Forty Hill CE School
Mathematics Calculation Policy

Based on the White Rose Maths Scheme used throughout the school
Accepted by the Governing Body: Dec 2022
Review Date: Dec 2025

Rationale
The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

(National Curriculum – Mathematics Programmes of Study, DFE 2013)

Written methods of calculations are based on mental strategies. Each of the four operations (addition, subtraction, multiplication and division) builds on mental skills which provide the foundation for jottings and informal written methods of recording. Skills need to be taught, practised and reviewed constantly. These skills lead on to more formal written methods of calculation.

Strategies for calculation need to be supported by familiar models and images to reinforce understanding. When teaching a new strategy, it is important to start with numbers that the child can easily manipulate so that they can understand the concept.

The aim is for all children to be confident in at least one written method for each of the four operations which is reliable and efficient.
Each of the stages of calculation identified in this booklet is explained through pictures, symbols and diagram

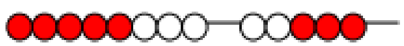
This policy has been designed to teach children using concrete, pictorial and abstract representations. This approach will vary between year groups and the individual abilities of children within each class.
• **Concrete representation**— a pupil is first introduced to an idea or skill by acting it out with real objects. This is a 'hands on' component using real objects and is a foundation for conceptual understanding.
• **Pictorial representation** – a pupil has sufficiently understood the 'hands on' experiences performed and can now relate them to representations, such as a diagram or picture of the problem.
• **Abstract representation**—a pupil is now capable of representing problems by using mathematical notation, for example 12 x 2 = 24.

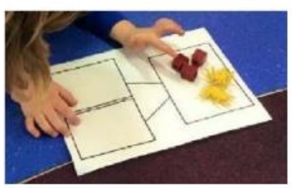
Key skills taken from the White Rose Calculation Policy – KS1			
	EYFS	**Year 1**	**Year 2**
Addition	-One more or less -Combining two amounts -Making pairs -Bonds to 10 -Build numbers to 10 -Adding more	- Add two 1-digit numbers to 10 - Add 1 and 2-digit numbers to 20	- Add three 1-digit numbers - Add 1 and 2-digit numbers to 100 - Add two 2-digit numbers
Subtraction	-One more or less -Taking away	-Subtract two 1-digit numbers to 10 -Subtract 1 and 2-digit numbers to 20	-Subtract 1 and 2-digit numbers to 100 -Subtract two 2-digit numbers
Multiplication	-Making pairs -Doubling	-Solve one-step problems with multiplication	-Solve one-step problems with multiplication
Division	-Sharing and Grouping -Even and odd	-Solve one-step problems with division (sharing) -Solve one-step problems with division (grouping)	-Solve one-step problems with division (sharing) -Solve one-step problems with division (grouping)

Key skills taken from the White Rose Calculation Policy – KS2				
	Year 3	**Year 4**	**Year 5**	**Year 6**
Addition	- Add with up to 3-digits	- Add with up to 4-digits	- Add with more than 4 digits - Add with up to 3 decimal places	- Add with more than 4 digits - Add with up to 3 decimal places
Subtraction	-Subtract with up to 3- digits	-Subtract with up to 4- digits	-Subtract with more than 4 digits -Subtract with up to 3 decimal places	-Subtract with more than 4 digits -Subtract with up to 3 decimal places
Multiplication	-Multiply 2-digit by 1- digit numbers	-Multiply 2-digit by 1- digit numbers -Multiply 3-digit by 1- digit numbers	-Multiply 4-digit by 1- digit numbers -Multiply 2-digit by 2- digit numbers -Multiply 2-digit by 3- digit numbers -Multiply 2-digit by 4- digit numbers	-Multiply 2-digit by 4- digit numbers
Division	-Divide 2-digits by 1- digit (no exchange sharing) -Divide 2-digits by 1- digit (sharing with exchange) -Divide 2-digits by 1- digit (sharing with remainders)	-Divide 2-digits by 1- digit (grouping) -Divide 3-digits by 1- digit (sharing with exchange) -Divide 3-digits by 1- digit (grouping)	-Divide 3-digits by 1- digit (grouping) -Divide 4-digits by 1- digit (grouping)	-Divide multi-digits by 2-digits (short division) -Divide multi-digits by 2-digits (long division)

<table>
<tr><th colspan="3">EYFS – Nursery and Reception – Addition</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>

Use toys and general classroom resources for children to physically manipulate, group/regroup.

Use specific maths resources such as counters, snap cubes, Numicon etc.
They understand addition as counting on and will count on in ones and twos using object s, cubes, bead string and number line.
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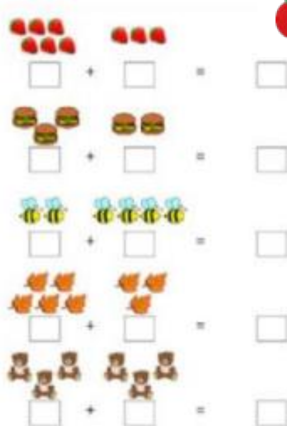
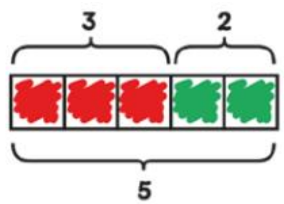
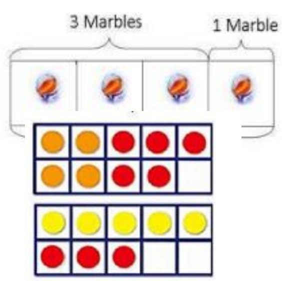
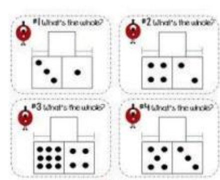
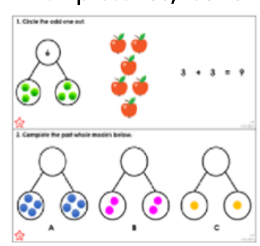


Two groups of pictures so children are able to count the total.


Bar model using visuals, pictures/icons or colours.


Use visual supports such as ten frames, part-part whole and addition mats with pictures/icons.


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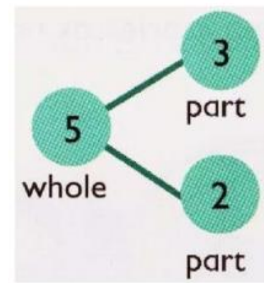
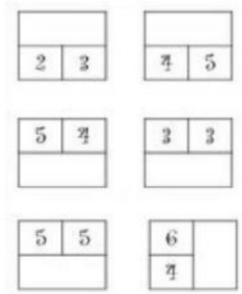
A focus on symbols and numbers to form a calculation.
Manipulatives are used to aid calculation.
$5+2=7$




No expectation for children to be able to record a number sentence/addition calculation.
This may be introduced in the Summer term.
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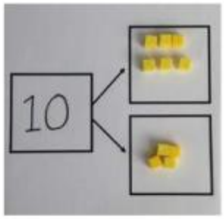
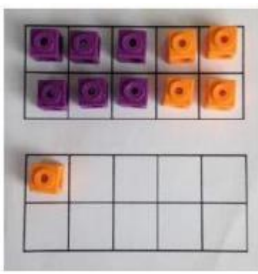
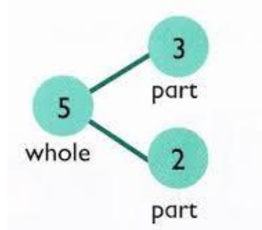
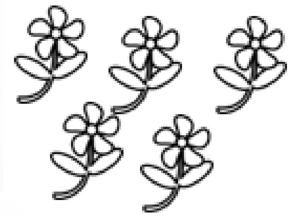
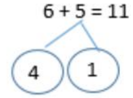
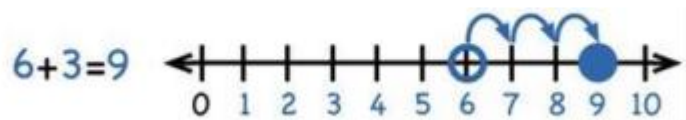
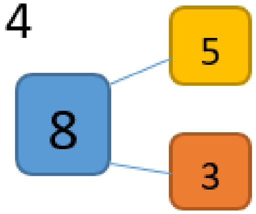
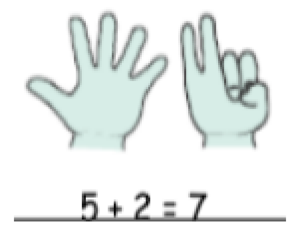
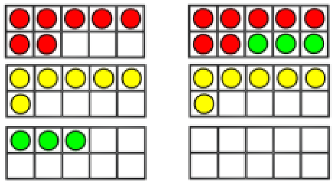
Use visual supports such as ten frames, part-part whole and addition mats, with the physical objects and resources that can be manipulated. 		

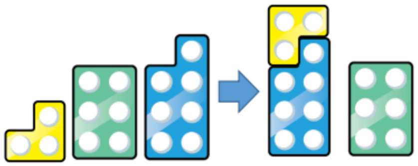
Year 1 – Addition		
Concrete	**Pictorial**	**Abstract**
  Use cubes to add two numbers together as a group or in a bar. (Some children may still need to use real objects) Start with the larger number on the  bead string and then count on to the smaller number 1 by 1 to find the answer.  6 + 5 = 11 Start with the bigger number and use the smaller number to make 10. Use of tens frame.	   Use pictures to add two numbers together as a group or in a bar model.  6 + 5 = 11  6 + 4 =10 10 + 1 = 11  Use a number line to count on in ones.	4 + 3 = 7 10= 6 + 4  Use the part-part whole diagram as shown above to move into the abstract. "What is 2 more than 4?" "What is the sum of 2 and 4?" "What is the total of 4 and 2?" 4 + 2 = They may use their fingers to support their mental methods. Place the largest number in your head and count on to the answer. 

Year 2 – Addition

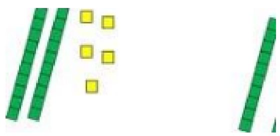
Concrete



When adding 3 numbers, children to use a tens frame, numicon or bead strings to find 10. Add on the remaining number.

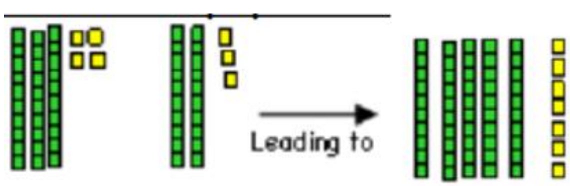


Base 10 blocks to recognise which column changes.

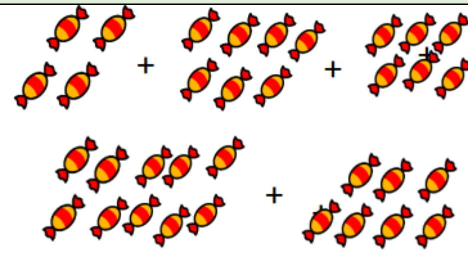


25 + 10 = 35

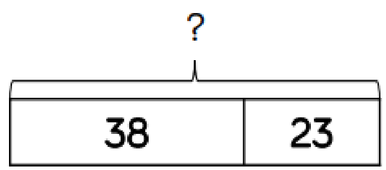
Make two sets of Base 10 and then combine to make the answer. Ensure children **add the ones then the tens** as this is imperative for column addition.



