grid to further support their understanding, carrying the ten <u>underneath</u> the line</p> $2634 + 4517 =$ 	$\begin{array}{r} 20 \\ 40 \\ 60 \end{array} + \begin{array}{r} 5 \\ 8 \\ 13 \end{array} = 73$ <p>Start by partitioning the numbers before formal column to show the exchange.</p> $\begin{array}{r} 25 \\ + 48 \\ \hline 73 \\ 1 \end{array}$

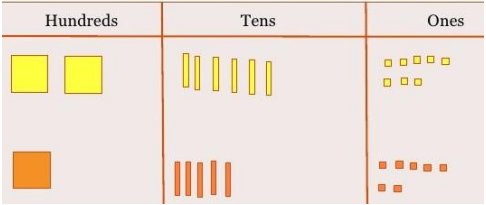
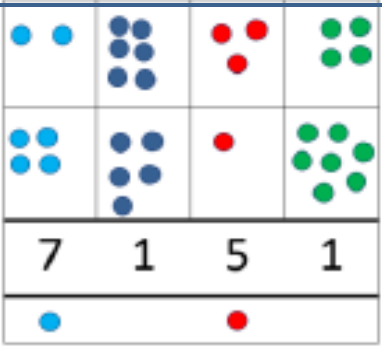
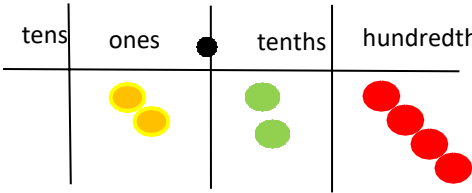
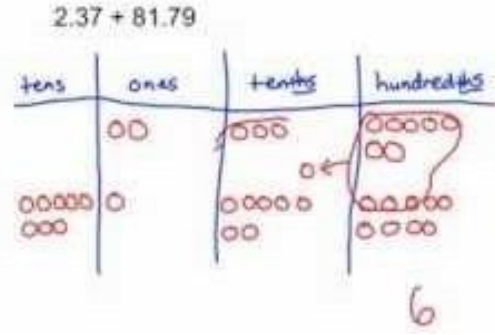
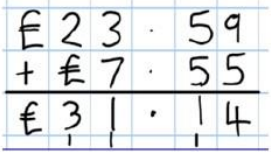
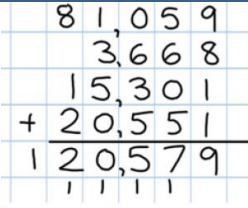
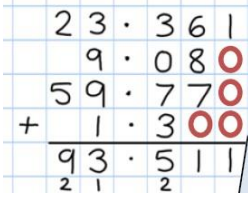
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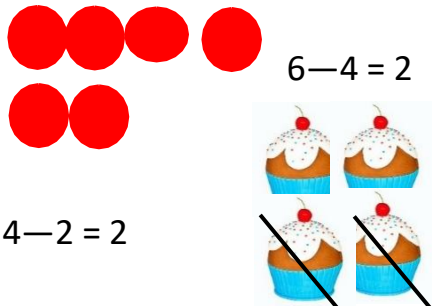
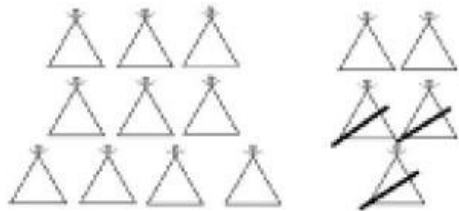
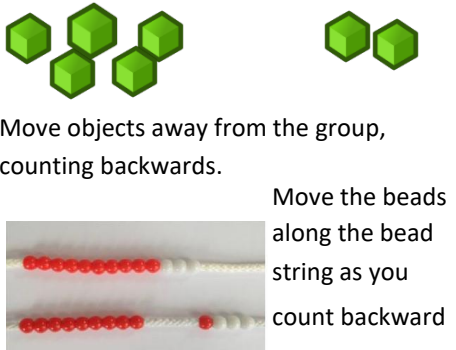
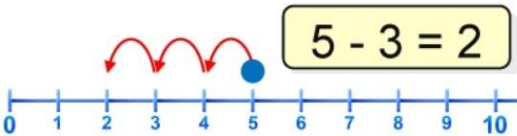
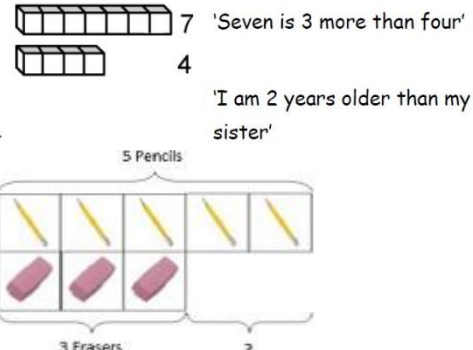
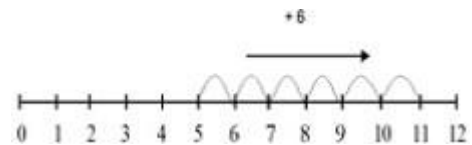
ADDITION +



