



# Mathematics Intent and Purpose

## Why do we teach mathematics?

Mathematics is a creative and highly interconnected discipline that has been developed over centuries.

It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment.

A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

## What is the aim of our curriculum for mathematics?

Our 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.

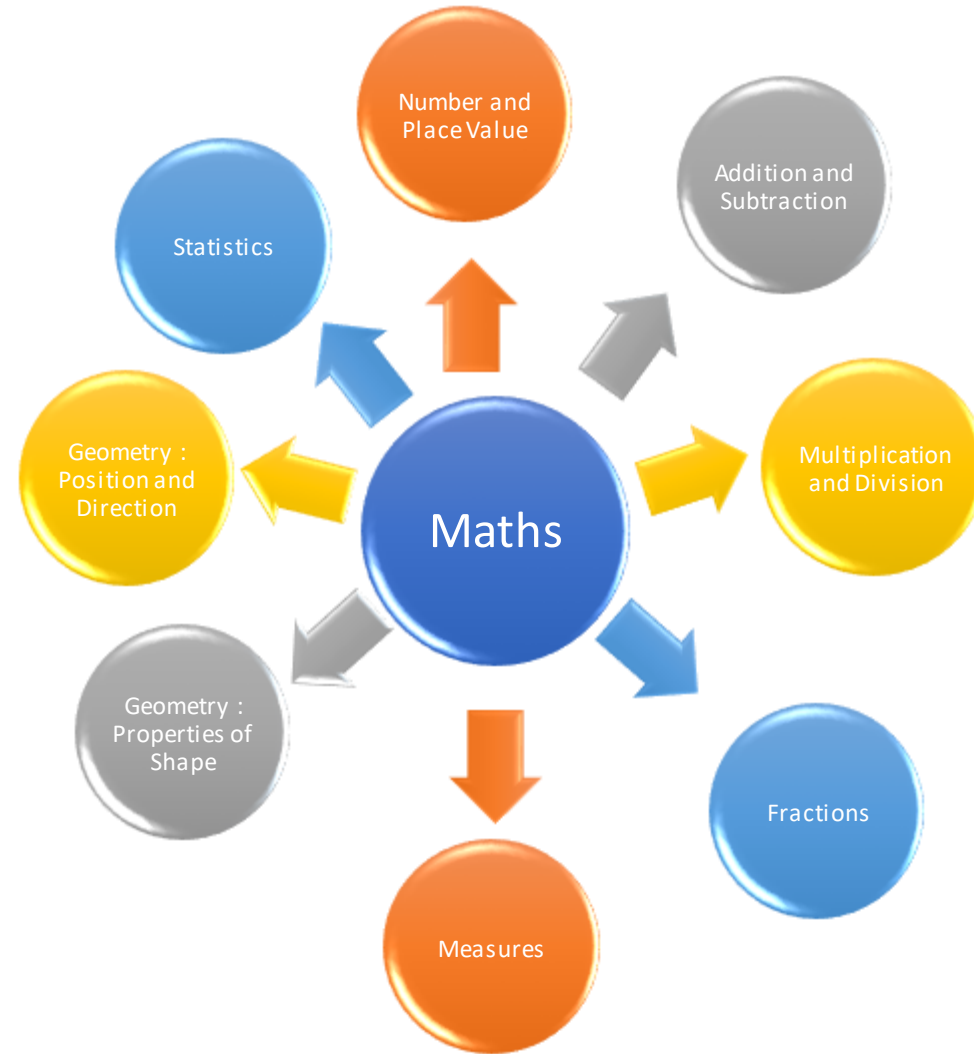
Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. They should also be able to apply their mathematical knowledge to science and other subjects.