Pictorial



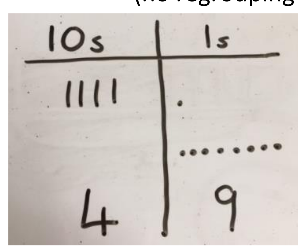
Add together three groups of objects. Draw a picture to recombine the groups to make 10.

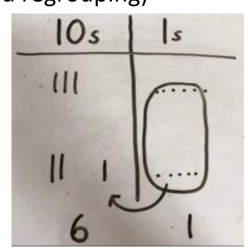


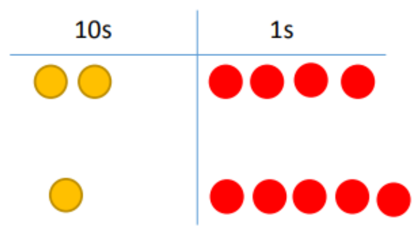
Bar models to show calculation.

Represent base 10 with lines / dots

(no regrouping and regrouping)







After using Base 10, move to drawing counters. **Always add the ones column first.**

Abstract

Combine the two numbers to make 10 and then add on the remainder.

$$\underbrace{4 + 7 + 6}_{10} = \boxed{10} + \boxed{7}$$

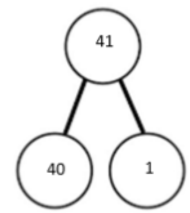
$$= \boxed{17}$$

Children should be shown missing number sentences.

41 + 8 =

1 + 8 = 9

40 + 9 = 49



$$\begin{array}{r} 41 \\ +\ \ 8 \\ \hline 49 \end{array}$$

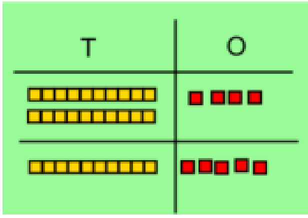
Looking for ways to make 10

36 + 25=

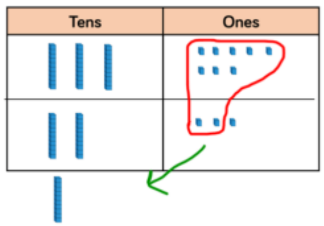
30 + 20 = 50

6 + 5 = 11

50 + 11 = 61

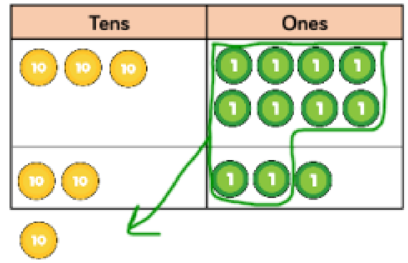


Regrouping: Make both numbers on a place value grid. Add up the ones and exchange 10 ones for 1 ten.



$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline {\scriptstyle 1} \end{array}$$

This can also be used when re-grouping.



$$\begin{array}{l} 40 + 9 \\ \underline{20 + 3} \\ 60 + 12 = 72 \end{array}$$

Some children may benefit from seeing the calculations in their expanded form.

Formal method (with and without regrouping)

$$\begin{array}{r} 36 \\ \underline{+25} \\ 61 \\ \hline {\scriptstyle 1} \end{array}$$

The calculation symbol should be noted to the left of the numbers.
Exchanging must be noted beneath the answer line of the calculation.

Year 3 – Addition

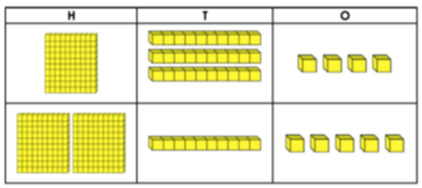
Concrete

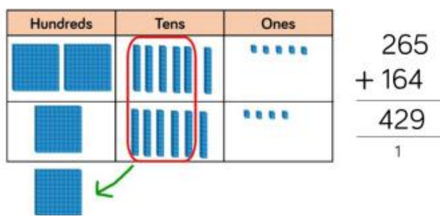
This can be done with place value counters or Base 10.

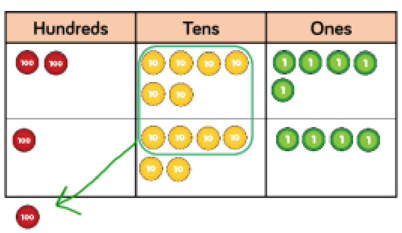
Begin with no regrouping, before moving to calculations with regrouping.

Children must understand the importance of **starting adding in the ones column.**

134 + 215 =

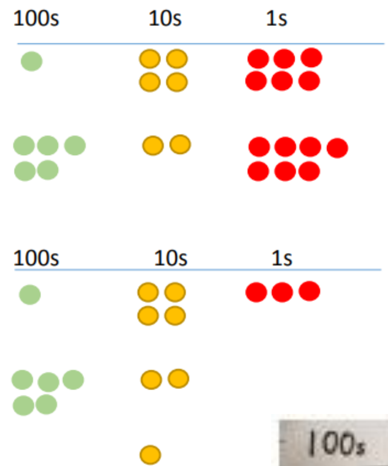






Children should see the written calculation alongside concrete resources to link to written methods.

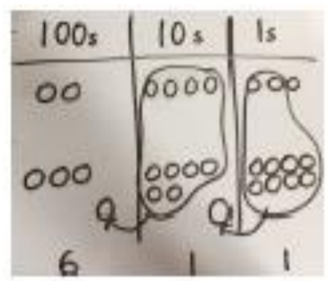
Pictorial



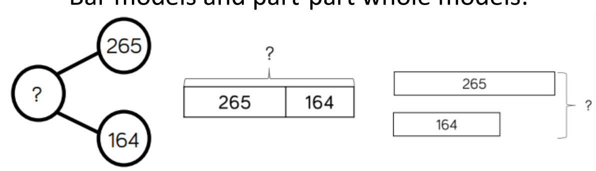
Children can move to drawing pictorial representations of their calculation.

Addition of money needs to have £ and p added separately

Children can draw pictorial representations on Base 10 or counters and show regrouping.



Bar models and part-part whole models:



Abstract

Some children may benefit from seeing the calculation in its expanded form first.

$$\begin{array}{l} 100 + 40 + 6 \\ \underline{500 + 20 + 7} \\ 600 + 70 + 3 = 673 \end{array}$$

Formal column addition:

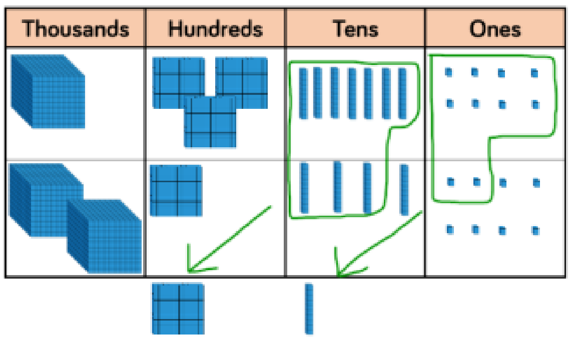
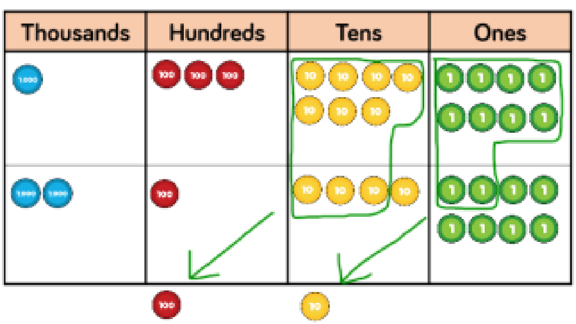
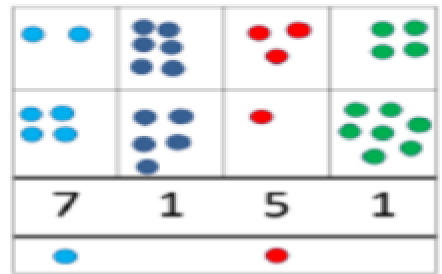
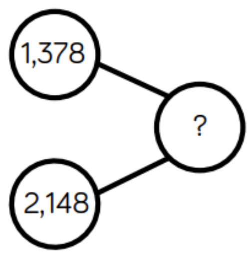
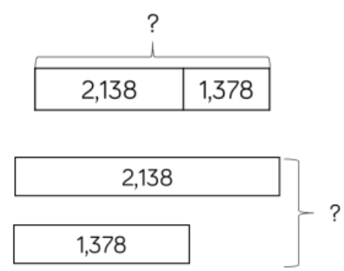
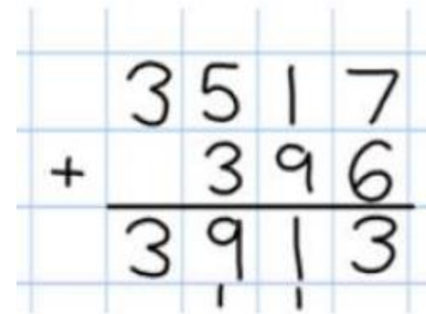
The calculation symbol should be noted to the left of the numbers.

Exchanging must be noted beneath the answer line of the calculation.

$$\begin{array}{r} 243 \\ \underline{+368} \\ \underline{611} \\ 1\ 1\ \ \end{array}$$

In Y3 and Y4 (and beyond where appropriate) the children can record their written calculations using (H, T, O) to reinforce the place value of each digit in the sum.

Year 4 – Addition

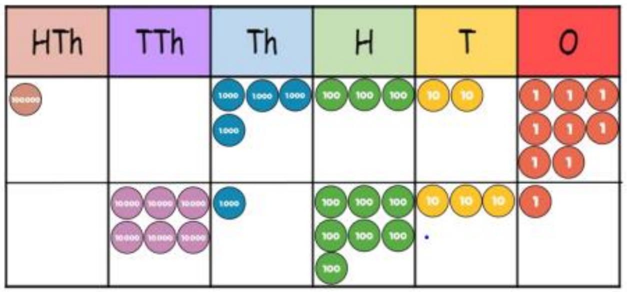
Concrete	Pictorial	Abstract
This can be done with place value counters or Base 10. Begin with no regrouping, before moving to calculations with regrouping. Children must understand the importance of **starting adding in the ones column.**   Children should see the written calculation alongside concrete resources to link to written methods.	Children can move to drawing counters in a place value grid. They must show where an exchange has taken place.  **Exchanging must be noted beneath the answer line of the calculation.** Bar models and part-part whole models:   	Formal column addition: **The calculation symbol should be noted to the left of the numbers.** In Y3 and Y4 (and beyond where appropriate) the children can record their written calculations using (H, T, O) to reinforce the place value of each digit in the sum.  **Exchanging must be noted beneath the answer line of the calculation.**

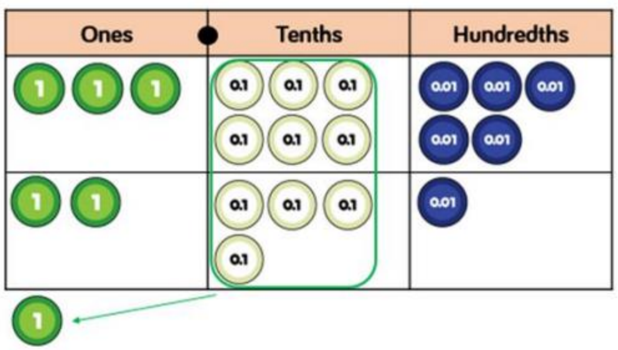
Year 5 – Addition

Concrete

See year 4 – introduce numbers with more than 4 digits

Consolidate understanding using numbers with more than 4 digits and extend by adding numbers with up to 3 decimal places.