Y4-6

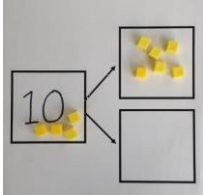
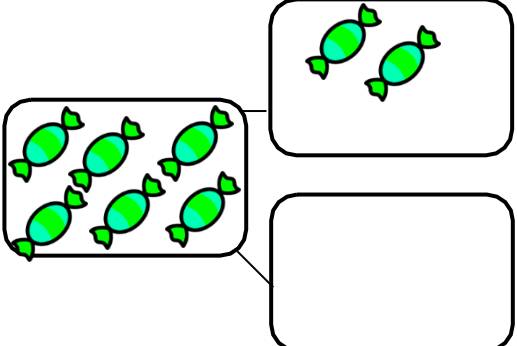
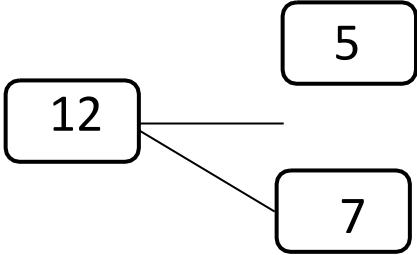
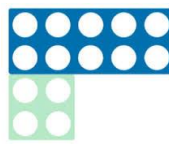
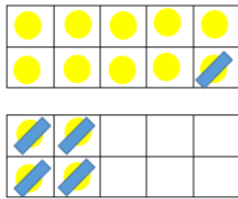
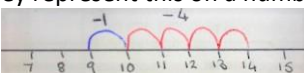

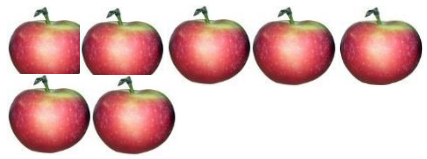

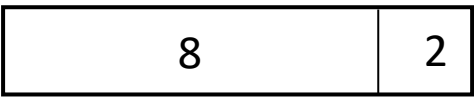
## ADDITION +

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Y4—add numbers with up to 4 digits</p>	<p>Children continue to use dienes or pv counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.</p> 	 <p>Draw representations using pv grid.</p> <p>Use digit cards using PV grid</p>	<p>Begin with expanded method as in Y3</p> <div data-bbox="1458 288 1704 496"> <math display="block">\begin{array}{r} 7836 \\ +1351 \\ \hline 9187 \\ 1 \end{array}</math> </div> <p>Continue from previous work to carry hundreds as well as tens.</p> <p>Relate to money and measures.</p>
<p>Y5—add numbers with more than 4 digits.</p> <p>Add decimals with 2 decimal places, including money.</p>	<p>As year 4</p>  <p>Introduce decimal place value counters and model exchange for addition.</p>		<div data-bbox="1480 679 1603 855"> <math display="block">\begin{array}{r} 72.8 \\ +54.6 \\ \hline 127.4 \\ 11 \end{array}</math> </div> 
<p>Y6—add several numbers of increasing complexity</p> <p>Including adding money, measure and decimals with different numbers of decimal points.</p>	<p>As Y5</p>	<p>As Y5</p>	 <p>Insert zeros for place holders.</p> 

Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones.	<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  <p><math>6 - 4 = 2</math></p> <p><math>4 - 2 = 2</math></p>	 <p><math>15 - 3 = 12</math></p> <p>Cross out drawn objects to show what has been taken away.</p>	<p>Written calculations using variations in layout:</p> $7 - 4 = 3$ $\square = 7 - 4$ $16 - 9 = 7$
Counting back	 <p>Move objects away from the group, counting backwards.</p> <p>Move the beads along the bead string as you count backward</p>	 <p><math>5 - 3 = 2</math></p> <p>Count back in ones using a number line. Start at the bigger number and count back the smaller number showing jumps on the number line.</p>	<p>Put 13 in your head, count back 4. What number are you at?</p>
Find the Difference	<p>Compare objects and amounts</p>  <p>7 'Seven is 3 more than four'</p> <p>4</p> <p>5 Pencils</p> <p>3 Erasers</p> <p>?</p> <p>Lay objects to represent bar model.</p>	<p>Count on using a number line to find the difference.</p>  <p>+6</p>	<p>Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?</p>

Y1

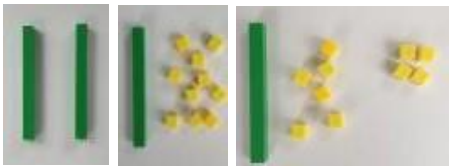
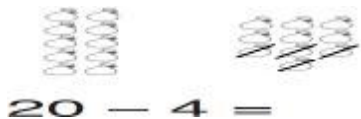
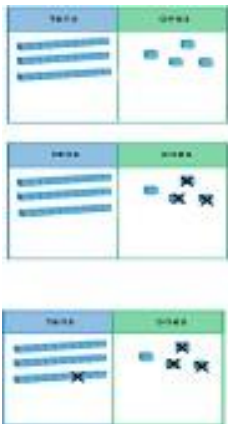
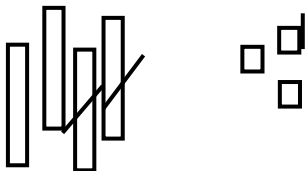
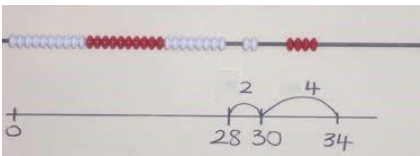
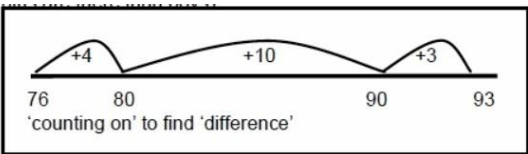
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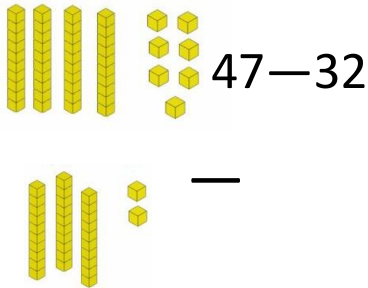
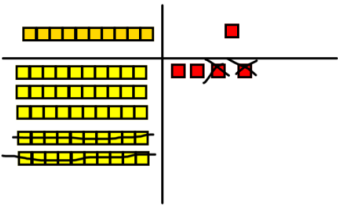
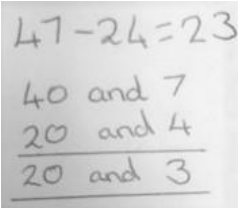