# Mathematics Implementation and Pedagogy

## How is mathematics taught at Shinfield Infant and Nursery School?

- Maths at Shinfield Infant and Nursery School is taught using a 'mastery' approach. Mastering maths means pupils acquiring a deep, long-term, secure and adaptable understanding of the subject and being able to apply concepts in many different contexts. Maths is taught in mixed-ability class groups, where the focus is on all pupils working together on the same lesson content at the same time. This ensures that all can master concepts before moving to the next part of the curriculum sequence. If a pupil fails to grasp a concept or procedure, this is identified quickly, and early intervention ensures the pupil can move forward.
- Teaching is based on the White Rose Maths Hub approach, with lesson design identifying the new mathematics that is to be taught, the key points and potential misconceptions to create a carefully sequenced journey through the learning. Procedural fluency and conceptual understanding are developed in tandem because each supports the development of the other.
- White Rose resources are supplemented where appropriate by additional resources identified by teachers e.g. White Rose planning, Primary Stars, Twinkl 'Diving into Mastery'. Discussion is a key part of teaching, with children being expected to explain their approach to questions; this allows for the development of deeper understanding as well as providing assessment opportunities. Each lesson follows the 'I do, We do, You do' approach with teacher models of the concept being followed by shared work before independent 'Intelligent Practice' that both reinforces pupils' procedural fluency and develops their conceptual understanding.
- Concrete resources are available in all classrooms, with the expectation that children will move from the use of these through pictorial representations to abstract as they gain a secure mental model of the concept. Throughout EYFS and KS1 children are introduced to a range of concrete resources and are strongly encouraged to use these to develop a deeper understanding of concepts by seeing it visually, rather than as an abstract.
- Key facts such as multiplication tables and addition facts are learnt to automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts.
- Instant recall of key number facts is practised to build on a secure and genuine mathematical understanding in order for pupils to move forward and solve increasingly complex problems. Each group is also given a set of KIRFS (Key Instant Recall Facts) to learn every half term with the expectation of instant recall of these facts.

# Mathematics Key Concepts



## Mathematics Content Spine

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Place value within 10 ( 5 weeks approx)	Addition and Subtraction within 10 ( 5 weeks approx)  Geometry (1 week)	Place value within 20 ( 3 weeks approx)  Addition and Subtraction within 20 ( 3 weeks approx)	Place value within 50 ( 2 weeks approx)  Length and height ( 2 weeks)  Mass and Volume ( 2 weeks)	Multiplication and Division (3 weeks)  Fractions ( 1 week approx)  Geometry – position and direction ( 1 week approx)	Place value within 100 ( 2 weeks)  Money ( 1week)  Measurement –time ( 2 weeks)
Year 2	Place Value (5 weeks approx)  Addition and Subtraction	Addition and Subtraction  Geometry – shape (2 weeks approx)	Money ( 2 weeks approx)  Multiplication and Division ( 5 weeks approx)	Measurement – Length and Height  Mass, capacity and temperature (5 weeks approx)	Number – Fractions (3 weeks)  Measurement – time ( 3 weeks)	Statistics  Geometry – position and direction ( 4 weeks)

Please note that weeks are approximated and time is allowed for consolidation and assessments each term.

# Mathematics Progression Map – Number and Place Value

<b>EYFS Goal Number</b>	<ul style="list-style-type: none"> <li>• Have a deep understanding of number to 10, including the composition of each number.</li> <li>• Subitise (recognise quantities without counting) up to 5</li> </ul>
<b>Numerical patterns</b>	<ul style="list-style-type: none"> <li>• Verbally count beyond 20, recognising the pattern of the counting system;</li> <li>• Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;</li> <li>• Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.</li> </ul>

	Counting and Number Patterns	Comparing Numbers
<b>1</b>	<ul style="list-style-type: none"> <li>• Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.</li> <li>• Count, read and write numbers to 100 in numerals</li> <li>• Count in multiples of twos, fives and tens.</li> <li>• Given a number, identify one more and one less.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the language of: equal to, more than, less than (fewer), most, least.</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>• Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and order numbers from 0 up to 100; use &lt;, &gt; and = signs.</li> </ul>

	Identifying and Representing Numbers	Reading and Writing Numbers and Recognising Place Value	Problem Solving
<b>1</b>	<ul style="list-style-type: none"> <li>• Identify and represent numbers using objects and pictorial representations including the number line.</li> </ul>	<ul style="list-style-type: none"> <li>• Read and write numbers from 1 to 20 in numerals and words.</li> </ul>	
<b>2</b>	<ul style="list-style-type: none"> <li>• Identify, represent and estimate numbers using different representations, including the number line.</li> </ul>	<ul style="list-style-type: none"> <li>• Read and write numbers to at least 100 in numerals and in words.</li> <li>• Recognise the place value of each digit in a two-digit number (tens, ones).</li> </ul>	<ul style="list-style-type: none"> <li>• Use place value and number facts to solve problems.</li> </ul>