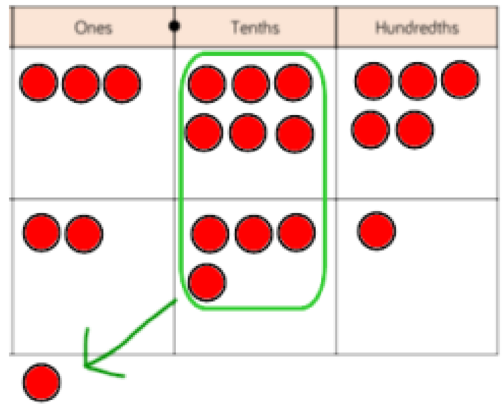




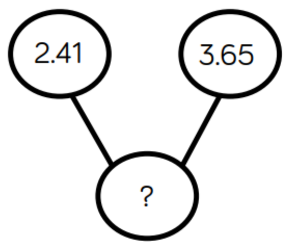
Pictorial

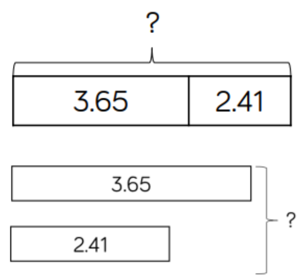
See year 4 – introduce numbers with more than 4 digits

Draw counters on blank place value grids – show exchanges.



Bar models and part-part whole models:





Abstract

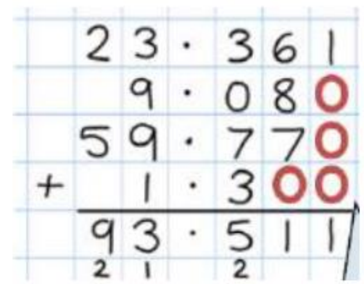
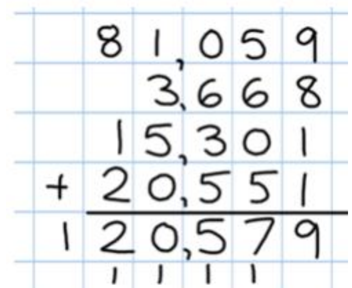
Formal column addition:

The calculation symbol should be noted to the left of the numbers.

Exchanging must be noted beneath the answer line of the calculation.

1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
		1			

$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

Year 6 – Addition		
Concrete	**Pictorial**	**Abstract**
See year 5 – Add several numbers of increasing complexity using columnar addition.	**See year 5 – Add several numbers of increasing complexity using columnar addition.**	Formal column addition: More than four digits and decimals with different place value and regrouping in some columns. **The calculation symbol should be noted to the left of the numbers.** **Exchanging must be noted beneath the answer line of the calculation.** Zeros may be added as place holders  

<table>
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<tr>
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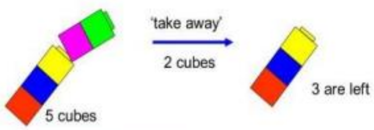
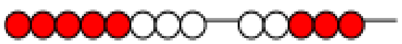
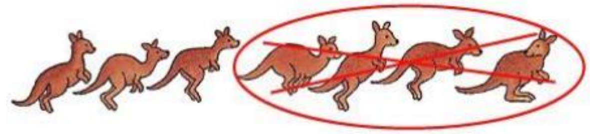
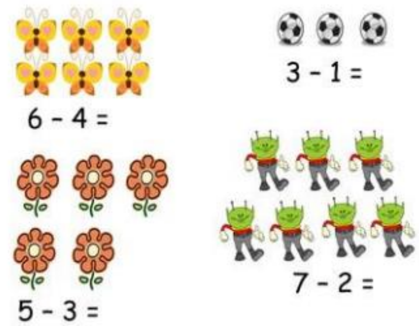
Use toys and general classroom resources for children to physically manipulate, group/regroup.



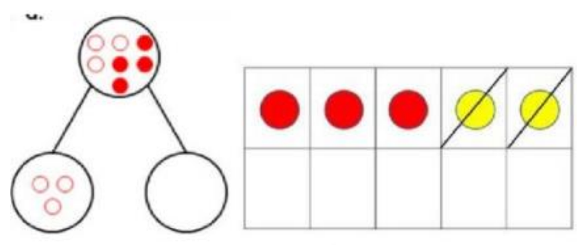

Use specific maths resources such as snap cubes, Numicon, bead strings etc.
They understand subtraction as counting out. They begin to count back in ones and twos using objects, cubes, bead string and number line.



Use visual supports such as ten frames, part-part whole and subtraction mats, with the physical objects and resources that can be manipulated.
</td>
<td>




A group of pictures for children to cross out or cover quantities to support subtraction.

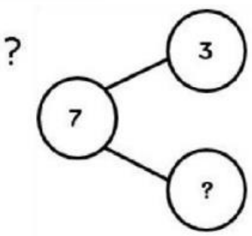


Use visual supports such as ten frames, part-part whole and bar model with pictures/icons.
</td>
<td>
A focus on symbols and numbers to form a calculation.

10 - 6 = 4

<table>
<tr><td>3</td><td>?</td></tr>
<tr><td colspan="2">7</td></tr>
</table>

7 - 3 = ?



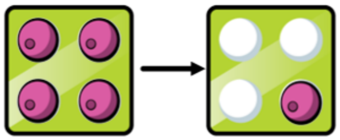
No expectation for children to be able to record a number sentence/subtraction calculation.
This may be introduced in the Summer term.
</td>
</tr>
</table>

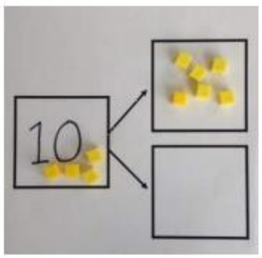
Year 1 – Subtraction

Concrete

Use physical objects, counters, cubes and other items such as bean bags to show how objects can be taken away.

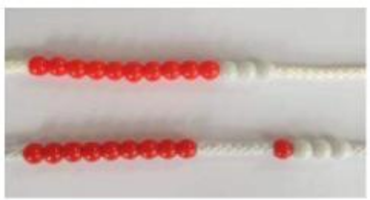
4 - 3 = 1



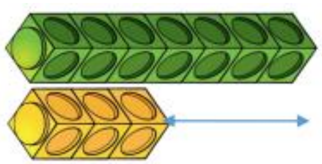


Use cubes to show the link with addition in part-part whole models.

Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.



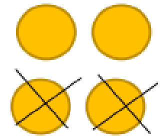
Use cubes to build towers or make bars to find the difference. Use basic bar models with items to find the difference.



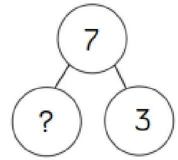
Pictorial

Cross out drawn objects to show what has been taken away.

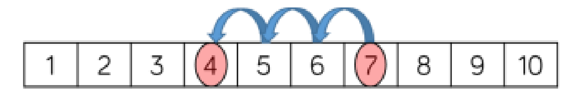
4 – 2 = 2



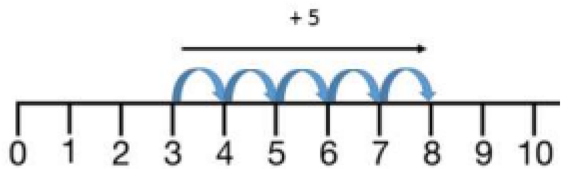
Part-part whole models.



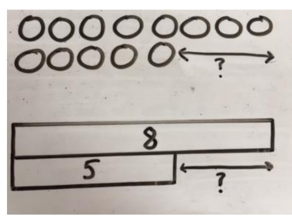
Count back on a number line or number track. Start at the bigger number and count back the smaller number, showing the jumps on the number line.

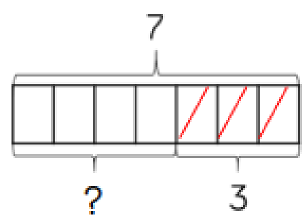


Count on the find the difference.



Draw cubes/other concrete objects or use the bar model to illustrate what they need to calculate

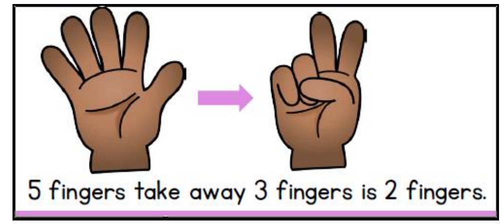




Abstract

5 – 3 = 2

They may use their fingers to support their mental methods.

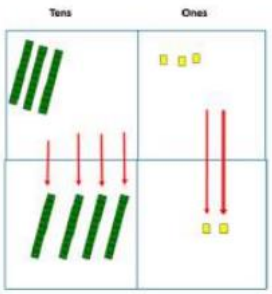


"Hannah has 8 goldfish. Helen has 3 goldfish. Find the difference between the number of goldfish the girls have."

Year 2 – Subtraction

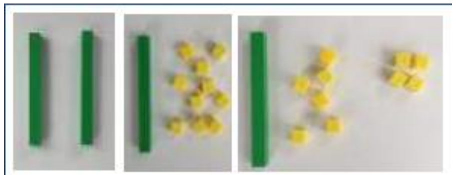
Concrete

75 – 42 = 33



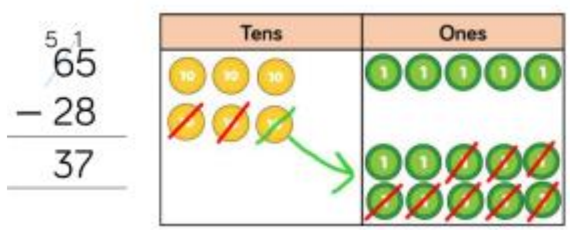
No regrouping:
Use Base 10 to make the largest number and then take away the smallest number.

Regrouping:
20 – 4 =
Use base 10 to show how to exchange a ten for ones.



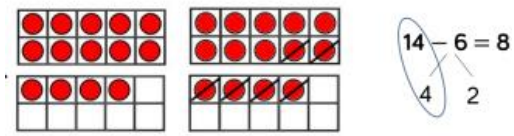
Show how you partition numbers to subtract. Again make the larger number first and **begin subtracting from the ones column**.

