



# Woodfield Primary School



## (No 37) Maths Calculation Policy

Date	September 2023
Written by	Woodfield Primary School
Adopted by MAT Board	N/A
Adopted by LGB	
Review Date	
Version	N/A

## 1. Rationale

This policy has been written in line with the National Curriculum for mathematics (September 2014). The purpose of the policy is twofold. Firstly, it contains the key written methods that will be taught within our school and has been written in order to ensure consistency and progression throughout the school. Secondly, it supports teachers when trying to identify appropriate concrete and pictorial representations to help develop understanding.

## 2. Aims of the Policy

Our Calculation Policy aims to ensure all pupils:

- are taught consistent calculation strategies across the key stages
- can show high levels of fluency when performing mental and written calculations
- have deep conceptual understanding through carefully planned progression of concrete, pictorial and abstract representations
- are competent in fluency, reasoning and problem solving

As a result of these, we aim that children will:

- Gain a secure foundation of skills and concepts
- Use the calculation skills consistently and with confidence
- Develop independence and be able select appropriate resources to support their learning
- Use and apply these skills to rich and sophisticated problems

## 3. Policy into Practice - Our Approach

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

We believe that it is fundamental that pupils can move from conceptual learning to abstract learning in order to be able to apply their mathematical skills to reasoning and problem solving. To reflect this ideology, the calculation strategies used will focus on moving from concrete to pictorial and then to abstract recording (CPA). Mental methods and strategies will also work alongside these methods.

## 4. White Rose Maths Scheme

We follow the White Rose Maths scheme within school. For each calculation and year group, the concrete and pictorial examples are from the White Rose Maths calculation policy. This mirrors the teaching slides that children are exposed to in lessons. For the abstract written methods, we follow the same presentation as White Rose Maths for subtraction and division, however for addition and multiplication there are slight changes which can be seen throughout this document.

# Addition – Year 1

## Add with numbers up to 20

### Key number skills for addition at Year 1:

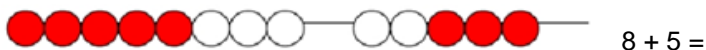
- Read and write numbers to 100 forwards and backwards, from any given number.
- Read and write numbers from 1 – 20 in numerals and words.
- Recall bonds to 10 and 20 and addition facts within 20.
- Count to and across 100.
- Count in multiples of 1, 2, 5 and 10.
- Solve simple one step problems involving addition using objects, number lines and pictorial representations

### Use number lines to add by counting on in ones.

Concrete and Pictorial	Abstract
<p style="text-align: center;"><math>8 + 7 = 15</math></p>	<p><math>5 + 12 = 17</math></p> <p style="color: red;">Presentation: Children should be able to write each digit in its own box and correctly write the addition symbol</p>

### Note:

This builds on from prior learning of adding by combining two sets of objects into one group (5 cubes and 3 cubes) in Early Years.





# Add two 2-digit numbers to 100

## Concrete and Pictorial

$38 + 23 = 61$

Tens	Ones
38	23
61	1

## Abstract

Encourage children to use the formal method. This may need to be done in stages

### Stage 1

Children may need to use the formal column method by firstly using partitioned column without crossing the tens

$$\begin{array}{r}
 23 + 34 \\
 \hline
 20 + 3 \\
 + 30 + 4 \\
 \hline
 50 + 7 \\
 = 57
 \end{array}$$

### Stage 2

Moving onto partitioned column with crossing the tens

$$\begin{array}{r}
 58 + 43 \\
 \hline
 50 + 8 \\
 40 + 3 \\
 \hline
 90 + 11 \\
 = 101
 \end{array}$$

### Stage 3

$$\begin{array}{r}
 62 \\
 + 35 \\
 \hline
 97
 \end{array}$$

Presentation: Children should write the calculation with each digit in its own box

# Addition – Year 3

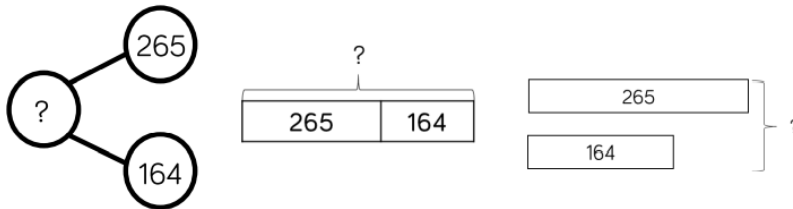
## Add numbers with up to 3-digits

### Key number skills for addition at Year 3:

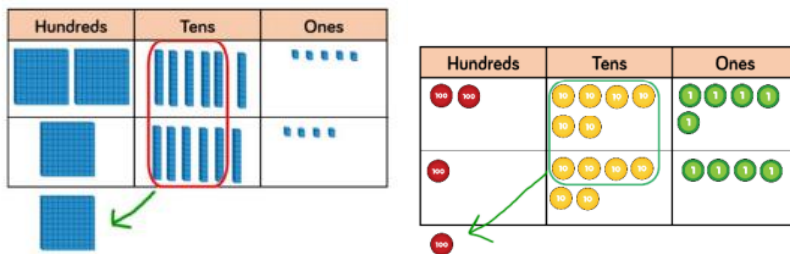
- Read and write numbers to 100 in numerals and words.
- Add 2-digit numbers mentally including those exceeding 100.
- Add a 3-digit number and ones mentally.
- Add a 3-digit number and tens mentally.
- Add a 3-digit number and hundreds mentally.
- Estimate answers to calculations, using inverse to check answers.
- Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number.
- Compare and order numbers up to 1000.
- Solve problems including missing number problems, using number facts, place value and money.
- Recognise place value of each digit in 3-digit numbers.
- Continue to practise a wide range of mental addition strategies i.e. Number bonds, adding nearest multiple of 10, 100 and adjusting, using near doubles, partitioning and recombining

### Add numbers up to 3 digits

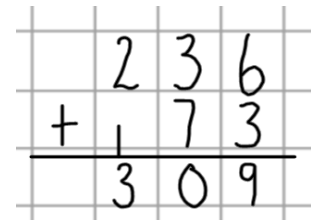
#### Concrete and Pictorial (WRM)



$$265 + 164 = 429$$



#### Abstract



Children to set out the numbers in columns using their place value knowledge.