# Mathematics Progression Map – Addition and Subtraction

- EYFS Goal**
- **Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.**

	Mental Calculations	Written Calculations	Number Bonds
<b>1</b>	<ul style="list-style-type: none"> <li>• Add and subtract one-digit and two-digit numbers to 20, including zero.</li> </ul>	<ul style="list-style-type: none"> <li>• Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals.</li> </ul>	<ul style="list-style-type: none"> <li>• Represent and use number bonds and related subtraction facts within 20.</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>• add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; three one-digit numbers.</li> <li>• Show that a addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.</li> </ul>	<ul style="list-style-type: none"> <li>• Add and subtract numbers with up to two digits, using informal and formal written methods of columnar addition and subtraction.</li> </ul>	<ul style="list-style-type: none"> <li>• Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.</li> </ul>
	Problem Solving	Inverse Operations	
<b>1</b>	<ul style="list-style-type: none"> <li>• Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as: <math>7 = * - 9</math></li> </ul>		
<b>2</b>	<ul style="list-style-type: none"> <li>• Solve problems with addition and subtraction:               <ul style="list-style-type: none"> <li>- using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li> <li>- applying their increasing knowledge of mental and written methods.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</li> </ul>	



### Reception Number and Number Patterns

#### Concrete and Pictorial Modelling

#### Objective/Strategy

Have a deep understanding of number to 10, including the composition of each number.



Subitise (recognise quantities without counting) up to 5



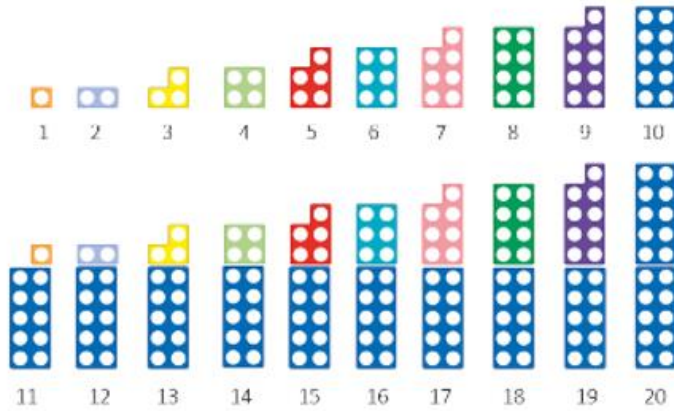
Which plate matches this value?

2  
two



#### Numerical Patterns

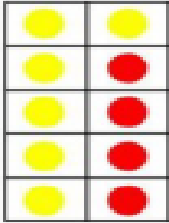
Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.



Can you think of any other ways to represent this number?







$$6 + 4 = 10$$

$$4 + 6 = 10$$

$$10 - 4 = 6$$

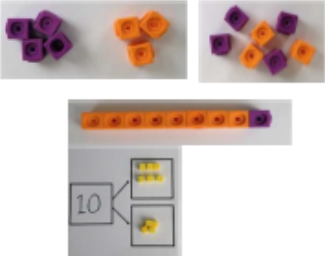
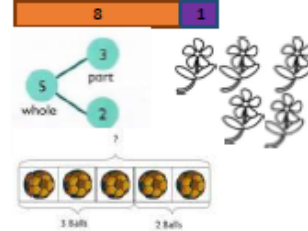

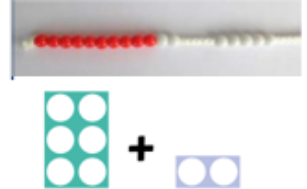
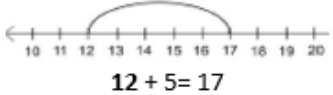


$$10 - 6 = 4$$




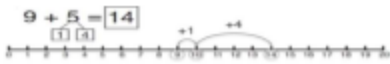
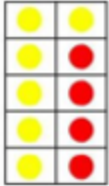
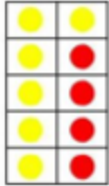
## Year 1 Addition