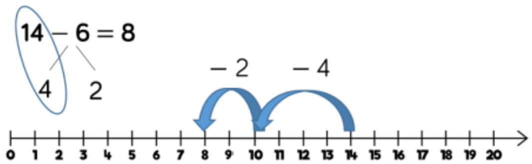
Place value counters:



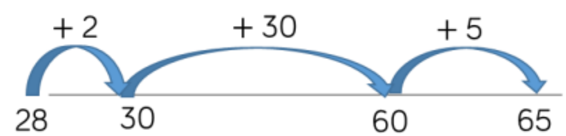
Pictorial

Children should be encouraged to find the number bond to 10 when partitioning the subtracted number.

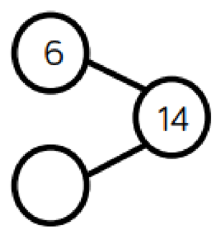


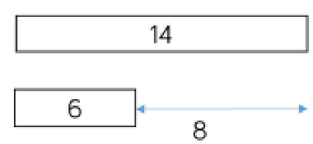


Blank number lines can encourage children to partition numbers into appropriate jumps in order to find the difference. They should make efficient jumps.
65 – 37 =



Bar models and part-part whole models:



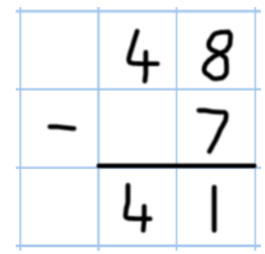


Abstract

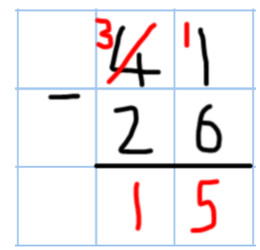
Formal column subtraction:

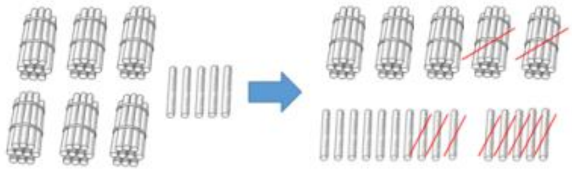
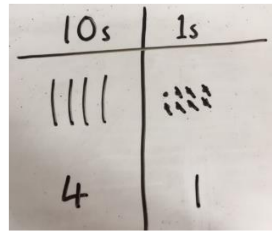
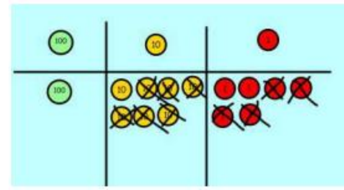
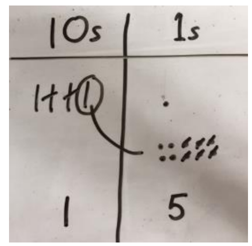
The calculation symbol should be noted to the left of the numbers.

No regrouping:



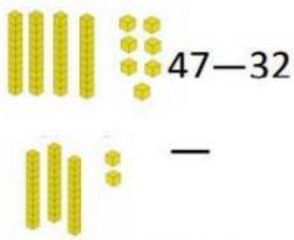
Regrouping:
Exchanges must be recorded above the top number in the calculation.



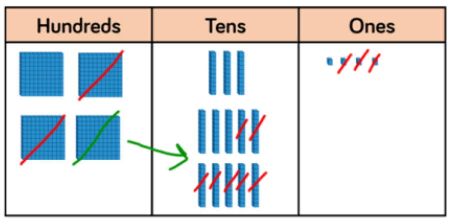
Bundles of straws: 	**No regrouping:** Draw the dienes/place value counters and then cross out what you are subtracting.   **Regrouping:**  Draw the dienes/place value counters and then cross out what you are subtracting. Any exchanges must be clearly shown.	

Year 3 – Subtraction

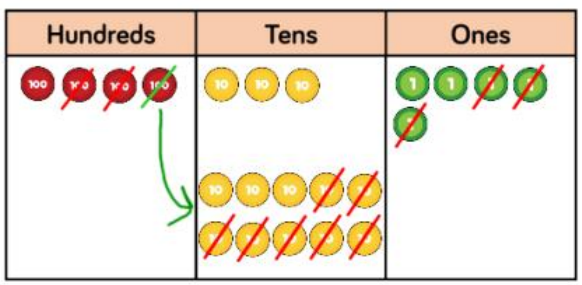
Concrete



Use Base 10 or place value counters to model a calculation (with and without regrouping.

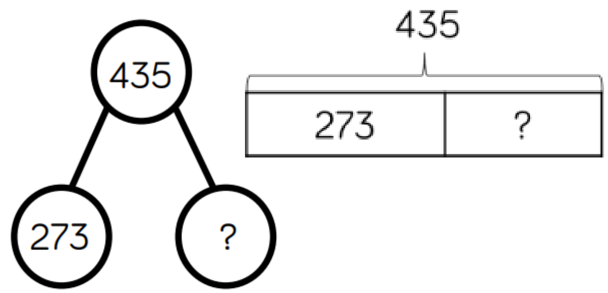


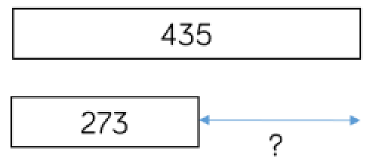
$$\begin{array}{r} {}^{3}\cancel{4}{}^{1}35 \\ -\ 273 \\ \hline 162 \end{array}$$



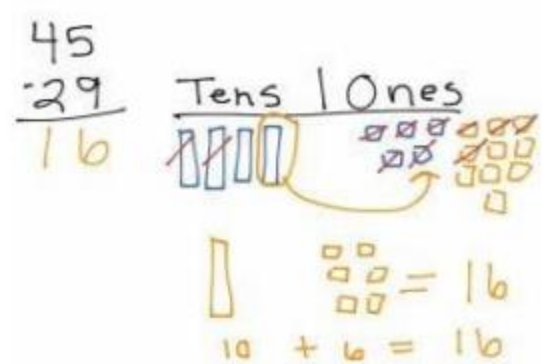
Pictorial

Bar models and part-part whole models:





When confident with using manipulatives, children may record this in their own pictorial way.



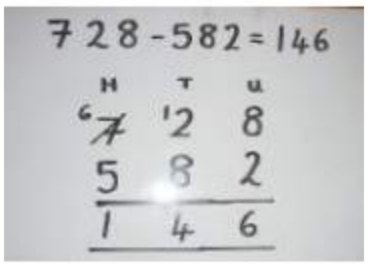
Abstract

Some children may need to see calculations in their expanded form before moving to formal written methods

The calculation symbol should be noted to the left of the numbers.

$$47-24=23$$

$$\begin{array}{r} 40+7 \\ -\ 20+4 \\ \hline 20+3 \end{array}$$



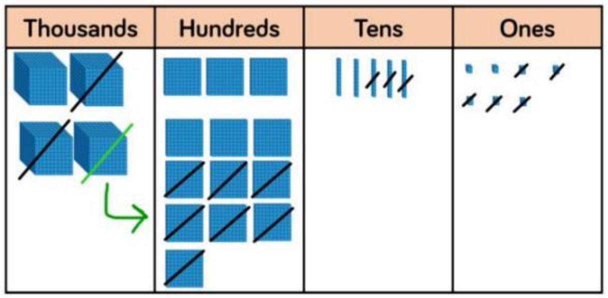
Regrouping:
Exchanges must be recorded above the top number in the calculation.

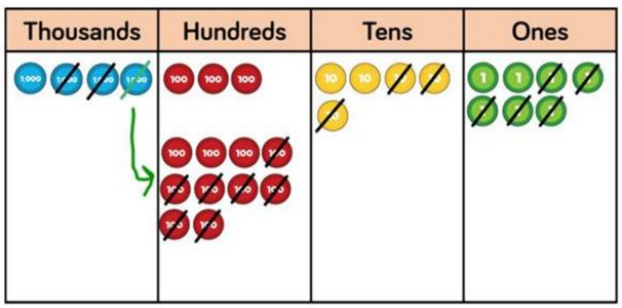
Year 4 – Subtraction

Concrete

Use Base 10 or place value counters to model a calculation (with and without regrouping.

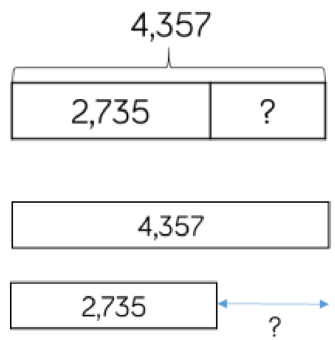
4,357 – 2,735 = 1,622

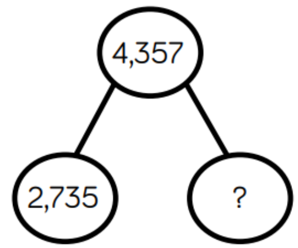




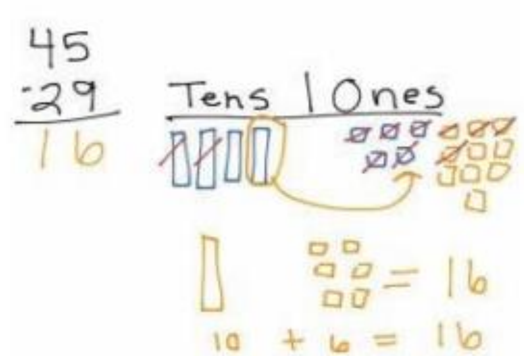
Pictorial

Bar models and part-part whole models:



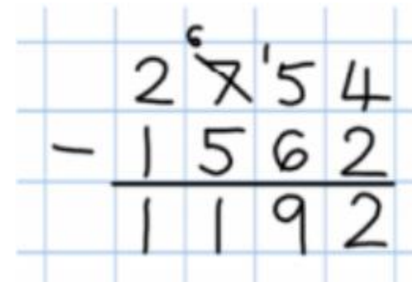


When confident with using manipulatives, children may record this in their own pictorial way.



Abstract

The calculation symbol should be noted to the left of the numbers.
Regrouping:
Exchanges must be recorded above the top number in the calculation.



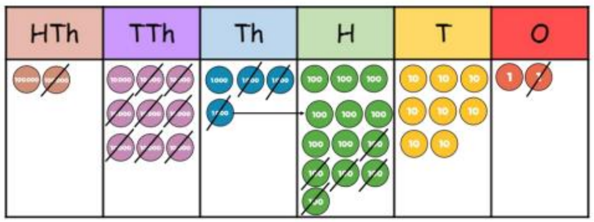
$$\begin{array}{r} {}^{3}\cancel{4}{}^{1}357 \\ -\ 2735 \\ \hline 1622 \\ \hline \end{array}$$

Year 5 – Subtraction

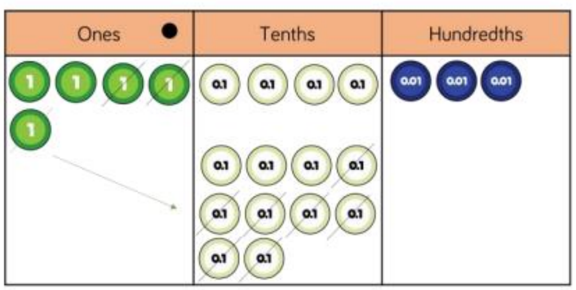
Concrete

Base 10 or place value counters can be used to physically show exchanges taking place in a variety of columns.
At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently.