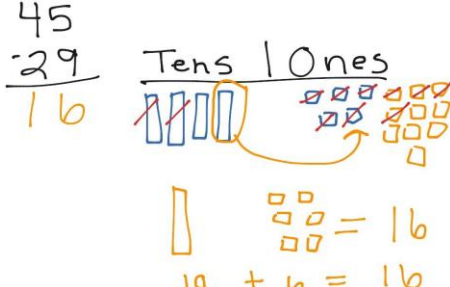
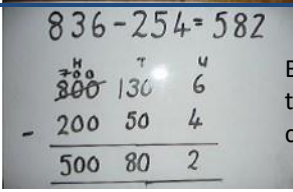
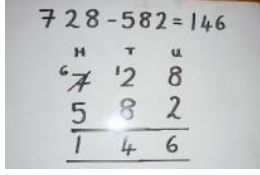
Objective & Strategy	Concrete	Pictorial	Abstract
<b>Represent and use number bonds and related subtraction facts within 20</b>  <b>Part Part Whole model</b>	 <p>Link to addition. Use PPW model to model the inverse.</p> <p>If 10 is the whole and 6 is one of the parts, what's the other part?</p> $10 - 6 = 4$	 <p>Use pictorial representations to show the part.</p>	<p>Move to using numbers within the part whole model.</p> 
<b>Make 10</b>	$14 - 5$  <p>Make 14 on the numicon (or ten frame). Take 4 away to make ten, then take one more away (cover one up) so that you have taken 5.</p>	 <p>Children to represent numicon pictorially. Can they represent this on a number line?</p> 	$14 - 5$ <p>Children to solve mentally and explain: how many do we take off first to get to 10? How many left to take off?</p> <p>Children need to know related facts that will help them</p>  <p>5 is made up of 4 and 1 so I can subtract 4 to make 10 and then 1 to get to 9</p>
<b>Bar model</b>	 $5 - 2 = 3$		 $10 = 8 + 2$ $10 = 2 + 8$ $10 - 2 = 8$ $10 - 8 = 2$

Y1

SUBTRACTION -

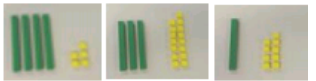

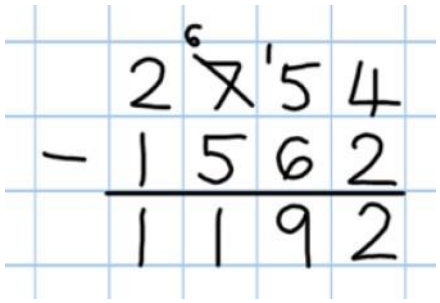
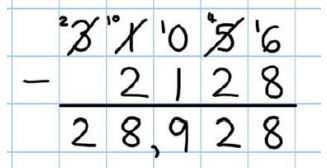
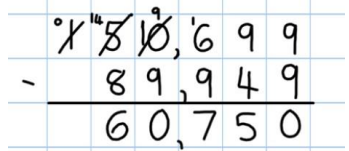
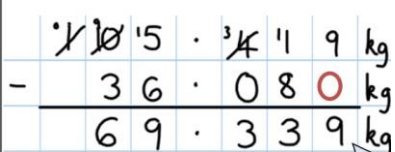
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Objective & Strategy	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	 <p>Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'</p>		$20 - 4 = 16$
Partitioning to subtract without regrouping. <i>'Friendly numbers'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

Objective & Strategy	Concrete	Pictorial	Abstract
Column subtraction without regrouping (friendly numbers)	 <p>47—32</p> <p>Use base 10 or Numicon to model making the bigger number and then taking the smaller number away</p>	 <p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$ <p>Draw base 10 representations next to the written number sentence to support understanding of working out.</p>	 <p>Intermediate step needed to lead to clear subtraction understanding.</p> 
Column subtraction with regrouping	<p>Column method (using base 10 and having to exchange)</p> <p>45-26</p>  <ol style="list-style-type: none"> <li>1) Start by partitioning 45</li> <li>2) Exchange one ten for ten more ones</li> <li>3) Subtract the ones, then the tens.</li> </ol>	 <p>Children may draw base ten or PV counters and cross off.</p>	 <p>Begin by partitioning into pv columns</p>  <p>Then move to formal method.</p>

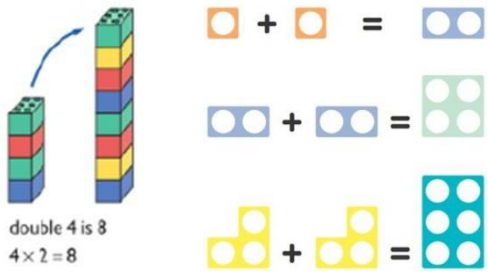


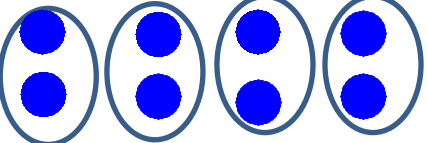
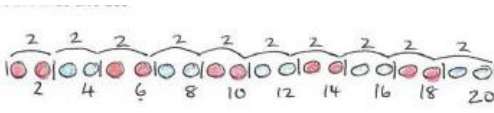