within 10 and then 20

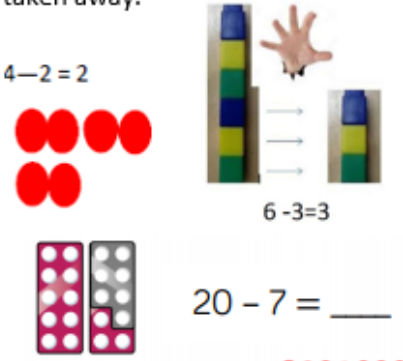
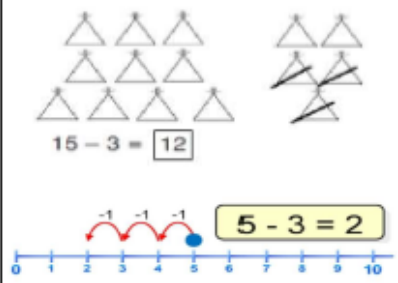
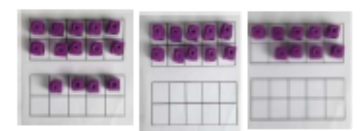
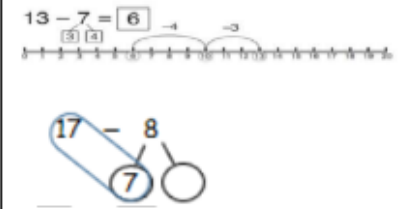
Use dienes or base ten (tens rods and ones/units cubes) for number in preparation for Year 2

Objective/Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model  <b>Addition Year 1</b>	Use part-whole model. Use cubes to add two numbers together as a group or in a bar.  	Use pictures to add two numbers together as a group or in a bar.  	Use the part-whole diagram as shown below to move into the abstract. Include missing number questions to support varied fluency.  $8 = 5 + 3$ $5 + 3 = 8$ $8 = ? + 3$ $5 + ? = 8$  
Starting at the bigger number and counting on  <b>Addition Year 1</b>	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer. Use counters, tens frames or Numicon.  	Start at the larger number on the number line and count on in ones or in one jump to find the answer.   $12 + 5 = 17$	Place the larger number in your head and count on the smaller number to find your answer.  $5 + 12 = 17$
Regrouping to make 10 This is an essential skill for column addition later  <b>Addition Year 1</b>	$6 + 5 = 11$ Start with the bigger number and use the smaller number to make 10. Use ten frames.  	Use pictures or a number line. Regroup or partition the smaller number using the part-whole model to make 10.   $3 + 9 =$	$7 + 4 = 11$ $3 + 1$ I am at seven, how many more do I need to make 10? (3) How many more do I add on now? (1)

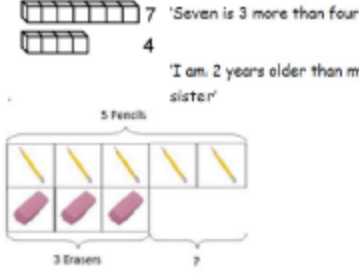
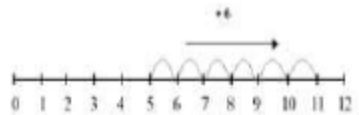
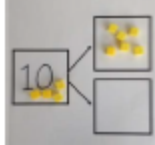
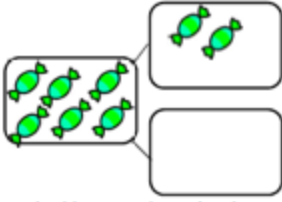

Key Vocabulary: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

	<p><math>9+3=12</math></p> <p>This example shows how bead strings can be used to demonstrate the same method.</p> 		
<p>Use number bonds to 10 to make number bonds to 20</p> <p>Addition Year 1  </p>	<p>Use 10s frames and coloured counters (1 frame for the number bond to 10 and 2 frames for the number bond to 20) and Numicon.</p>  <p> <math>6+4=10</math>  <math>4+6=10</math>  <math>10-4=6</math>  <math>10-6=4</math> </p>	<p>Colour in dots (2 different colours to make the bonds) on 10s frames (1 frame for the number bond to 10 and 2 frames for the number bond to 20).</p>  <p> <math>6+4=10</math>  <math>4+6=10</math>  <math>10-4=6</math>  <math>10-6=4</math> </p>	<p><math>7+3=10</math> so <math>17+3=20</math> or <math>13+7=20</math></p>