294,382 – 182,501 = 111,881

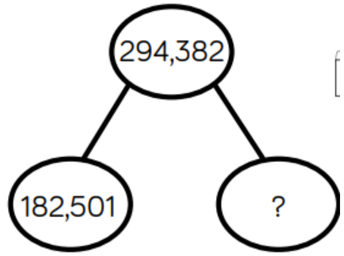


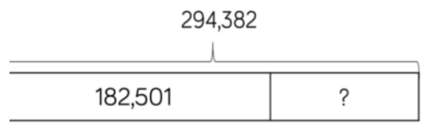
Subtract with up to 3 decimal places:
Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

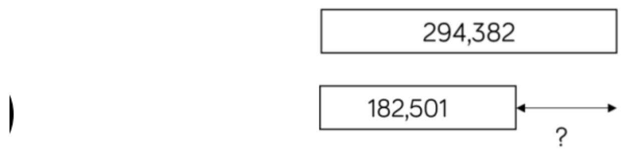


Pictorial

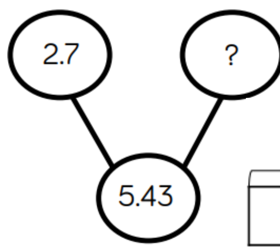
Bar models and part-part whole models:

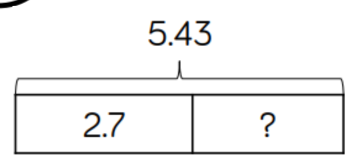


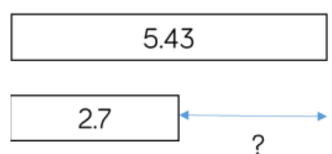




Subtract with up to 3 decimal places



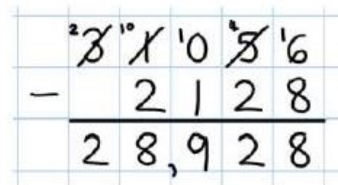




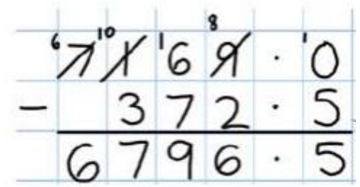
Abstract

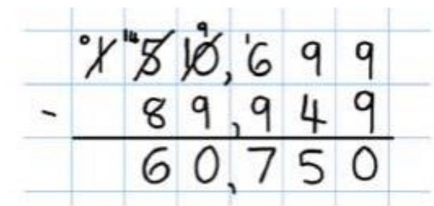
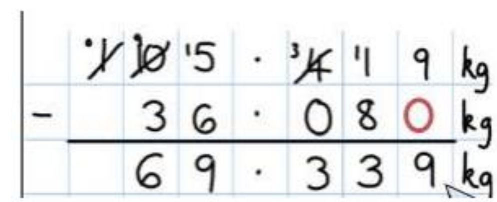
The calculation symbol should be noted to the left of the numbers.
Regrouping:
Exchanges must be recorded above the top number in the calculation.

	2	9	$^{3}\cancel{4}$	$^{1}3$	8	2
–	1	8	2	5	0	1
	1	1	1	8	8	1

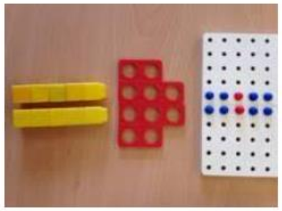
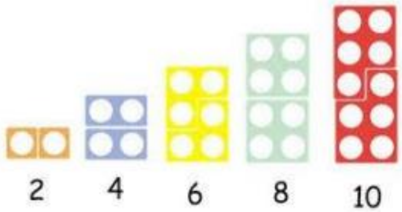


Use zeros for place-holders.

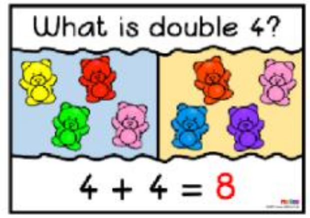


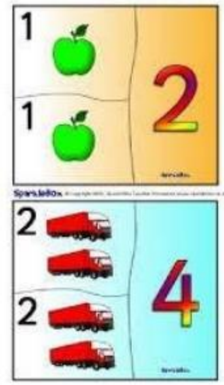
Year 6 – Subtraction		
Concrete	**Pictorial**	**Abstract**
See year 5 – Subtract with increasingly large and more complex numbers and decimal values.	**See year 5 – Subtract with increasingly large and more complex numbers and decimal values.**	**The calculation symbol should be noted to the left of the numbers.** **Regrouping:** **Exchanges must be recorded above the top number in the calculation.**  

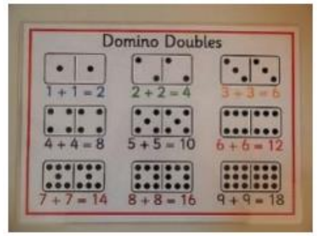
<table>
<tr><th colspan="3">EYFS – Nursery and Reception – Multiplication</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>

Counting and other maths resources for children to make 2 equal groups.

Physical and real life examples that encourage children to see concept of doubling as adding two equal groups.
</td>
<td>




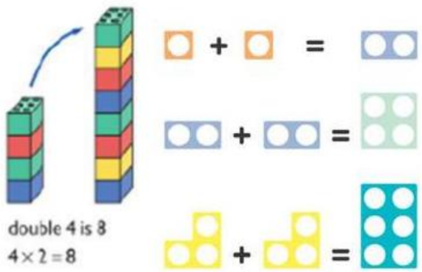


Pictures and icons that encourage children to see concept of doubling as adding two equal groups.
</td>
<td>
<table>
<tr><td>1+1=</td><td>7+7=</td></tr>
<tr><td>2+2=</td><td>8+8=</td></tr>
<tr><td>3+3=</td><td>9+9=</td></tr>
<tr><td>4+4=</td><td>10+10=</td></tr>
<tr><td>5+5=</td><td>11+11=</td></tr>
<tr><td>6+6=</td><td>12+12=</td></tr>
</table>

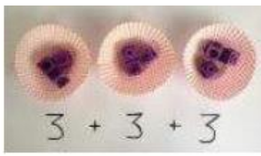
Addition calculations to model adding two equal groups.
</td>
</tr>
</table>

Year 1 – Multiplication

Concrete



Use manipulatives to show doubling.



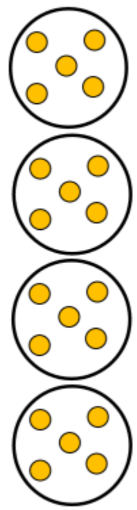
Use different objects to add equal groups.

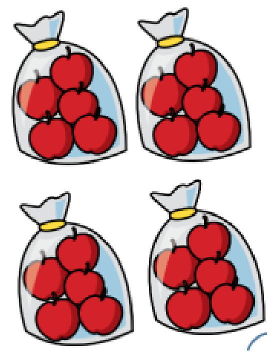
Use concrete objects to support counting in equal multiples

Pictorial

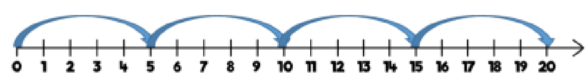
Draw pictures to show doubling

Drawing images to show equal groups – use these to support repeated addition sentences





Number lines to support counting in equal multiples



Abstract

Children are not expected to record multiplication formally. The multiplication symbol is introduced in Year 2

Children can write repeated addition sentences to describe pictures and objects.

$2 + 2 + 2 = 6$

Use arrays to write repeated addition sentences and prepare for Year 2.

$5 + 5 + 5 = 15$

$3 + 3 + 3 + 3 + 3 = 15$

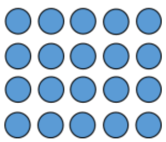
One bag holds 5 apples.
How many apples do 4 bags hold?

Year 2 – Multiplication

Concrete

See Year 1 – consolidate multiplication as repeated addition

Use counters an objects to create arrays and create corresponding multiplication sentences.



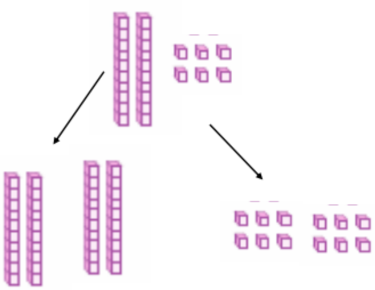
$5 + 5 + 5 + 5 = 20$

$4 \times 5 = 20$

$5 \times 4 = 20$

Children should understand that arrays create two different multiplication sentences and due to the commutative law, the order to factors does not affect the answer.

Use manipulatives to aid counting in equal multiples or skip counting.



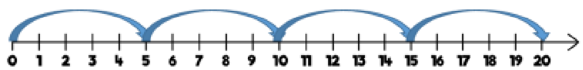
Use Base 10 to model doubling.

$40 + \quad 12 = 52$

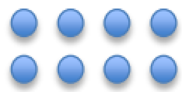
Pictorial

Draw pictures and representations to show how to double numbers

Number lines to support counting in equal multiples

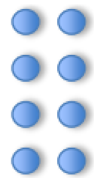


Draw arrays in different rotations to find **commutative** multiplication sentences.



$4 \times 2 = 8$

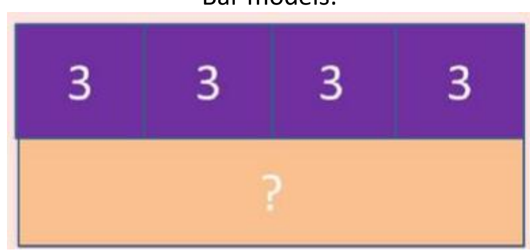
$2 \times 4 = 8$



$2 \times 4 = 8$

$4 \times 2 = 8$

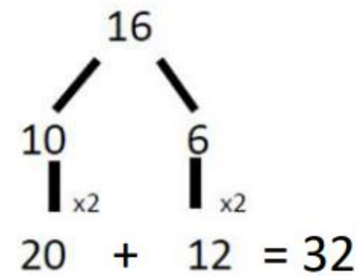
Bar models:



Abstract

Recall and use multiplication and division facts for the 2, 5 and 10 times tables

Partition a number and double each pat before finding the sum of these numbers.



Use an array to write multiplication sentences and reinforce repeated addition.