**Presentation:** Addition sign on the left hand side. Any number that has been regrouped goes on top of the total line.

# Addition – Year 4

## Add numbers with up to 4-digits

### Key number skills for addition at Year 4:

- Select most appropriate method and explain why.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies i.e. Number bonds, add the nearest multiple of 10, 100 and 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers with up to 4-digits using the formal written method of column addition.
- Count in multiples of 6,7,9, 25 and 1000.
- Count backwards through zero to include negative numbers.
- Order and compare numbers beyond 1000.
- Read Roman numerals to 100.

### Add numbers up to 4-digits

Concrete and Pictorial (WRM)		Abstract
<p>Children will know the compact column addition method from year 3.</p> <p><b>Presentation: Regrouped numbers sit on top of the line. Note that the addition symbol goes on the left hand side.</b></p>		

# Addition – Year 5

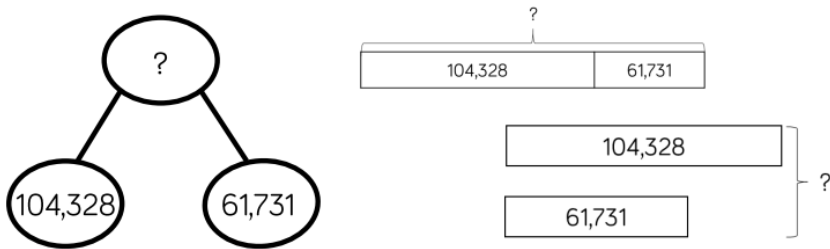
## Add numbers with more than 4-digits

### Key number skills for addition at Year 5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies i.e. add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, inverse, partitioning and recombining, use number bonds.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100,000.

### Add numbers with more than 4-digits using the formal written method of column addition

#### Concrete and Pictorial (WRM)



$$104,328 + 61,731 = 166,059$$

HTh	TTh	Th	H	T	O
10000		1000 1000 1000 1000	100 100 100	10 10	1 1 1 1 1 1 1 1
	1000 1000 1000 1000	1000	100 100 100 100 100	10 10 10	1

#### Abstract

	2	3	4	8	1
+		1	3	6	2
	2	4	8	4	3

Children will know the compact column addition method from year 4 and should know the presentation expectations.

**Presentation:** The regrouped numbers sit on top of the line. Note that the addition symbol goes on the left hand side.

	1	9	.	0	1
		3	.	6	5
+		0	.	7	0
	2	3	.	3	6

The decimal point should be aligned in the same way







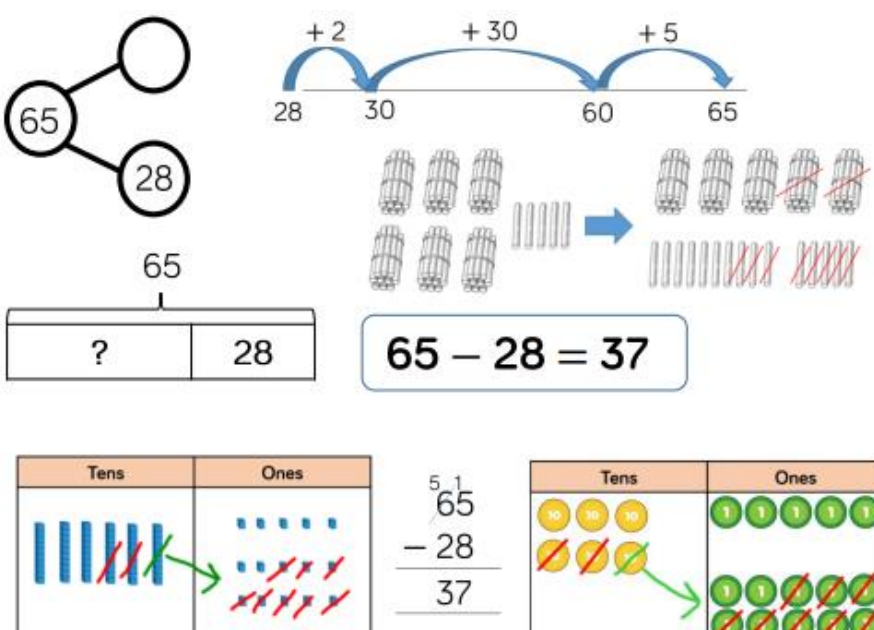
# Subtraction – Year 2

## Subtract with 2-digit numbers

### Key number skills for subtraction Year 2:

- Recognise the place value of each digit in a 2-digit number.
- Recall and use subtraction facts to 20 fluently and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, including a 2-digit number and units, a 2-digit number and tens and two 2-digit numbers.
- Show that subtraction cannot be done in any order.
- Read and write numbers to at least 100 in numerals and words.
- Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representations and increasing confidence.
- Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems.

### Subtract 1 and 2-digit numbers to 100

Concrete and Pictorial (WRM)	Abstract
 <p style="text-align: center;"><b><math>65 - 28 = 37</math></b></p>	<div style="text-align: center;"> <math display="block">\begin{array}{r} \overset{5}{\cancel{6}}\overset{1}{5} \\ - 28 \\ \hline 37 \end{array}</math> </div> <p>Initially, children should be encouraged to use the formal column method when calculating alongside straws, base 10 or place value counters.</p> <p>As numbers become bigger, the concrete equipment becomes less efficient</p> <p style="color: red;">Presentation: Numbers that have been exchanged should be crossed out and written above the number to the left</p>

# Subtraction – Year 3

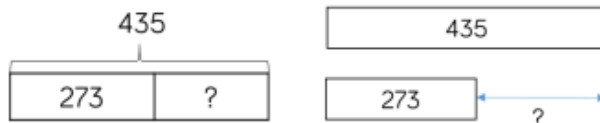
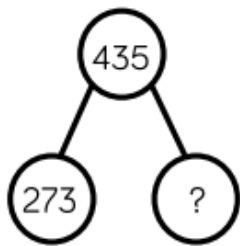
## Subtract with 2 and 3-digit numbers

### Key number skills at Year 3:

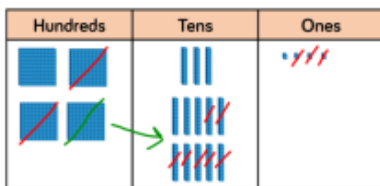
- Subtract mentally a 3-digit number and ones, tens and hundreds.
- Estimate answers and use inverse operations to check.
- Solve problems including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place-value of each digit in a 3-digit number.
- Read and write numbers up to 1000 in numerals and words.
- Practise mental subtraction strategies such as subtracting near multiples of 10 and adjusting and select most appropriate methods to subtract, explaining why.