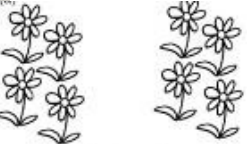

Y3

SUBTRACTION -

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Subtracting tens and ones</p> <p>Year 4 subtract with up to 4 digits.</p> <p><i>Introduce decimal subtraction through context of money</i></p>	<p><b>Column method</b> (using base 10 and having to exchange)</p> <p>45-26</p>  <ol style="list-style-type: none"> <li>1) Start by partitioning 45</li> <li>2) Exchange one ten for ten more ones</li> <li>3) Subtract the ones, then the tens.</li> </ol> <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p>	<p>Children to use digit cards and pv counters and show their exchange—see Y3</p>  <p>Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.</p>	 <p>Use the phrase 'exchange' for H/T/U</p>
<p>Year 5- Subtract with at least 4 digits, including money and measures.</p> <p><i>Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal</i></p>	As Year 4	Children to draw pv counters and show their exchange—see Y3	 <p>Use zeros for place-holders.</p>
Year 6—Subtract with increasingly large and more complex numbers and decimal values.			 

Y4-6

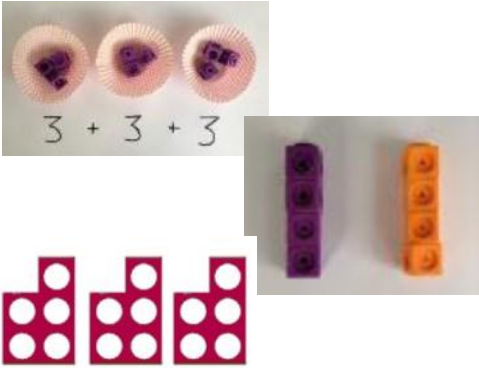
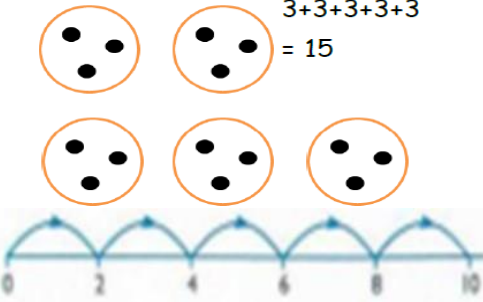

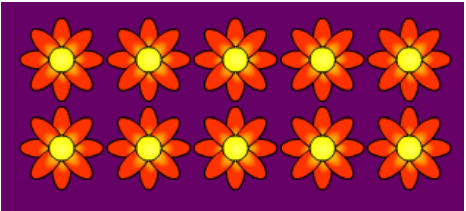
SUBTRACTION -

Objective & Strategy	Concrete	Pictorial	Abstract
Doubling	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling</p>  <p>double 4 is 8 <math>4 \times 2 = 8</math></p>	<p>Draw pictures to show how to double numbers</p> <p>Double 4 is 8</p> 	<p>Mental recall of doubles. Can they use knowledge of doubles to solve simple word problems?</p>
Counting in multiples	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting.</p> 	 <p>Children make representations to show counting in multiples.</p> 	<p>Count in multiples of a number aloud. Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>
Making equal groups and counting the total	  <p><math>\square \times \square = 8</math></p> <p>Use manipulatives to create equal groups.</p>	<p>Draw  to show <math>2 \times 3 = 6</math></p> <p>Draw and make representations</p>	<p><math>2 \times 4 = 8</math></p>

Y1

MULTIPLICATION X



Objective & Strategy	Concrete	Pictorial	Abstract
Repeated addition	 <p>Use different objects to add equal groups</p>	<p>Use pictorial including number lines to solve problems.</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p> 	<p>Write addition sentences to describe objects and pictures.</p> 
Understanding arrays	<p>Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.</p> 	<p>Draw representations of arrays to show understanding</p>	$3 \times 2 = 6$ $2 \times 5 = 10$

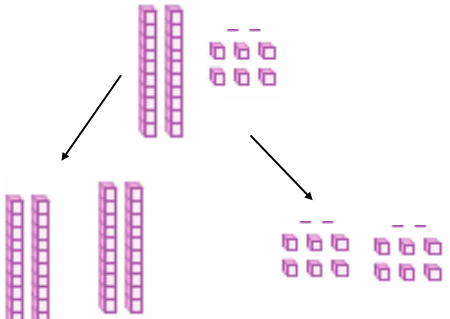
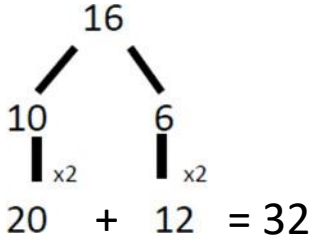
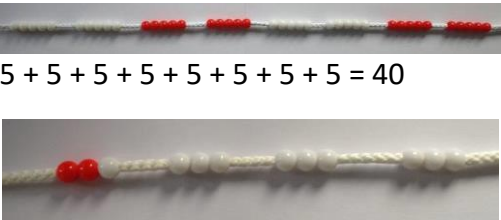
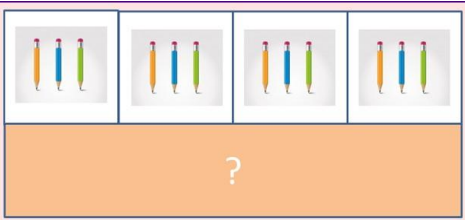
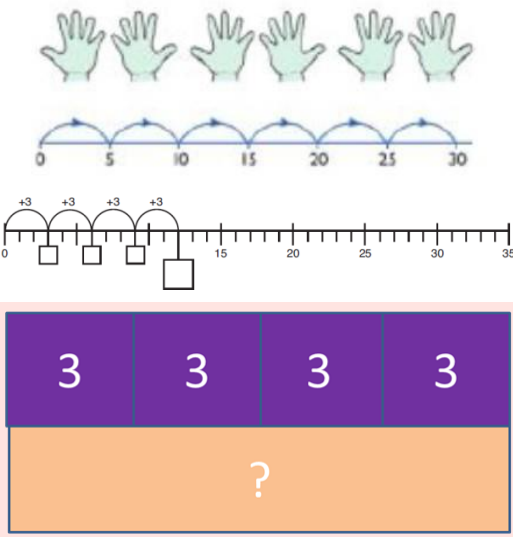
Y1