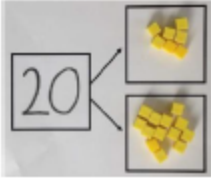

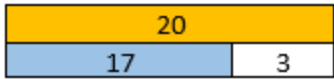
Key Vocabulary: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Year 1 Subtraction			
Use dienes (tens and ones/units) for number in preparation for year 2			
Objective/Strategy	Concrete	Pictorial	Abstract
<p>Taking away 1-digit then 2-digit numbers up to 20 (start by not crossing 10, then crossing 10)</p> <p>Subtraction Year 1</p>	<p>Use physical objects, counters, cubes, bead strings, Numicon, etc. to show how objects can be taken away.</p> <p><math>4 - 2 = 2</math></p>  <p><math>6 - 3 = 3</math></p> <p><math>20 - 7 = \underline{\quad}</math></p>	<p>Cross out drawn objects to show what has been taken away, count back on a number line, bar model.</p>  <p><math>15 - 3 = 12</math></p> <p><math>5 - 3 = 2</math></p>	<p><math>7 - 4 = 3</math>  <math>16 - 9 = 7</math>  Put 13 in your head, count back 4. What number are you at?</p>
<p>Make 10 when counting back to cross over 10</p> <p>Subtraction Year 1</p>	<p><math>14 - 5 =</math></p> <p>Make 14 on the ten frame with counters. Take 4 away to make ten, then take one more away so that you have taken 5.</p> 	<p>Use a number line, jump back 3 first, then another 4. Use ten as the stopping point. Use part-whole model.</p>  <p><math>13 - 7 = 6</math></p> <p><math>17 - 8 = 9</math></p>	<p><math>16 - 8</math>  How many do we take off first to get to 10?  How many left to take off?</p>
<p>Find the difference (relate to addition, counting on as well as counting back)</p>	<p>Compare objects and amounts  Lay objects to represent bar model.</p>	<p>Count on using a number line to find the difference.</p>	<p>Hannah has 12 sweets and her sister has 5.  How many more does Hannah have than her sister?</p>



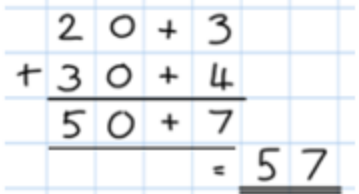
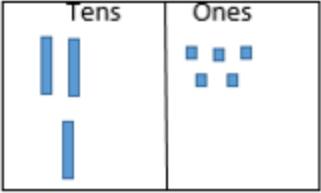
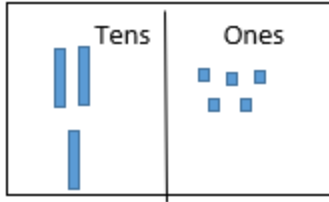
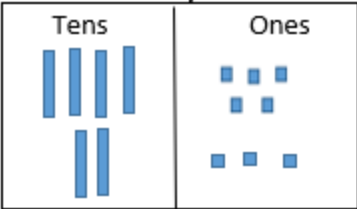
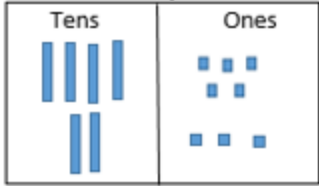
Key Vocabulary: take away, less than, the difference, subtract, minus, fewer, decrease.

<p>Subtraction Year 1</p>	 <p>7 'Seven is 3 more than four' 4 'I am 2 years older than my sister' 5 Pencils 3 Erasers</p>	 <p>0 1 2 3 4 5 6 7 8 9 10 11 12</p>	
<p>Represent and use number bonds and related subtraction facts within 20. Include subtracting zero.</p> <p>Part-whole model</p> <p>Subtraction Year 1</p>	<p>Link to addition. <math>12+1=13</math> <math>13-1=12</math> Use 10s frames and 2 different coloured counters to model inverse.</p>  <p>If 10 is the whole and 6 is one of the parts, what is the other part? <math>10 - 6 = 4</math></p>	<p>Use part-whole model (dienes drawn), bar model and draw dots in 10s frames.</p> 	<p>Move to using numbers within the part-whole model. Include missing number problems:</p> <p><math>12 - ? = 5</math> <math>7 = 12 - ?</math></p> 