### Subtract numbers with up to 3-digits

#### Concrete and Pictorial (WRM)



$$435 - 273 = 262$$



$$\begin{array}{r} 3 \ 1 \\ 435 \\ - 273 \\ \hline 262 \end{array}$$



$$\begin{array}{r} 3 \ 1 \\ 435 \\ - 273 \\ \hline 262 \end{array}$$

Initially, children should be encouraged to use the formal column method when calculating alongside straws, base 10 or place value counters.

As numbers become bigger, the concrete equipment becomes less efficient

**Presentation:** Numbers that have been exchanged should be crossed out and written above the number to the left. Subtraction symbol on the left hand side

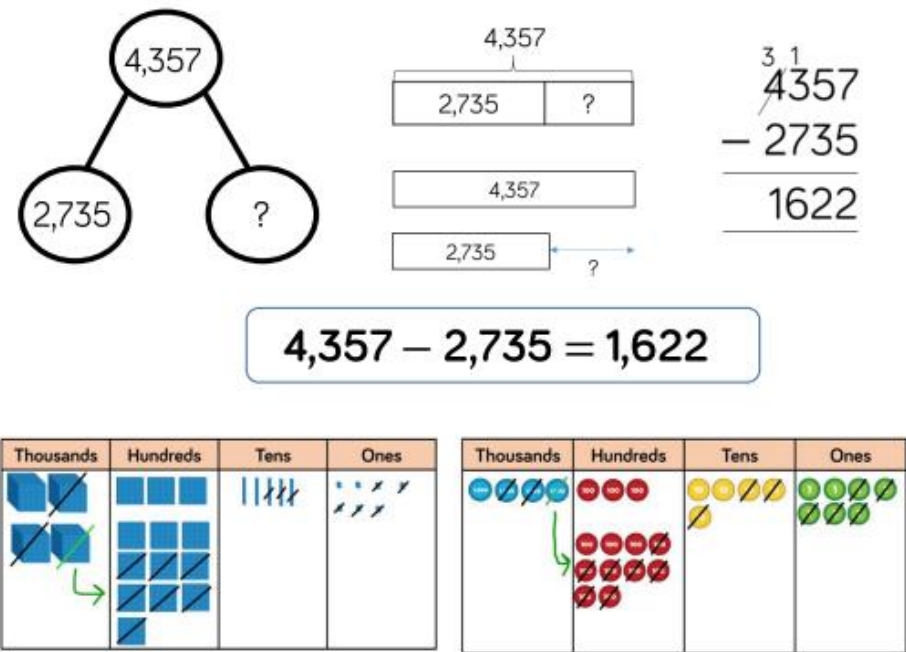
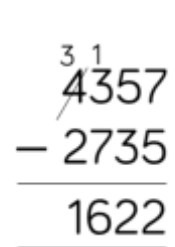
# Subtraction – Year 4

## Subtract with 4-digit numbers

### Key number skills for subtraction at Year 4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Find 100 more or less than a given number.
- Count backwards through zero, including negative numbers.
- Recognise place value of each digit in a 4-digit number.
- Round any number to the nearest 10, 100 and 1000.
- Solve number and practical problems involving subtraction.

### Subtract numbers with up to 4-digits

Concrete and Pictorial (WRM)	Abstract
 <p style="text-align: center; border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 0 auto;"><b><math>4,357 - 2,735 = 1,622</math></b></p>	 <p>Initially, children should be encouraged to use the formal column method when calculating using base 10 or place value counters.</p> <p>As numbers become bigger, the concrete equipment becomes less efficient</p> <p style="color: red;">Presentation: Numbers that have been exchanged should be crossed out and written above the number to the left. Subtraction symbol on the left hand side</p>

# Subtraction – Year 5

## Subtract numbers with more than 4-digits

### Key number skills for subtraction at Year 5:

- Subtract numbers mentally with increasingly large numbers.
- Use rounding and estimation to check answers to calculations and determine in a range of contexts levels of accuracy.
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10000 and 100000.

### Subtract numbers with more than 4-digits

Concrete and Pictorial (WRM)	Abstract																								
<div style="text-align: center;"> </div> <table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <thead> <tr style="background-color: #f0f0f0;"> <th style="width: 12.5%;">HTh</th> <th style="width: 12.5%;">TTh</th> <th style="width: 12.5%;">Th</th> <th style="width: 12.5%;">H</th> <th style="width: 12.5%;">T</th> <th style="width: 12.5%;">O</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	HTh	TTh	Th	H	T	O																			<div style="text-align: center;"> </div> <p style="color: red; font-size: small;">At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently.</p> <div style="text-align: center;"> </div> <p style="text-align: center;">Subtracting using decimals</p>
HTh	TTh	Th	H	T	O																				

## Subtraction – Year 6

### Subtracting with increasingly large and more complex numbers and decimal values

#### Key number skills for subtraction at Year 6:

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Use negative numbers in context and calculate intervals across zero.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.

#### Subtracting with increasingly large numbers

Note that the subtraction symbol goes on the left hand side.

A handwritten subtraction problem on grid paper. The top number is 14999 with a small '0' above the '1' and '14' above the '4'. The bottom number is 8994. A minus sign is on the left. The result is 6075. A horizontal line is drawn under the numbers.

Using the compact column method to subtract money and measures, including decimals with different numbers of decimal places.

A handwritten subtraction problem on grid paper. The top number is 15.419 with a small '0' above the '1' and '15' above the '5'. The bottom number is 3.608. A minus sign is on the left. The result is 69.339 kg. A horizontal line is drawn under the numbers.

Pupils should be able to apply their knowledge of a range of mental strategies, mental recall skills and informal and formal written methods when selecting **the most appropriate method** to work out subtraction problems.