MULTIPLICATION







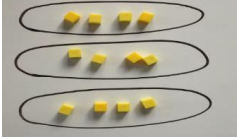
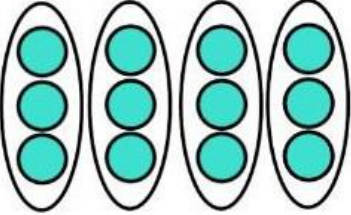
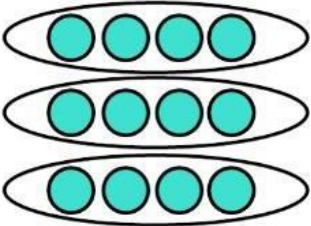


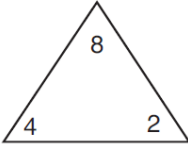
Y2

MULTIPLICATION

Objective & Strategy	Concrete	Pictorial	Abstract
Doubling	<p>Model doubling using dienes and PV counters.</p>  $40 + 12 = 52$	<p>Draw pictures and representations to show how to double numbers</p>	<p>Partition a number and then double each part before recombining it back together.</p>  $20 + 12 = 32$
Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition)	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.</p>  $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40$ 	<p>Number lines, counting sticks and bar models should be used to show representation of counting in multiples.</p> 	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>0, 2, 4, 6, 8, 10</p> <p>0, 3, 6, 9, 12, 15</p> <p>0, 5, 10, 15, 20, 25, 30</p> <p>Missing number</p> $4 \times \square = 12$ $4 \times 3 = \square$

Y2

## MULTIPLICATION X

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Multiplication is commutative</p>	<p>Create arrays using counters and cubes and Numicon.</p>    <p>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.</p>  	<p>Use representations of arrays to show different calculations and explore commutativity.</p>  	<p><math>12 = 3 \times 4</math></p> <p><math>12 = 4 \times 3</math></p> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p><math>5 + 5 + 5 = 15</math></p> <p><math>3 + 3 + 3 + 3 + 3 = 15</math></p> <p><math>5 \times 3 = 15</math></p> <p><math>3 \times 5 = 15</math></p>
<p>Using the Inverse</p> <p><i>This should be taught alongside division, so pupils learn how they work alongside each other.</i></p>		 <p>□ × □ = □</p> <p>□ × □ = □</p> <p>□ ÷ □ = □</p> <p>□ ÷ □ = □</p>	<p><math>2 \times 4 = 8</math></p> <p><math>4 \times 2 = 8</math></p> <p><math>8 \div 2 = 4</math></p> <p><math>8 \div 4 = 2</math></p> <p><math>8 = 2 \times 4</math></p> <p><math>8 = 4 \times 2</math></p> <p><math>2 = 8 \div 4</math></p> <p><math>4 = 8 \div 2</math></p> <p>Show all 8 related fact family sentences.</p>

Y3

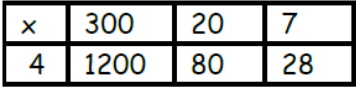
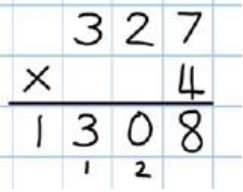

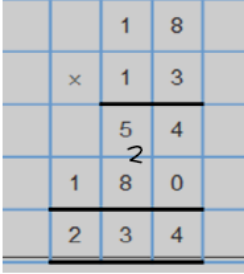
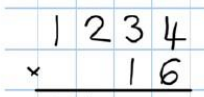
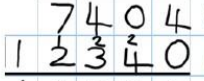
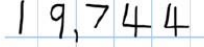
## MULTIPLICATION

Objective & Strategy	Concrete	Pictorial	Abstract
Grid method	<p>Show the links with arrays to first introduce the grid method.</p> 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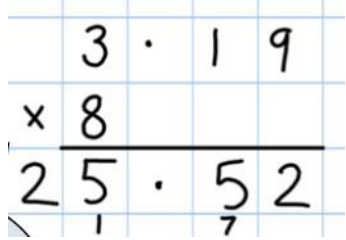
## MULTIPLICATION X