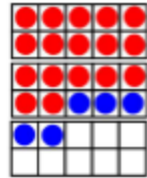
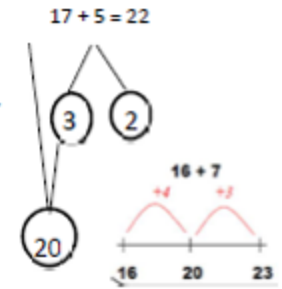
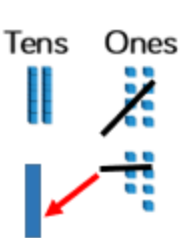
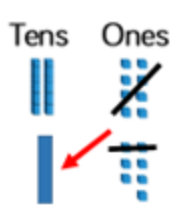
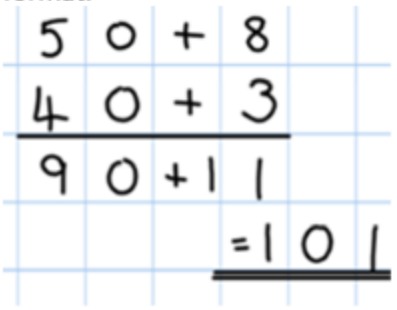
Key Vocabulary : take away, less than, the difference, subtract, minus, fewer, decrease.

Year 2 Addition			
up to 100 and starting to cross over 100			
Objective/Strategy	Concrete	Pictorial	Abstract
Adding multiples of ten to make 100 and numbers up to 100.  <b>Addition Year 2</b>	Model creating number bonds using a 10s frame to represent 100 and 2 different coloured counters, dienes or Numicon 10s.   (Each counter represents 10 in this example)  $60 + 40 = 100$  	Drawing of 10s rods, 10s numberline or 10s place value counters on a 10s frame to represent 100.    $60 + 40 = 100$	$20 + 30 = 50$ $70 = 50 + 20$ $40 + \square = 60$ Recite number bonds to 100
Use known addition number facts to make 20 to explore <b>subtraction</b> facts (to make 20 and numbers up to 20)  <a href="#">links to Year 2 subtraction</a>  <b>Addition Year 2</b>	Children explore ways of making numbers within 20 using part-whole model, counters or cubes and 2 tens frames with 2 different colour counters.  	Use bar model, number lines, part-whole model with numbers, drawings of 10s frames with dots.    	Explore commutativity of addition and make list. E.g. $12+3=15$ $15=12+3$ $3+12=15$ $15=3+12$  Explore the concept of the inverse relationship of addition and subtractions and use this to check calculations. E.g. $12+3=15$ So $15-3=12$ and $15-12=3$

Key Vocabulary: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

<p>Add a two-digit number and ones (not bridging 10s, so no exchanging)</p> <p><b>Addition Year 2</b> See also Empty Number line method as an alternative (below)</p>	<p>Use dienes and place value chart. <b>Add ones/units first.</b></p> 	<p>Use part-whole model or number track to model. When bridging 10s use a number line, draw dienes in place value chart. Add ones/units first.</p> 	<p>Lead into recording in column format, to reinforce place value and prepare children for formal written methods with larger values.</p> 
<p>Add a 2-digit number and tens</p> <p><b>Addition Year 2</b></p>	<p><math>25 + 10 = 35</math> Explore that the ones digit does not change. Use dienes in a place value chart. <b>Add ones/units first.</b></p> 	<p>Draw dienes in the place value chart to help to lead into column addition. Look at ones/units column first to see if there's anything to add.</p>  <p><math>25 + 10 = 35</math></p>	<p><math>27 + 10 = 37</math> <math>27 + 20 = 47</math> <math>27 + \square = 57</math></p>
<p>Add two, 2-digit numbers (no exchanging)</p> <p><b>Addition Year 2</b></p>	<p><math>45 + 23 =</math> Use dienes in a place value chart. <b>Add ones/units first.</b></p> 	<p>Draw dienes in the place value chart to help to lead into column addition. Add ones then add tens.</p> 	<p><math>27 + 31 = 58</math> <math>31 + \square = 58</math></p>