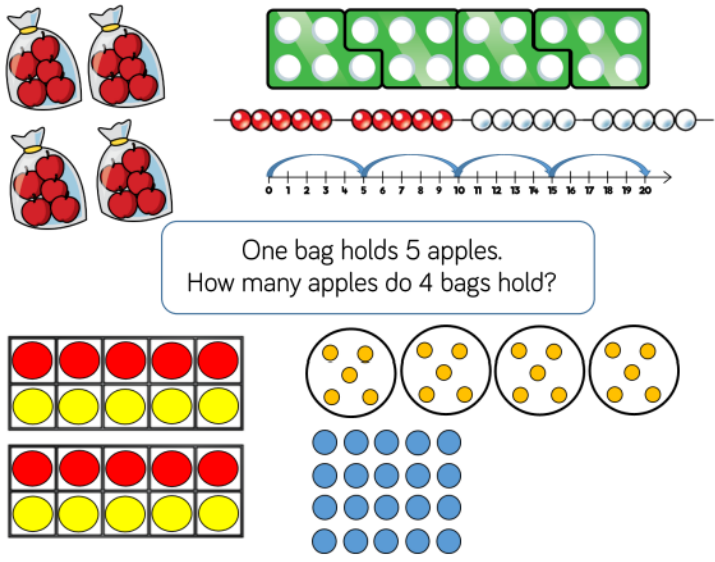
# Multiplication – Year 1

## Multiply with concrete objects, arrays and pictorial representations

### Key number skills for multiplication at Year 1:

- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

### Solve 1-step problems using multiplication

Concrete and Pictorial (WRM)	Abstract
 <p data-bbox="352 1016 783 1106">One bag holds 5 apples. How many apples do 4 bags hold?</p>	<p data-bbox="1018 819 1442 882">Children are not expected to record multiplication formally in year 1</p>



# Multiplication – Year 2

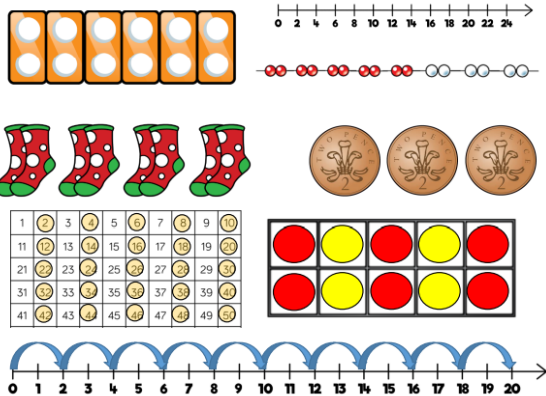
## Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

### Key number skills for multiplication at Year 2:

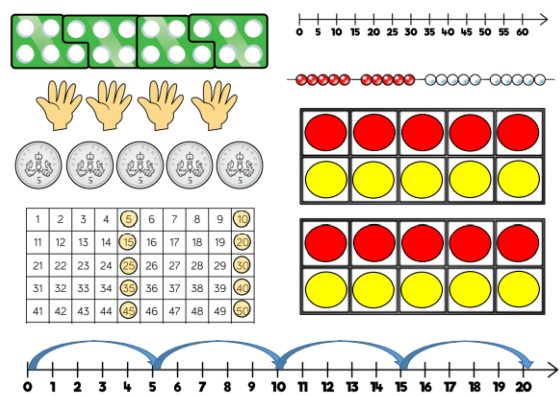
- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the 2, 5 and 10 multiplication tables, including recognising odds and evens.
- Write and calculate number sentences using the x and = signs.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.

### Times Tables : Encourage daily practise

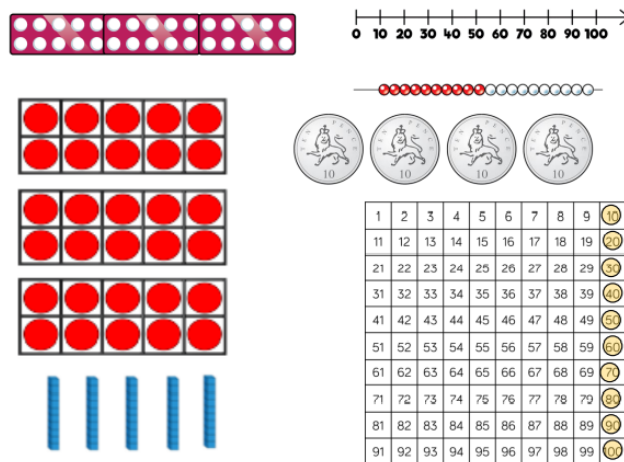
#### 2x table



#### 5x table

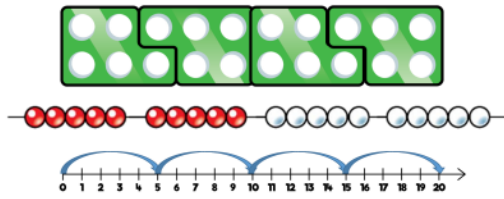
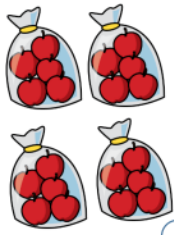


**10x table** – Look for patterns in the ten times table, using concrete manipulatives. Notice the pattern in the digits – the ones are always 0, and the tens increase by 1 ten each time.