$5 + 5 + 5 = 15$

$3 + 3 + 3 + 3 + 3 = 15$

$5 \times 3 = 15$

$3 \times 5 = 15$

$12 = 3 \times 4$

$12 = 4 \times 3$

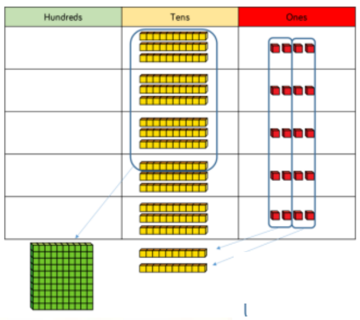
Year 3 – Multiplication

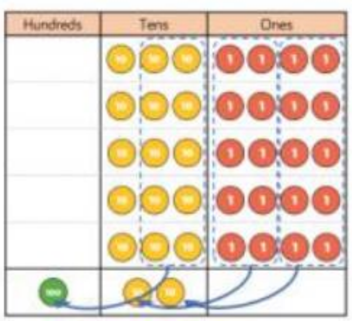
Concrete

Informal methods and the expanded method are used in Year 3 before moving on to the short multiplication method in **Year 4.**

Multiply a 2-digit number by a 1-digit number – no exchange and with exchange

Base 10/ place value counters:



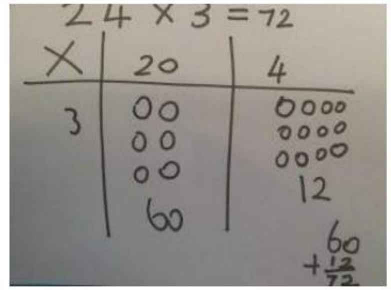


Place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge

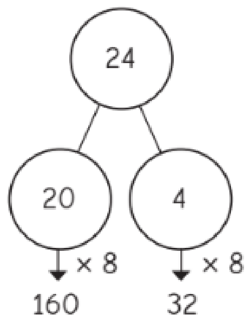
Children must always multiply the ones first to prepare them for formal written methods.

Pictorial

Children can represent the work they have done with place value counters pictorially.



Flexible portioning using part-part whole models:



160 + 32 = 192

24 × 8 = 192

Abstract

Recall and use multiplication and division facts for the 3, 4 and 8 times tables

4 x 15 =

4 × 5 = $\boxed{}$

4 × 10 = $\boxed{}$

$\boxed{}$ + $\boxed{}$ = $\boxed{}$

4 × 15 = $\boxed{}$

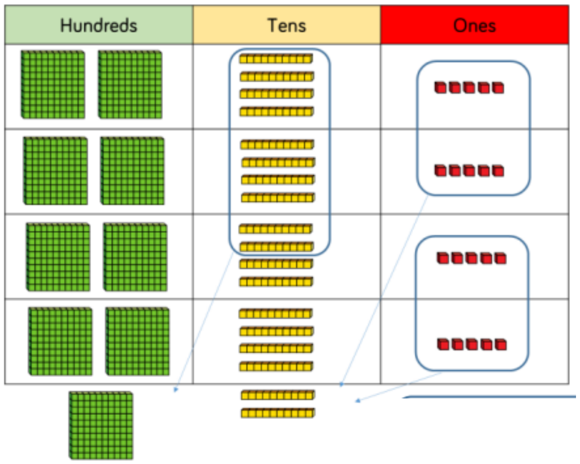
Use of the expanded method allows children to gain a deep understanding of the structure of the calculation before progressing to formal short multiplication in Year 4

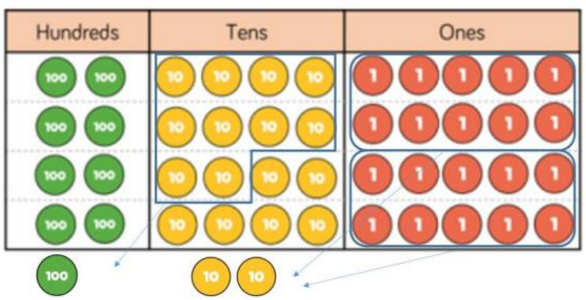
Year 4 – Multiplication

Concrete

See Year 3 – Move to multiplying 3-digit numbers by 1-digit numbers.

245 × 4 = 980

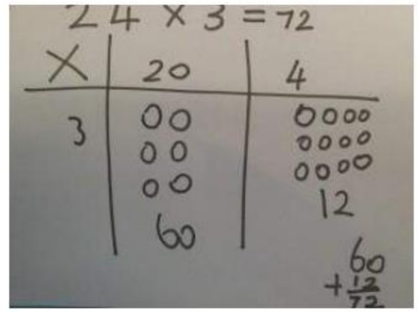




Place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use times table knowledge

Pictorial

Some children may represent the work they have done with place value counters pictorially.



Children should be encouraged to move towards more formal written methods.

Abstract

Recall and use multiplication and division facts for the 6, 7, 9, 11 and 12 times tables
<u>Consolidate all times tables up to 12x12</u>

	H	T	O
		3	4
×			5
		2	0
	1	5	0
	1	7	0

(4 × 5)
(30 × 5)

	H	T	O
		3	4
×			5
	1	7	0
	1	2	

Children should be moved to more short, formal written methods, initially in an expanded form and then in the formal short single-line form.

The calculation symbol should be noted to the left of the numbers.

Exchanging must be noted beneath the answer line of the calculation.

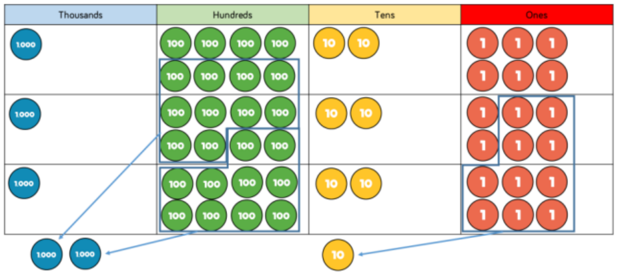
Year 5 – Multiplication

Concrete

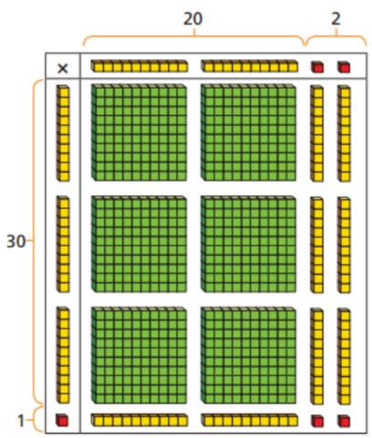
Multiply 4-digit numbers by 1-digit numbers

Place value counters:

1,826 × 3 = 5,478



Multiply 2-digit numbers by 2-digit numbers



When multiplying a 2-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10

Pictorial

Some children may represent the work they have done with place value counters pictorially.

Abstract

Revise all multiplication and division facts up to 12x12

The calculation symbol should be noted to the left of the numbers.

Exchanging must be noted beneath the answer line of the calculation.

Multiply 4-digit numbers by 1-digit numbers

	Th	H	T	O
	1	8	2	6
×				3
	5	4	7	8
	2		1	

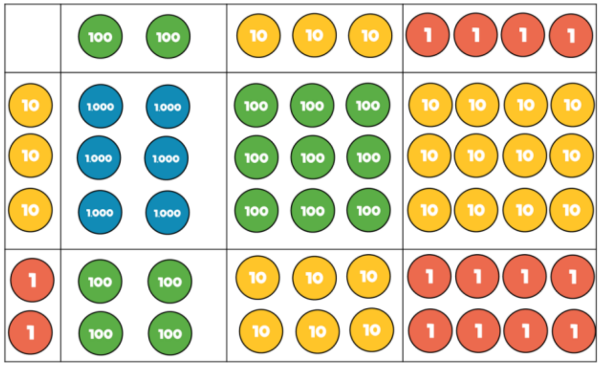
Multiply 2-digit numbers by 2-digit numbers

×	20	2
30	600	60
1	20	2

	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

The grid method matches the area model as an initial written method before moving on to the formal written multiplication method

Multiply 3-digit numbers by 2-digit numbers



Children can continue to use the area model when multiplying 3- digits by 2-digits. Place value counters become more efficient to use but Base 10 can be used to highlight the size of numbers.

Multiply 3-digit numbers by 2-digit numbers

Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$_1$7	$_1$0	2	0
7	4	8	8

Move towards the formal written method, seeing the links with the grid method.

Multiply 4-digit numbers by 2-digit numbers

TTh	Th	H	T	O
	2	7	3	9
×			2	8
2 $_2$	1 $_5$	9 $_3$	1 $_7$	2
5 $_1$	4	7 $_1$	8	0
7	6	6	9	2
		$_1$		

Year 6 – Multiplication

Concrete

Children should be confident in the written methods. If needed, see Year 5.
If children are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.

Pictorial

See Year 5.

Abstract

Revise all multiplication and division facts up to 12x12

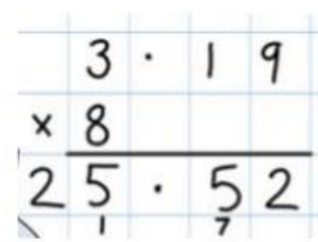
Multiply 4-digit numbers by 2-digit numbers

TTh	Th	H	T	O
	2	7	3	9
×			2	8
2 2	1 5	9 3	1 7	2
5 1	4	7 1	8	0
7	6	6	9	2
		1		

The calculation symbol should be noted to the left of the numbers.

Exchanging must be noted beneath the answer line of the calculation.

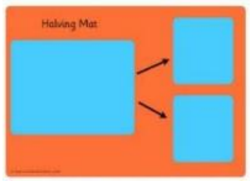
Multiply decimal up to 2 decimal place by a single digit.



Remind children the single digit belongs in the ones column and line numbers up accordingly.

<table>
<tr><th colspan="3">EYFS – Nursery and Reception – Division</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>


Children have the opportunity to physically cut objects, food or shapes in half.

Use visual supports such as halving mats and part-part whole, with the physical objects and resources that can be manipulated.

Counting and other maths resources for children to share into two equal groups. Later in the year, introduce grouping.
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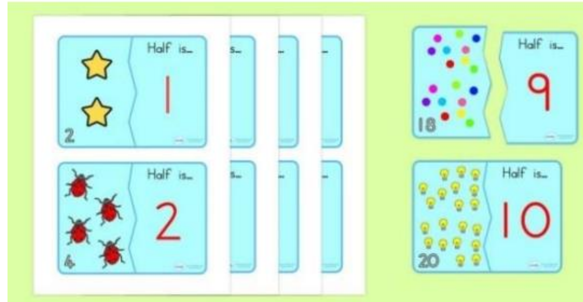
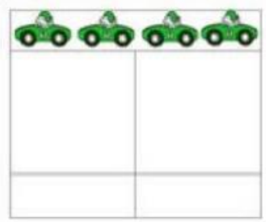
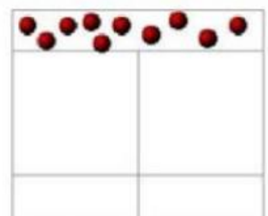


Pictures and icons that encourage children to see concept of halving in relation to subitising, addition and subtraction knowledge. i.e. Knowing 4 is made of 2 groups of 2, so half of 4 is 2.