Key Vocabulary : sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

	Add the ones then add the tens.		
<p>Regrouping to make 10</p> <p><i>This is an essential skill for column addition</i></p> <p>Addition Year 2</p>	<p>Start with the bigger number and use the smaller number to make 10. Use ten frames.</p>  <p> <math>17 + 5 = 22</math>  <math>17 + 3 = 20</math>  <math>20 + 2 = 22</math>          Explore the pattern  <math>17 + 5 = 22</math>  <math>27 + 5 = 32</math> </p>	<p>Regroup or partition the smaller number using the part-whole model to make 10, a number line, 10s frames.</p> 	<p>Regroup to make other multiples of 20 +</p> <p>E.g. <math>33 + 9 =</math>  <math>33 + 7 + 2 =</math></p>
<p>Add two numbers <b>exchanging</b> 1s for 10s</p> <p>Addition Year 2</p>	<p>Model using dienes on a place value chart, exchange ten 1s for a tens rod and move that with the 10s. <b>Add ones/units first.</b></p> <p>28+7=</p> 	<p>Model drawing dienes on a place value chart, exchange ten 1s for a tens rod and move that with the 10s by crossing out the ten 1s and drawing the exchanged 10 under the tens column.</p> <p>28+7=</p> 	<p>Use expanded column addition format.</p> 

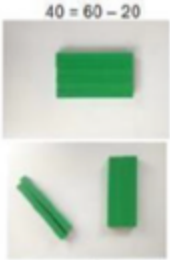
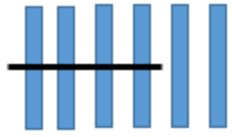





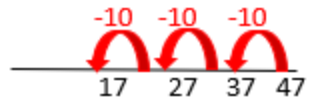


Key Vocabulary: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.



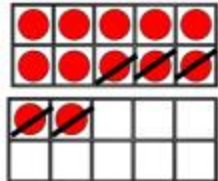

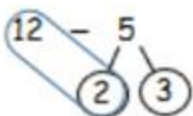



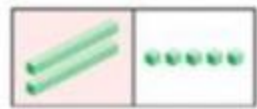
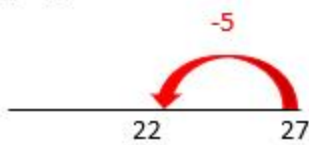


## Year 2 Subtraction

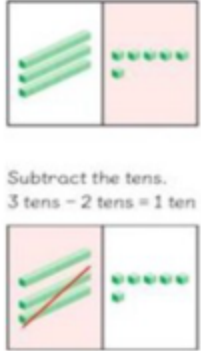
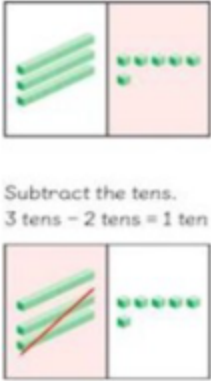
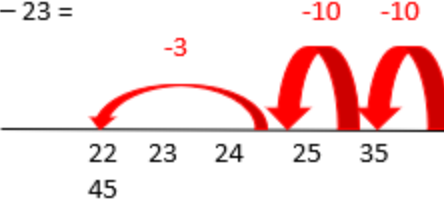
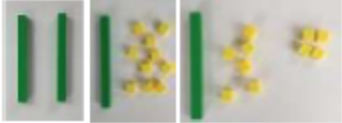