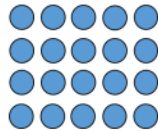
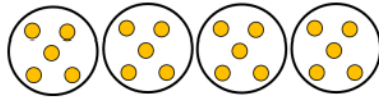
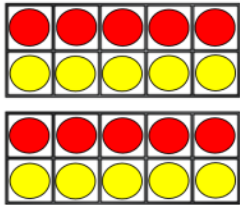


## Solve 1-step problems using multiplication

### Concrete and Pictorial (WRM)



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



$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

### Abstract

In year 2, children are introduced to the multiplication symbol

$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

# Multiplication – Year 3

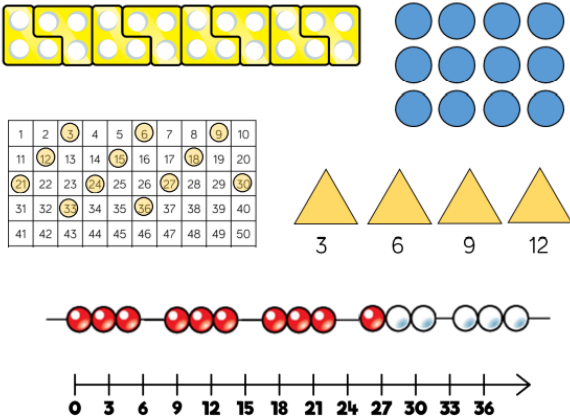
## Multiply 2-digits by a single digit number

### Key number skills for multiplication at Year 3:

- Recall and use multiplication facts for the 2, 3, 4, 5, 8 and 10 multiplication tables, and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including 2-digit x single-digit, drawing upon mental methods, and progressing to reliable written methods.
- Solve multiplication problems, including missing number problems.
- Develop mental strategies using commutativity and associativity law (e.g.  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ )
- Solve simple problems in contexts, deciding which operations and methods to use.
- Develop efficient mental methods to solve a range of problems e.g. using commutativity ( $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and for missing number problems  $\_ \times 5 = 20$ ,  $3 \times \_ = 18$ ,  $8 \times \_ = 32$ .

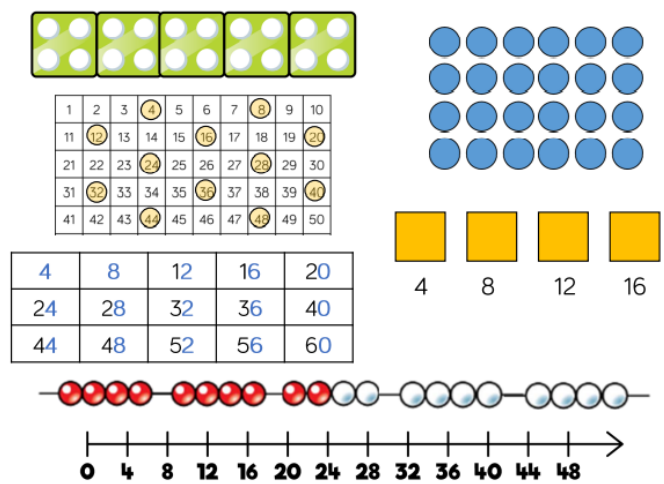
### Times Tables: Encourage daily practise

#### 3x table



Look for patterns in the three times table, noticing the odd, even, odd, even pattern using number shapes to support.

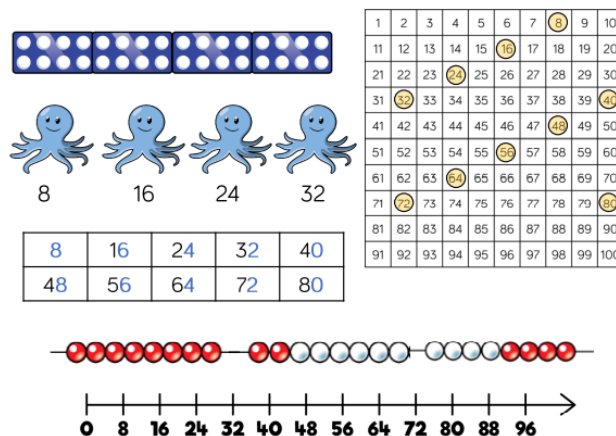
#### 4x table



Make links to the 2 times table, seeing how each multiple is double the twos.

#### 8x table

Look for patterns in the 8 times table, making links to the 4 times table and seeing how each multiple is double the fours.



## Multiply 2-digit numbers by 1-digit numbers

### Concrete and Pictorial (WRM)

Hundreds	Tens	Ones
	30	4
	30	4
	30	4
	30	4
	30	4
	30	4
	30	4
	30	4
	30	4



$$34 \times 5 = 170$$

	H	T	O	
		3	4	
x			5	
		2	0	(5 × 4)
+	1	5	0	(5 × 30)
	1	7	0	

### Abstract

	H	T	O	
		3	4	
x			5	
		2	0	(5 × 4)
+	1	5	0	(5 × 30)
	1	7	0	

Teachers may decide to first look at the expanded column method before moving onto the short multiplication method.

The place value counters should be used to support the understanding of the method rather than the multiplication itself, as children should use their times table knowledge.

# Multiplication – Year 4

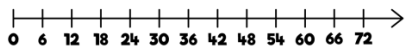
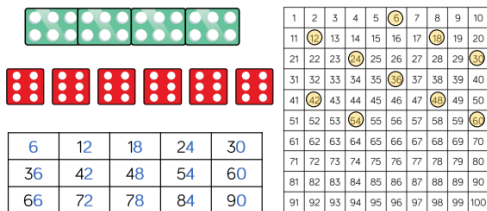
## Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12 x 12

### Key skills for multiplication at Year 4:

- Recall multiplication facts for **all multiplication tables up to 12 x 12**.
- Recognise place value of digits in up to 4-digit numbers .
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.
- Use commutativity and other strategies mentally  $3 \times 6 = 6 \times 3$ ,  $2 \times 6 \times 5 = 10 \times 6$ ,  $39 \times 7 = 30 \times 7 + 9 \times 7$ .
- Solve problems with increasingly complex multiplication in a range of contexts.
- Count in multiples of 6, 7, 9, 25 and 1000.
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones).

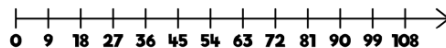
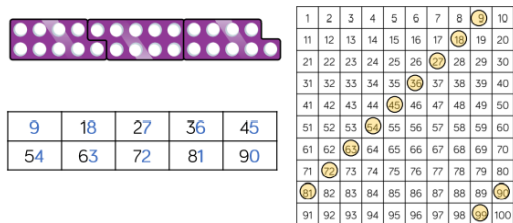
### Times Tables: Encourage daily practise

#### 6x table



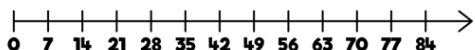
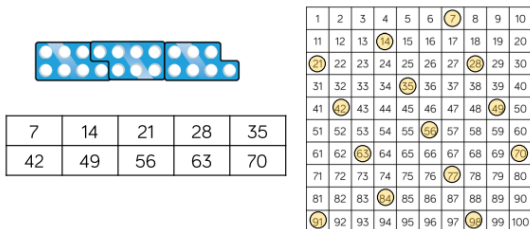
Look for patterns in the 6 times table, making links to the three times table seeing how each multiple is double the threes.