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Grid method recap from year 3 for 2 digits x 1 digit</p> <p>Move to multiplying 3 digit numbers by 1 digit. (year 4 expectation)</p>	<p>Using practical resources e.g. counters, children can use previous knowledge of arrays to make the grid method. We are multiplying by 4 so we need 4 rows</p> 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Objective & Strategy	Concrete	Pictorial	Abstract
Column Multiplication for 3 and 4 digits x 1 digit.	Children can continue to be supported by place value counters at the stage of multiplication.	 <p>Arrays for identifying factors of numbers</p>	
Column multiplication	Manipulatives may still be used with the corresponding long multiplication modelled alongside.	 <p>Continue to use bar modelling to support problem solving</p>	 <p>18 x 3 on the first row (8 x 3 = 24, carrying the 2 for 20, then 1 x 3) 18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in units first</p>  <p>(1234 x 6)</p>  <p>(1234 x 10)</p> 

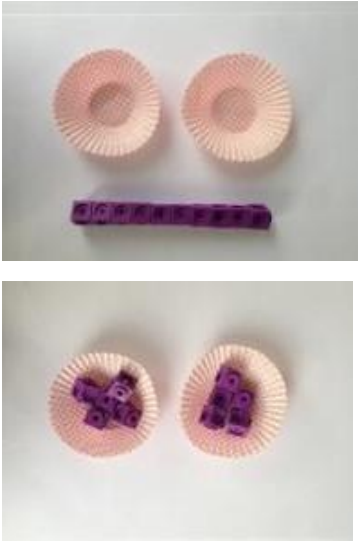
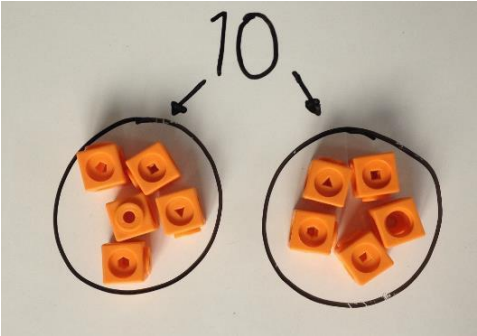
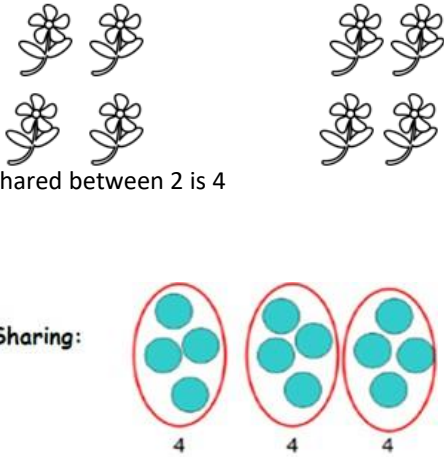
Y5-6

## MULTIPLICATION X

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Multiplying decimals up to 2 decimal places by a single digit.</p>			<p>Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer.</p> 

# Y6

# MULTIPLICATION X

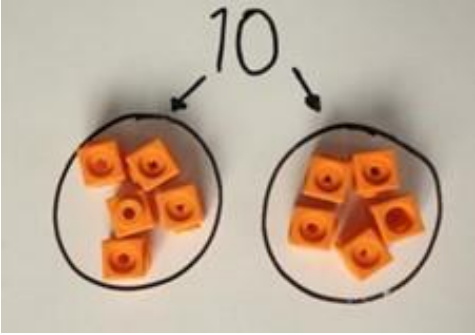
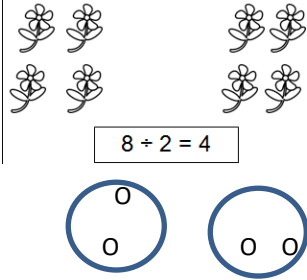
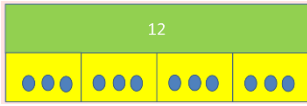
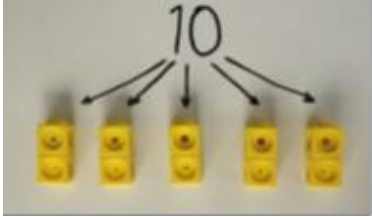
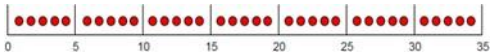
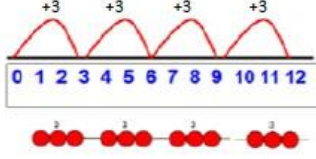

Objective & Strategy	Concrete	Pictorial	Abstract
<p>Division as sharing</p> <p><i>Use Gordon ITPs for modelling</i></p>	  <p>I have 10 cubes, can you share them equally in 2 groups?</p>	<p>Children use pictures or shapes to share quantities.</p>  <p>8 shared between 2 is 4</p> <p>Sharing:</p> <p>12 shared between 3 is 4</p>	<p>12 shared between 3 is</p> <p>4</p>

Y1

# DIVISION

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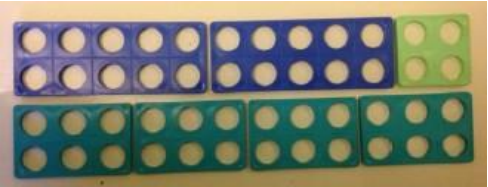