Bar model with pictures or icons to support understanding of finding 2 equal parts of a number, to further understand how two halves make a whole.
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"Half of 8 is_____".
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<table>
<tr><th colspan="3">Year 1 – Division</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
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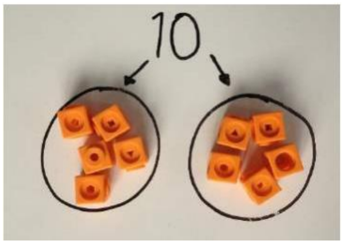
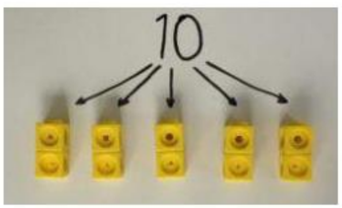
<td>

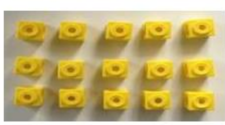
Division by sharing:
Use concrete manipulatives to share into equal groups.



Division by grouping:



Use concrete manipulatives to divide items into equal groups.



Children may be exposed to concrete arrays as a way of representing equal groups.

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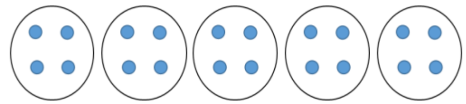
Children may draw representations of groups and use dots to represent the objects they have shared.



$20 \div 5 = 4$

Children use pictures or shapes to share or group quantities.

$8 \div 2 = 4$

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<td>

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.

In Year 2, children are introduced to the division symbol.

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<table>
<tr><th colspan="3">Year 2 – Division</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
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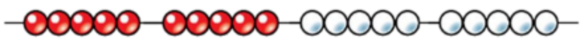
<td>

See Year 1.

Numicon can be used to show the relationship with multiplication and division.

Number beads to support division by grouping:



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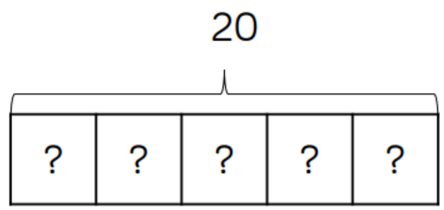
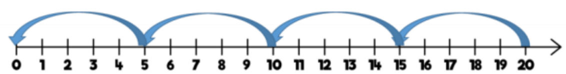
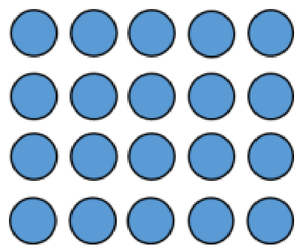
See Year 1.

Bar models can support division by sharing.
20 ÷ 5 = 4



Number lines can support division by grouping (counting back in multiples).





Use arrays to represent equal groups. Children should be exposed to the corresponding division sentences.

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Recall and use multiplication and division facts for the 2, 5 and 10 times tables

10 ÷ 5 = 2 Divide 10 into 5 groups. How many are in each group?

Share 8 buns between two people.
8 ÷ 2 = 4

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<tr><th colspan="3">Year 3 – Division</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
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Use concrete arrays to represent multiplication sentences and related division facts. Highlight that division is <u>not commutative</u>.
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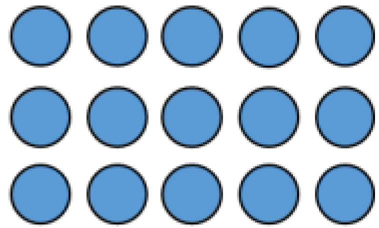
<td>
Children can draw their own arrays to represent a given division sentence.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<td>
Recall and use multiplication and division facts for the 3, 4 and 8 times tables

Find the inverse of multiplication and division sentences by creating four linking number sentences.
5 x 3 = 15
3 x 5 = 15
15 ÷ 5 = 3
15 ÷ 3 = 5
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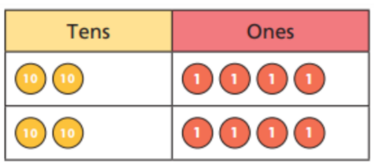
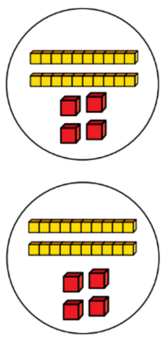
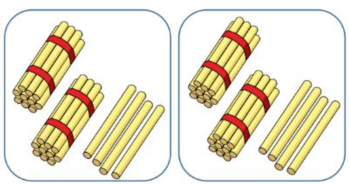
<td>
Divide 2-digits by 1-digit (sharing with no exchange)
When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones.
48 ÷ 2 = 24



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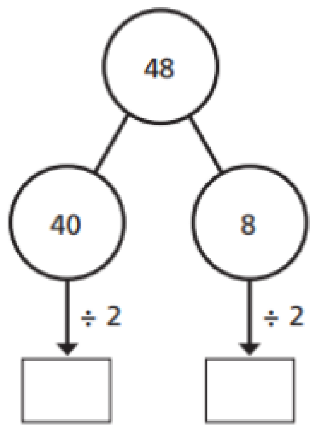
<td>
Divide 2-digits by 1-digit (sharing with no exchange)



Part-whole models can provide children with a clear written method that matches the concrete representation.
48 ÷ 2 = 24
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<td>
Divide 2-digits by 1-digit (sharing with no exchange)
Part-part whole models are used to show the calculations that have been done.
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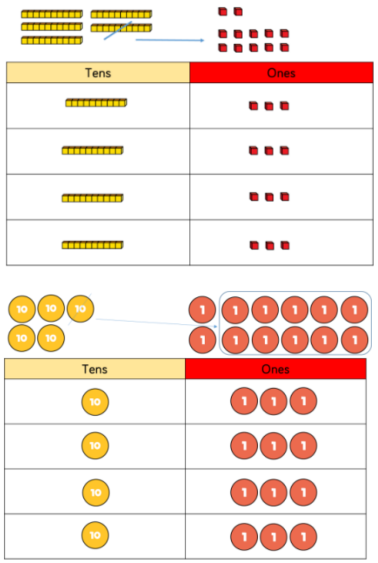
Divide 2-digits by 1-digit (sharing with exchange)



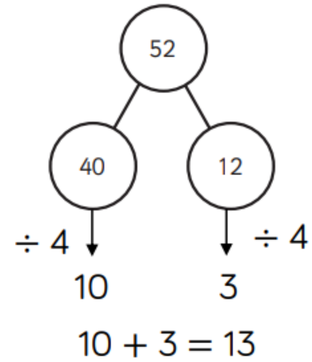
52 ÷ 4 = 13

Children can use Base 10 and place value counters to exchange one ten for ten ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.

Divide 2-digits by 1-digit (sharing with exchange)

Flexible partitioning in a part-whole model supports this method.

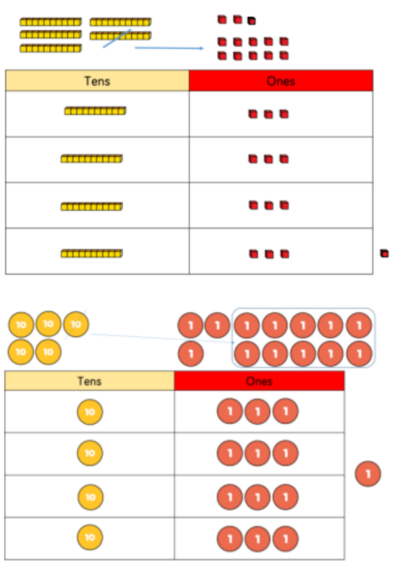
52 ÷ 4 = 13



Divide 2-digits by 1-digit (sharing with exchange)

Part-part whole models are used to show the calculations that have been done.

Divide 2-digits by 1-digit (sharing with remainders)

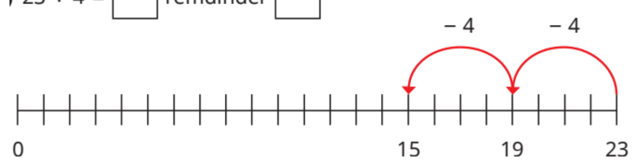


Children can use Base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made.

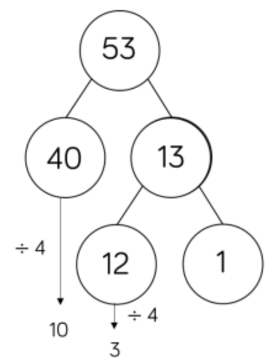
Divide 2-digits by 1-digit (sharing with remainders)

Blank number lines can be used to count back in equal jumps and identify the remainder left over

23 ÷ 4 = ☐ remainder ☐



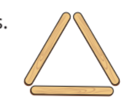
Part – part whole model



Divide 2-digits by 1-digit (sharing with remainders)

Mo now uses the lolly sticks to make triangles.

How many triangles can Mo make?



Complete the sentences.

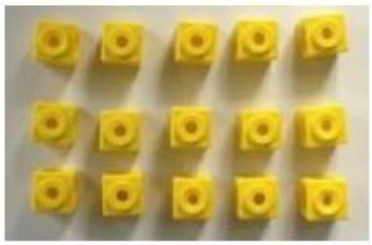
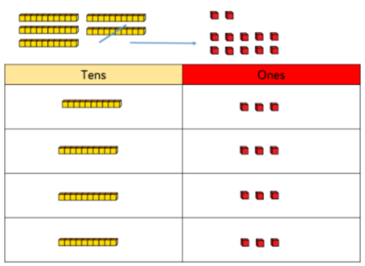
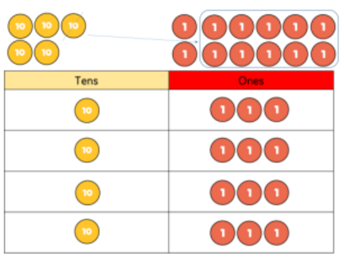
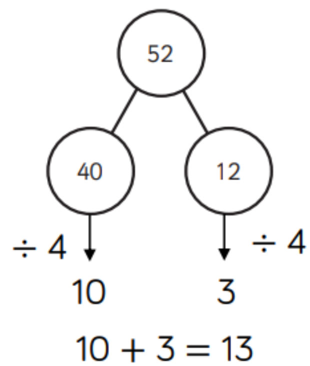
There are 17 lolly sticks.

There are ☐ groups of 3

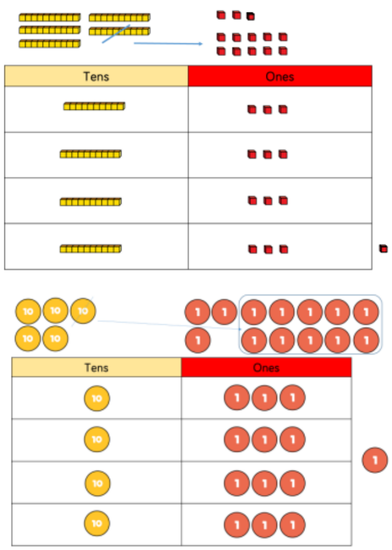
There are ☐ lolly sticks remaining.