#### 9x table

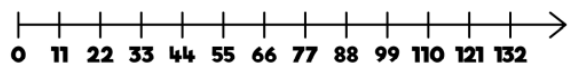
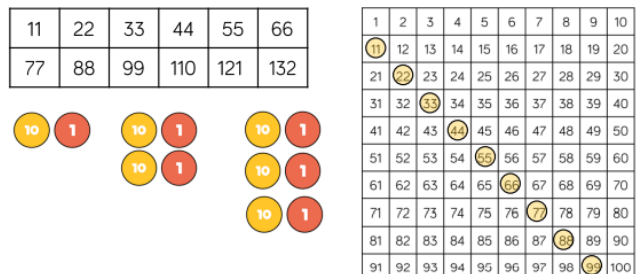


Look for patterns in the nine times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square/

**7x table** – The seven times table can be trickier to learn due to the lack of obvious pattern in the numbers however they already know several facts due to commutativity.

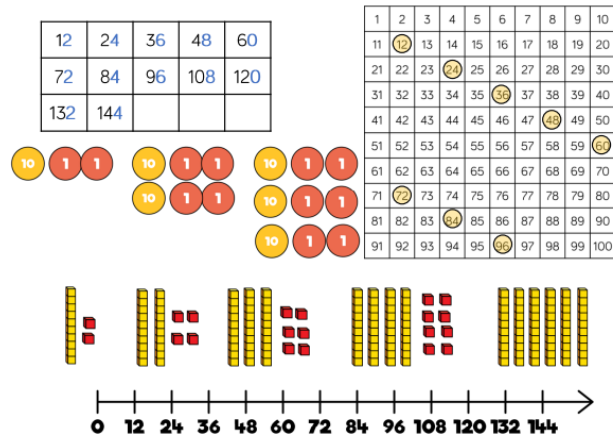


**11x table** – Notice the pattern in the tens and ones using the hundred square to support.



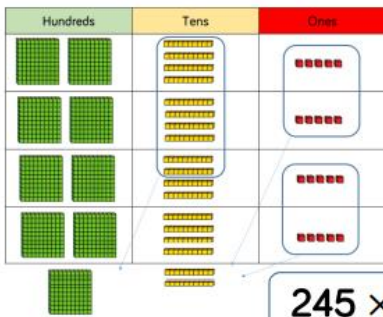
## 12x table

Make links to the 6 times table, seeing how each multiple is double the sixes.

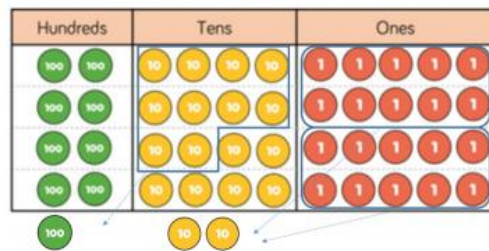


## Multiply a 3-digit number by a 1-digit number

### Concrete and Pictorial (WRM)



$$245 \times 4 = 980$$



### Abstract

Presentation: Numbers are regrouped on top of the total line.  
Note multiplication symbol goes on the left.

	3	2	7	
X	1	2	4	
<hr/>				
	1	3	0	8

# Multiplication – Year 5

## Multiply up to 4-digits by 1 or 2-digits

### Key number skills for multiplication at Year 5:

- Identify multiples and factors, using knowledge of multiplication tables to 12x12.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 1000.
- Recognise and use square and cube numbers and their notation.
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

Children should be encouraged to work in the abstract

### Short Multiplication

Children need to be taught to approximate first e.g. they would round  $72 \times 38$  to  $70 \times 40 = 2800$  to check the reasonableness of their answer. Recap short multiplication from year 4.

**Presentation:** Numbers are carried on top of the total line. Multiplication symbol goes on the left

	3	2	7	
X	1	2	4	
<hr/>				
	1	3	0	8

### Long Multiplication

Move onto long multiplication to show 2, 3 and 4- digit numbers multiplied by a 2-digit number.

		1	2	3	4	
	X	1	2	8	6	
<hr/>						
		7	4	0	4	
	9	8	7	2	0	
<hr/>						
	1	0	6	1	2	4

Make sure you cross out the numbers you have carried from your second row of multiplications before adding.

# Multiplication – Year 6

## Multiply decimals up to 2 decimal places by a single digit

### Key number skills for multiplication at Year 6:

- Recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5)**.
- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.
- Perform mental calculations with mixed operations and large numbers.
- Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.
- Estimate answers using rounding and approximation and determine levels of accuracy.
- Round any integer to a required degree of accuracy.

Children should be encouraged to work in the abstract

### Short Multiplication

Use short multiplication to multiply numbers with more than 4-digits by a single digit; to multiply money and measures, and to multiply decimals with up to 2 d.p. by a single digit.

**Presentation:** Numbers are carried on top of the total line. Multiplication symbol goes on the left

		3	.	1	9	
x	8					
<hr/>						
2	5	.	5	2		

### Long Multiplication

Use long multiplication to multiply numbers with at least 4 digits by a 2 digit number.

		1	2	3	4	
x		1	2	8	6	
<hr/>						
	7	4	0	4		
9	8	7	2	0		
<hr/>						
1	0	6	1	2	4	

Make sure you cross out the numbers you have carried from your second row of multiplications before adding.