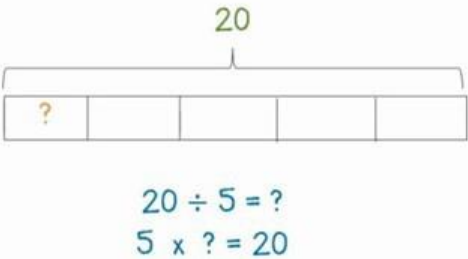
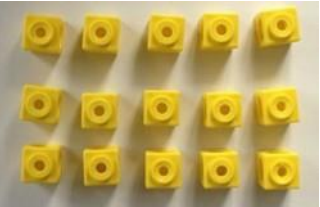
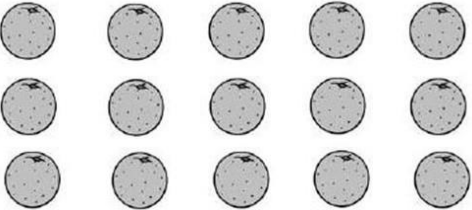
Objective & Strategy	Concrete	Pictorial	Abstract
Division as sharing	 <p>I have 10 cubes, can you share them equally in 2 groups?</p> <p>Use a range of manipulatives</p>	<p>Children use pictures or shapes to share quantities. Move on to sorting circles</p>  <p>Children use bar modelling to show and support understanding.</p> <p><math>12 \div 4 = 3</math></p> 	$12 \div 3 = 4$
Division as grouping	<p>Divide quantities into equal groups.</p> <p>Use cubes, counters, objects or place value counters to aid understanding.</p>  	<p>Use number lines for grouping</p>  <p><math>12 \div 3 = 4</math></p> <p>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.</p>  <p><math>20 \div 5 = ?</math>  <math>5 \times ? = 20</math></p>	$28 \div 7 = 4$ <p>Divide 28 into 7 groups. How many are in each group?</p>

Y2

DIVISION



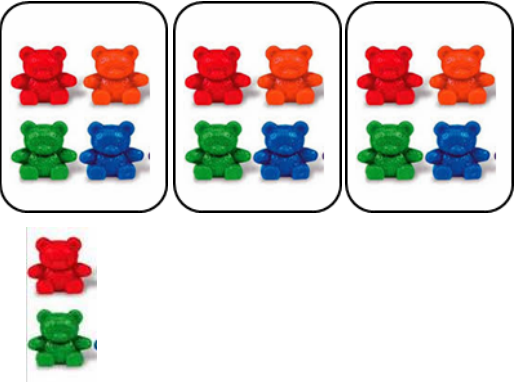
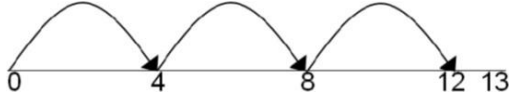

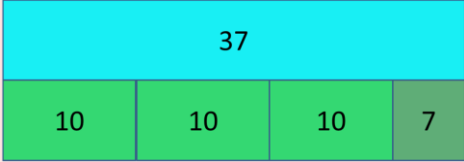
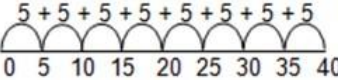
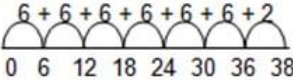


Objective & Strategy	Concrete	Pictorial	Abstract
Division as grouping	<p>Use cubes, counters, objects or place value counters to aid understanding.</p>  <p>24 divided into groups of 6 = 4</p> $96 \div 3 = 32$ 	<p>Continue to use bar modelling to aid solving division problems.</p> 	<p>How many groups of 6 in 24?</p> $24 \div 6 = 4$
Division with arrays	 <p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p> <p>Eg <math>15 \div 3 = 5</math>    <math>5 \times 3 = 15</math></p> <p><math>15 \div 5 = 3</math>    <math>3 \times 5 = 15</math></p>	<p>Draw an array and use lines to split the array into groups to make multiplication and division sentences</p> 	<p>Find the inverse of multiplication and division sentences by creating eight linking number sentences.</p> $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$

Y6

DIVISION

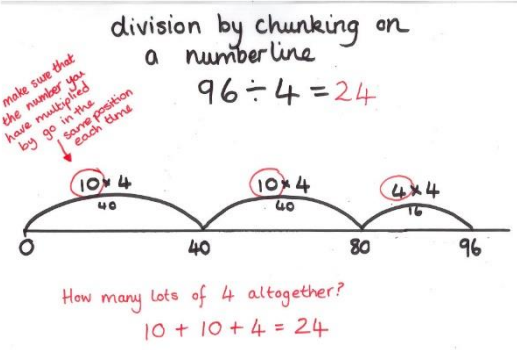
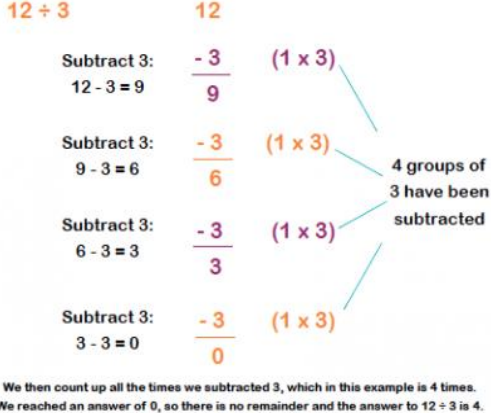


Objective & Strategy	Concrete	Pictorial	Abstract
Division with remainders.	<p><math>14 \div 3 =</math></p> <p>Divide objects between groups and see how much is left over</p>  <p>Ensure children understand how to share 'into 3 groups' AND 'into groups of 3'</p> <p><b>Example without remainder:</b>  <math>40 \div 5</math>            Ask "How many 5s in 40?"</p> <p><b>Example with remainder:</b>  <math>38 \div 6</math></p> <p>For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.</p>	<p>Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.</p>  <p>Draw dots and group them to divide an amount and clearly show a remainder.</p>  <p>Use bar models to show division with remainders.</p>  <p><b>Example without remainder:</b>  <math>5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 \text{ fives}</math></p>  <p><b>Example with remainder:</b>  <math>6 + 6 + 6 + 6 + 6 + 6 + 2 = 6 \text{ sixes with a remainder of 2}</math></p> 	<p>Complete written divisions and show the remainder using r.</p> <p><math>29 \div 8 = 3 \text{ REMAINDER } 5</math></p> <p>↑   ↑   ↑   ↑  dividend   divisor   quotient   remainder</p>