17 ÷ 3 = ☐ remainder ☐

Mo can make ☐ triangles.

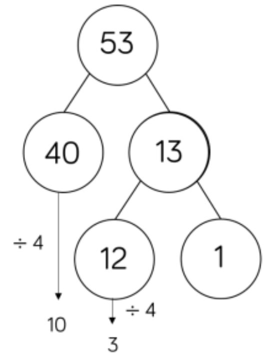
Year 4 – Division		
Concrete	**Pictorial**	**Abstract**
Use concrete arrays to represent multiplication sentences and related division facts. Highlight that division is <u>not commutative</u>. 	Children can draw their own arrays to represent a given division sentence.	***Recall and use multiplication and division facts for the 6, 7, 9, 11 and 12 times tables*** **<u>Consolidate all times tables up to 12x12</u>** Find the inverse of multiplication and division sentences by creating four linking number sentences. 5 x 3 = 15 3 x 5 = 15 15 ÷ 5 = 3 15 ÷ 3 = 5
Divide 2-digits by 1-digit (sharing with exchange)   Children can use Base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made	**Divide 2-digits by 1-digit (sharing with exchange)** Flexible partitioning in a part-whole model supports this method. **52 ÷ 4 = 13**  	**Divide 2-digits by 1-digit (sharing with exchange)** Children do not need to use the formal short division method at this stage and may use informal jottings or representations such as a part-whole model to record their working instead.

Divide 2-digits by 1-digit (sharing with remainders)

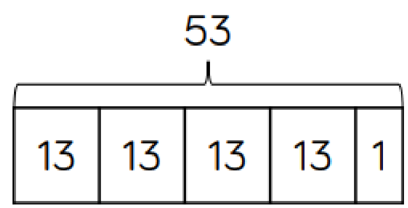


Children can use Base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made.

Divide 2-digits by 1-digit (sharing with remainders)



Part – part whole model and bar models

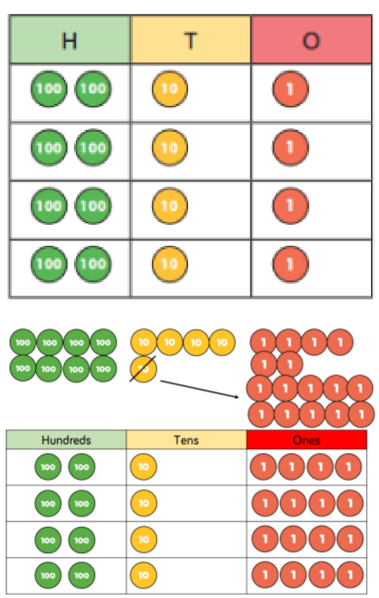


Divide 2-digits by 1-digit (sharing with remainders)

Children do not need to use the formal short division method at this stage and may use informal jottings or representations such as a part-whole model to record their working instead.

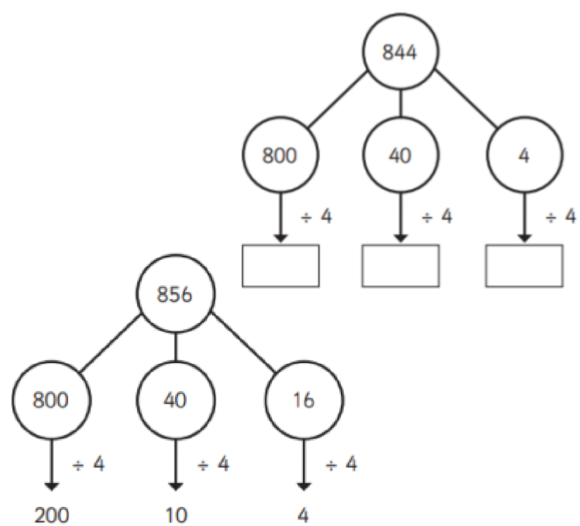
Divide 3-digits by 1-digit (sharing)

Children can continue to use place value counters to share 3- digit numbers into equal groups. This should also include numbers that require exchanges and or leave remainders.



Divide 3-digits by 1-digit (sharing)

Flexible partitioning in a part-part whole model.



Divide 3-digits by 1-digit (sharing)

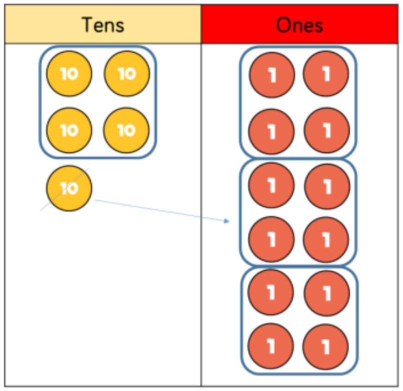
Children do not need to use the formal short division method at this stage and may use informal jottings or representations such as a part-whole model to record their working instead.

By the end of this step, children should have a good understanding of division that will support them when they move on to the formal written method in Year 5

Year 5 – Division

Concrete

Divide 2-digits by 1-digit (grouping)

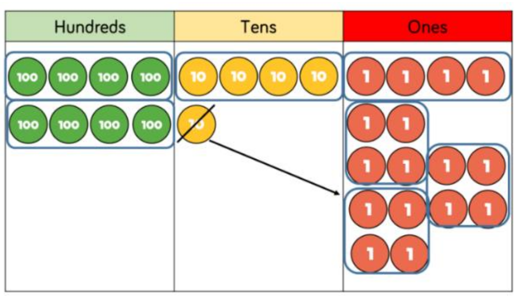


52 ÷ 4 = 13

When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor.

Language is important here. Children should consider 'How many groups of 4 tens can we make?' and 'How many groups of 4 ones can we make?' Remainders can also be seen as they are left ungrouped.

Divide 3-digits by 1-digit (grouping)



Continue to use a place value grid to show grouping and support their understanding of short division.

Pictorial

Divide 2-digits by 1-digit (grouping)

Children can draw their own representations of grouping.
Remainders should be shown as ungrouped.

Part-part whole models can be used to represent this calculation.

Divide 3-digits by 1-digit (grouping)

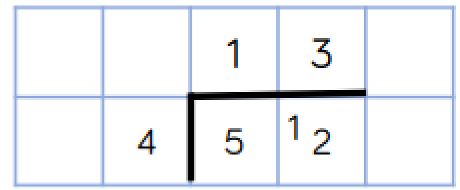
Children can also draw their own counters and group them

Abstract

Revise all multiplication and division facts up to 12x12

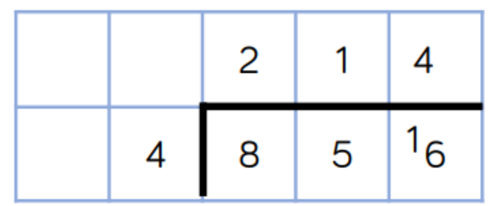
Divide 2-digits by 1-digit (grouping)

Introduce children to the formal written method of short division.

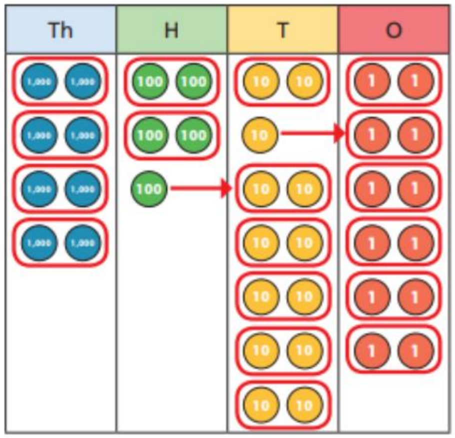


Exchanging must be noted carefully, as shown.

Divide 3-digits by 1-digit (grouping)



Exchanging must be noted carefully, as shown.

<table>
<tr>
<th>Divide 4-digits by 1-digit (grouping)</th>
<th>Divide 4-digits by 1-digit (grouping)</th>
<th>Divide 4-digits by 1-digit (grouping)</th>
</tr>
<tr>
<td>

Place value counters or plain counters can be used on a place value grid to support children to divide 4-digits by 1-digit.</td>
<td>Children can also draw their own counters and group them.

Children should be encouraged to move away from the concrete and pictorial when dividing numbers with multiple exchanges.</td>
<td><table>
<tr><td></td><td>4</td><td>2</td><td>6</td><td>6</td></tr>
<tr><td>2</td><td>8</td><td>5</td><td>$^{1}3$</td><td>$^{1}2$</td></tr>
</table>
Exchanging must be noted carefully, as shown.</td>
</tr>
</table>

<table>
<tr><th colspan="3">Year 6 – Division</th></tr>
<tr><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>
Divide multi digits by 2-digits (short division)

When children begin to divide up to 4- digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective.

Divide multi-digits by 2-digits (long division)
</td>
<td>
Divide multi digits by 2-digits (short division)

Children can write out multiples to support their calculations with larger remainders.

Divide multi-digits by 2-digits (long division)

Children can write out multiples to support their calculations with larger remainders.
</td>
<td>
Revise all multiplication and division facts up to 12x12
Divide multi digits by 2-digits (short division)

7,335 ÷ 15 = 489
<table>
<tr><td></td><td>0</td><td>4</td><td>8</td><td>9</td></tr>
<tr><td>15</td><td>7</td><td>$^{7}3$</td><td>$^{13}3$</td><td>$^{13}5$</td></tr>
</table>
Exchanging must be noted carefully, as shown.

Divide multi-digits by 2-digits (long division)

432 ÷ 12 = 36
<table>
<tr><td></td><td></td><td>0</td><td>3</td><td>6</td><td></td></tr>
<tr><td>1</td><td>2</td><td>4</td><td>3</td><td>2</td><td>(×30)</td></tr>
<tr><td></td><td>–</td><td>3</td><td>6</td><td>0</td><td></td></tr>
<tr><td></td><td></td><td></td><td>7</td><td>2</td><td>(×6)</td></tr>
<tr><td></td><td>–</td><td></td><td>7</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>0</td><td></td></tr>
</table>
12 × 1 = 12
12 × 2 = 24
12 × 3 = 36
12 × 4 = 48
12 × 5 = 60
12 × 6 = 72
12 × 7 = 84
12 × 8 = 96
12 × 7 = 108
12 × 10 = 120

When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction.
This will depend on the context of the question.
Children can also answer questions where the quotient needs to be rounded according to the context.
</td>
</tr>
</table>

372 ÷ 15 = 24 r12

			2	4	r	1	2
1	5	3	7	2			
	–	3	0	0			
			7	2			
	–		6	0			
			1	2			

$1 \times 15 = 15$

$2 \times 15 = 30$

$3 \times 15 = 45$

$4 \times 15 = 60$

$5 \times 15 = 75$

$10 \times 15 = 150$

372 ÷ 15 = 24 4/5

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	–	3	0	0	
			7	2	
	–		6	0	
			1	2	