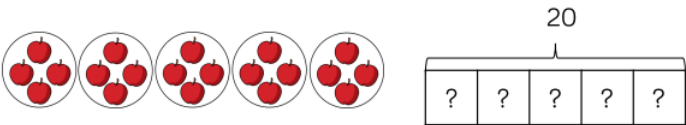
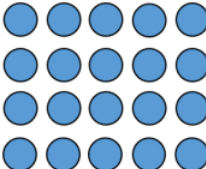
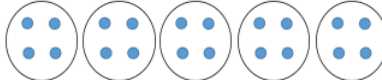
# Division Year 1

## Group and share small quantities

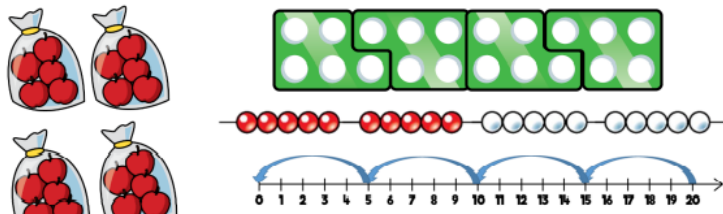
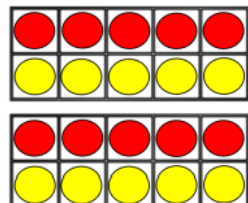

Key number skills needed for division at Year1:

- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations, arrays with the support of the teacher.
- Through grouping and sharing small quantities, pupils begin to understand division and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

### Solve 1-step problems by sharing

Concrete and Pictorial (WRM)	Abstract
<div style="text-align: center;">  <p style="margin: 10px 0;">There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> </div>	<p>Children are not expected to formally record division in year 1</p>

### Solve 1-step problems by grouping

Concrete and Pictorial (WRM)	Abstract
<div style="text-align: center;">  <p style="margin: 10px 0;">There are 20 apples altogether. They are put in bags of 5. How many bags are there?</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> </div>	<p>Children are not expected to formally record division in year 1</p>

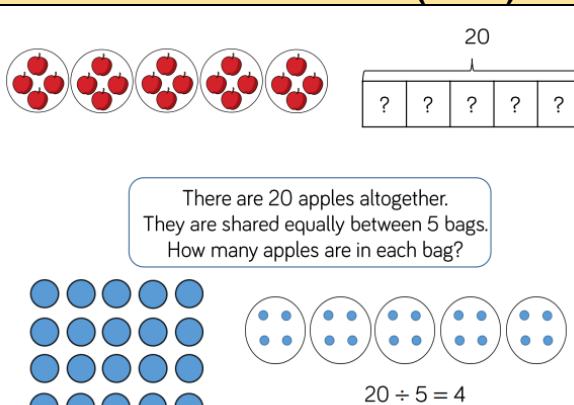
# Division Year 2

## Group and share using the $\div$ and $=$ sign

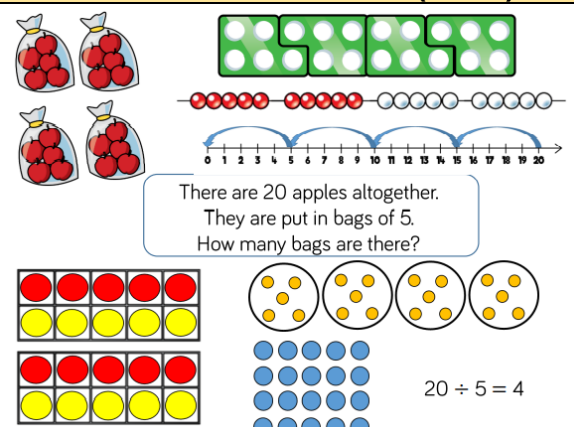
### Key number skills needed for division at Year 2:

- Count in steps of 2, 3, and 5 from 0.
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical sentences for multiplication and division within the multiplication tables and write them using the  $\times$ ,  $\div$  and  $=$  signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

### Division as sharing

Concrete and Pictorial (WRM)	Abstract
 <p style="text-align: center;"><math>20 \div 5 = 4</math></p>	$20 \div 5 = 4$

### Division as grouping

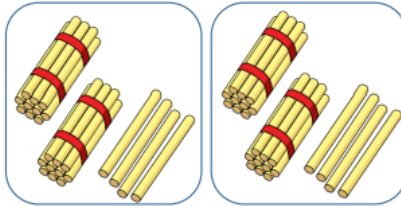
Concrete and Pictorial (WRM)	Abstract
 <p style="text-align: center;"><math>20 \div 5 = 4</math></p>	$20 \div 5 = 4$

# Divide 2-digits by 1-digit (Sharing with no exchange)

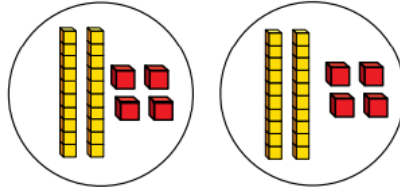
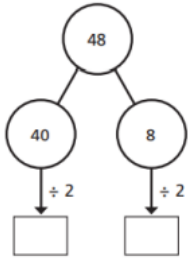
Concrete and Pictorial (WRM)

Abstract

Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1



$$48 \div 2 = 24$$



$$48 \div 2 = 24$$

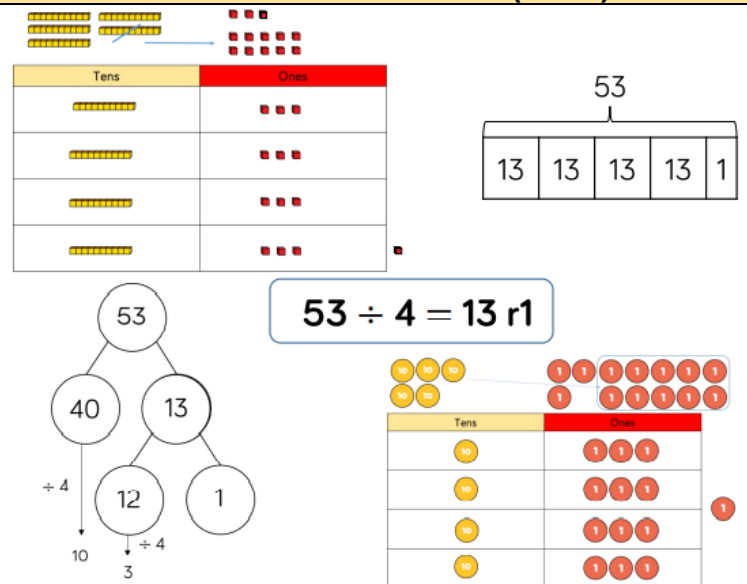
# Division Year 3

## Divide 2-digit numbers by a single digit

### Key number skills needed for division at Year 3:

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- Solve problems, in contexts, and including missing number problems, involving multiplication and division.
- Pupils develop efficient mental methods, for example, using multiplication and division facts
- (e.g. using  $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts ( $30 \times 2 = 60$ , so  $60 \div 3 = 20$  and  $20 = 60 \div 3$ ).
- Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division.