Y3

DIVISION



Objective & Strategy	Concrete	Pictorial	Abstract
<p>Y4</p> <p>Divide at least 3 digit numbers by 1 digit.</p> <p>Short Division</p>	<p>Practice chunking using counters or cubes to demonstrate taking 'chunks' away from the starting number</p>	<p>Represent on a number how the 'chunks of groups' are taken away rather than one group at a time</p> 	

Y4

DIVISION



## Long Division

Step 1—a remainder in the ones

$$\begin{array}{r} \text{h t o} \\ 041 \text{ R}1 \\ \hline 4 \overline{) 165} \end{array}$$

4 does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160).

4 goes into 16 four times.

4 goes into 5 once, leaving a remainder of 1.

$$\begin{array}{r} \text{th h t o} \\ 0400 \text{ R}7 \\ \hline 8 \overline{) 3207} \end{array}$$

8 does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200).

8 goes into 32 four times ( $3,200 \div 8 = 400$ )

8 goes into 0 zero times (tens).

8 goes into 7 zero times, and leaves a remainder of 7.

# Y6

# DIVISION



## Long Division

Step 1 continued...

$$\begin{array}{r}
 \text{h t o} \\
 061 \\
 4 \overline{) 247} \\
 \underline{-4} \\
 3
 \end{array}$$

When dividing the ones, 4 goes into 7 one time. Multiply  $1 \times 4 = 4$ , write that four under the 7, and subtract. This finds us the remainder of 3.

Check:  $4 \times 61 + 3 = 247$

$$\begin{array}{r}
 \text{th h t o} \\
 0402 \\
 4 \overline{) 1609} \\
 \underline{-8} \\
 1
 \end{array}$$

When dividing the ones, 4 goes into 9 two times. Multiply  $2 \times 4 = 8$ , write that eight under the 9, and subtract. This finds us the remainder of 1.

Check:  $4 \times 402 + 1 = 1,609$

# Y6

# DIVISION



# Long Division

# Y6

# DIVISION



Step 2—a remainder in the tens

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \end{array}$ <p>Two goes into 5 two times, or 5 tens <math>\div 2 = 2</math> whole tens -- but there is a remainder!</p>	$\begin{array}{r} \text{t o} \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 1 \phantom{0} \end{array}$ <p>To find it, multiply <math>2 \times 2 = 4</math>, write that 4 under the five, and subtract to find the remainder of 1 ten.</p>	$\begin{array}{r} \text{t o} \\ 29 \\ 2 \overline{) 58} \\ -4 \phantom{0} \downarrow \\ \hline 18 \end{array}$ <p>Next, drop down the 8 of the ones next to the leftover 1 ten. You combine the remainder ten with 8 ones, and get 18.</p>

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{t o} \\ 29 \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 18 \end{array}$ <p>Divide 2 into 18. Place 9 into the quotient.</p>	$\begin{array}{r} \text{t o} \\ 29 \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>Multiply <math>9 \times 2 = 18</math>, write that 18 under the 18, and subtract.</p>	$\begin{array}{r} \text{t o} \\ 29 \\ 2 \overline{) 58} \\ -4 \phantom{0} \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>The division is over since there are no more digits in the dividend. The quotient is 29.</p>

## Long Division

Step 2—a remainder in any of the place values

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{h t o} \\ 1 \\ 2 \overline{) 278} \end{array}$ <p>Two goes into 2 one time, or 2 hundreds <math>\div 2 = 1</math> hundred.</p>	$\begin{array}{r} \text{h t o} \\ 1 \\ 2 \overline{) 278} \\ -2 \\ \hline 0 \end{array}$ <p>Multiply <math>1 \times 2 = 2</math>, write that 2 under the two, and subtract to find the remainder of zero.</p>	$\begin{array}{r} \text{h t o} \\ 18 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \end{array}$ <p>Next, drop down the 7 of the tens next to the zero.</p>
Divide.	Multiply & subtract.	Drop down the next digit.
$\begin{array}{r} \text{h t o} \\ 13 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \end{array}$ <p>Divide 2 into 7. Place 3 into the quotient.</p>	$\begin{array}{r} \text{h t o} \\ 13 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 1 \end{array}$ <p>Multiply <math>3 \times 2 = 6</math>, write that 6 under the 7, and subtract to find the remainder of 1 ten.</p>	$\begin{array}{r} \text{h t o} \\ 13 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \end{array}$ <p>Next, drop down the 8 of the ones next to the 1 leftover ten.</p>
1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
$\begin{array}{r} \text{h t o} \\ 139 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \end{array}$ <p>Divide 2 into 18. Place 9 into the quotient.</p>	$\begin{array}{r} \text{h t o} \\ 139 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>Multiply <math>9 \times 2 = 18</math>, write that 18 under the 18, and subtract to find the remainder of zero.</p>	$\begin{array}{r} \text{h t o} \\ 139 \\ 2 \overline{) 278} \\ -2 \\ \hline 07 \\ -6 \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$ <p>There are no more digits to drop down. The quotient is 139.</p>

# Y6

# DIVISION