### Introducing remainders

Concrete and Pictorial (WRM)	Abstract
 <p style="text-align: center;"><math>53 \div 4 = 13 \text{ r}1</math></p>	<div style="border: 1px solid black; border-radius: 15px; padding: 10px; display: inline-block; margin-bottom: 10px;"> <math>53 \div 4 = 13 \text{ r}1</math> </div> <p>When dividing numbers with remainders, children can use Base 10 and place value counters to exchange one ten for ten ones.</p>

### Short Division for 2-digit numbers

Some children may start to move towards bus stop method for division, although this is not explicitly in the curriculum for year 3.

$$\begin{array}{r}
 32 \\
 3 \overline{) 96}
 \end{array}$$

# Division Year 4

## Divide up to 3-digit numbers by a single digit

### Key number skills needed for division at Year 4:

- Recall multiplication and division facts for all numbers up to 12 x 12.
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number.
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example  $200 \times 3 = 600$  so  $600 \div 3 = 200$ .
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

### Divide 3-digits by 1 digit

Concrete and Pictorial (WRM)	Abstract																																							
<div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin-bottom: 10px;"><math>844 \div 4 = 211</math></div> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>844</p> <table border="1" style="border-collapse: collapse; width: 100px; height: 30px;"> <tr><td style="width: 25px; height: 20px;">?</td><td style="width: 25px; height: 20px;">?</td><td style="width: 25px; height: 20px;">?</td><td style="width: 25px; height: 20px;">?</td></tr> </table> </div> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse; width: 100px; height: 80px;"> <thead> <tr> <th style="width: 25px; height: 20px;">H</th> <th style="width: 25px; height: 20px;">T</th> <th style="width: 25px; height: 20px;">O</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">100 100</td><td style="text-align: center;">10</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">100 100</td><td style="text-align: center;">10</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">100 100</td><td style="text-align: center;">10</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">100 100</td><td style="text-align: center;">10</td><td style="text-align: center;">1</td></tr> </tbody> </table> </div> <div style="text-align: center;"> <p>844</p> <div style="display: flex; justify-content: space-around; width: 100%;"> <div style="text-align: center;">800 ↓ +4 □</div> <div style="text-align: center;">40 ↓ +4 □</div> <div style="text-align: center;">4 ↓ +4 □</div> </div> </div> </div>	?	?	?	?	H	T	O	100 100	10	1	100 100	10	1	100 100	10	1	100 100	10	1	<p>There is no expectation for children to use a formal method for division at this stage, however some children may be ready for this.</p> <div style="text-align: center; margin: 20px 0;"> <table border="1" style="border-collapse: collapse; width: 150px; height: 80px;"> <tr><td style="width: 30px; height: 20px;">2</td><td style="width: 30px; height: 20px;">1</td><td style="width: 30px; height: 20px;">8</td></tr> <tr><td colspan="3" style="border-top: 1px solid black;"></td></tr> <tr><td style="font-size: 2em;">4</td><td style="font-size: 2em;">8</td><td style="font-size: 2em;">7</td><td style="font-size: 2em;">2</td></tr> </table> </div> <p>Note the use of the zero as a place value holder when something cannot be divided</p> <div style="text-align: center; margin-top: 20px;"> <table border="1" style="border-collapse: collapse; width: 150px; height: 80px;"> <tr><td style="width: 30px; height: 20px;">0</td><td style="width: 30px; height: 20px;">3</td><td style="width: 30px; height: 20px;">7</td></tr> <tr><td colspan="3" style="border-top: 1px solid black;"></td></tr> <tr><td style="font-size: 2em;">5</td><td style="font-size: 2em;">1</td><td style="font-size: 2em;">8</td><td style="font-size: 2em;">5</td></tr> </table> </div>	2	1	8				4	8	7	2	0	3	7				5	1	8	5
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# Division Year 5

## Divide up to 4-digits by a single digit

### Key number skills for division at Year 5:

- Recall multiplication and division facts for all numbers up to  $12 \times 12$  (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Use multiplication and division as inverses.
- Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g.  $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$ ).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

### Short Division Including Remainder

$$\begin{array}{r} 06635 \text{ r } 5 \\ 8 \overline{) 53029} \end{array}$$

Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life meaning context, where pupils consider the meaning of the remainder and how to express it, i.e. as a fraction, a decimal, or as a rounded number or value depending on the context of the problem.

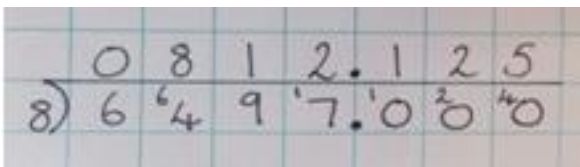
# Division Year 6

## Divide up to 4-digits by a single digit

### Key number skills for division at Year 6:

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations.
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Solve problems involving all 4 operations.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy.

### Short division for dividing by a single digit



Pupils should continue to use this method and consider the most appropriate way to express the remainder. In this example rather than expressing the remainder as r 1, a decimal point is added.

### Long division by chunking for dividing by 2-digits

$$\begin{array}{r}
 27 \\
 36 \overline{) 972} \\
 \underline{- 720} \\
 252 \\
 \underline{- 252} \\
 0 \\
 \text{Answer : } 27
 \end{array}$$

20x  
  
7x

↓

Find out ‘how many 36s are in 972?’ by subtracting ‘chunks’ of 36 until zero is reached (or until there is a remainder). Teach pupils to write a ‘useful list’ first at the side that will help them decide what chunks to use, e.g:

Useful List:  
 1x = 36  
 10x = 360  
 100x = 3600

Introduce the method in a simple way by limiting the choice of chunks to ‘Can we use 10 lots? Can use 100 lots?’ As children become confident with the process, encourage more efficient chunks to get to the answer more quickly (e.g. 20x, 5x) and expand on their ‘useful’ lists.