Subtraction number facts included in Year 2 Addition

Objective/Strategy	Concrete	Pictorial	Abstract				
<p>Subtracting multiples of ten to make 100 and numbers up to 100</p> <p style="color: green;">Subtraction Year 2</p>	<p>Model using a 10s frame to represent 100 and 2 different coloured counters to create number bonds, dienes or Numicon 10s.</p> 	<p>Drawing of 10s rods and cross out 10s, 10s numberline or 10s place value counters on a 10s frame to represent 100.</p> 	<p><math>30 - 20 = 10</math>  <math>70 = 100 - 30</math>  <math>90 - \square = 60</math>                      Recite subtraction number bonds to 100</p>				
<p>Subtract multiples of 10 from numbers to 100</p> <p style="color: green;">Subtraction Year 2</p> <p style="background-color: yellow;">See also Empty Number line method as an alternative (below)</p>	<p>Use a place value chart with dienes (start to lead into column subtraction).  <b>Subtract ones/units first.</b>  <math>38 - 10 =</math></p> 	<p>Use a place value chart and draw dienes (start to lead into column subtraction).  <math>38 - 10 =</math></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Tens</th> <th style="text-align: center;">Ones/units</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </tbody> </table>	Tens	Ones/units			<p>Subtract multiples of ten  <math>47 - 30 =</math></p> 
Tens	Ones/units						
							
<p>Make 10 when counting back to cross over 10</p> <p style="color: green;">Subtraction Year 2</p>	<p>Use 10s frames to subtract back to the 10 by partitioning the second number.  <math>12 - 5 =</math></p>	<p>Use number line and part-whole model to subtract back to the 10 by partitioning the second number.</p>	<p>Use the strategy mentally e.g. <math>23 - 5 =</math> so <math>23 - 3 = 20</math>, then there's 2 left to subtract (because <math>3 + 2 = 5</math>) so <math>20 - 2 = 18</math></p>				

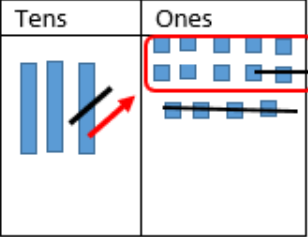
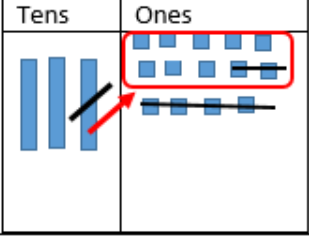
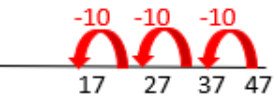
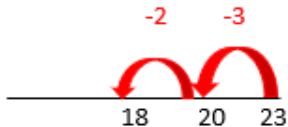
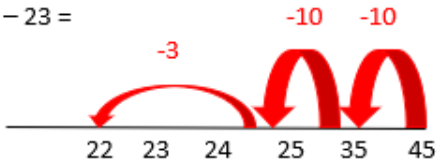
Key Vocabulary : take away, less than, the difference, subtract, minus, fewer, decrease.

	 <p><math>12 - 2 = 10</math> <math>10 - 3 = 7</math></p>	<p><math>13 - 5 =</math></p>  <p><math>12 - 5 =</math></p> 	
<p>Subtract a 1-digit number from a 2-digit (no exchanging)</p> <p>Subtraction Year 2</p>	<p>Use dienes, subtract by moving ones away. <b>Subtract ones/units first.</b></p> <p>Step 1 Subtract the ones. 8 ones - 3 ones = 5 ones</p>  <p>Step 2 Subtract the tens.</p>  <p><math>28 - 3 = 25</math></p>	<p>Use drawings of dienes in a place value chart and cross out to subtract.</p> <p>Step 1 Subtract the ones. 8 ones - 3 ones = 5 ones</p>  <p>Step 2 Subtract the tens.</p>  <p><math>28 - 3 = 25</math></p>	<p><math>27 - 5 =</math></p> 

Key Vocabulary : take away, less than, the difference, subtract, minus, fewer, decrease.

<p>Subtract two 2-digit numbers (no exchanging)</p> <p>Subtraction Year 2</p>	<p>Use dienes, subtract by moving ones/units away. <b>Subtract ones/units first.</b></p> <p>Step 1 Subtract the ones.</p>  <p>Step 2 Subtract the tens. 3 tens - 2 tens = 1 ten</p> <p><math>36 - 20 = 16</math></p>	<p>Use drawings of dienes in a place value chart and cross out to subtract.</p> <p>Step 1 Subtract the ones.</p>  <p>Step 2 Subtract the tens. 3 tens - 2 tens = 1 ten</p> <p><math>36 - 20 = 16</math></p>	<p>Subtract pairs of 2-digit numbers</p> <p><math>45 - 23 =</math></p> 								
<p>Regroup 10 into 10 ones (to prepare for exchanging)</p> <p>Subtraction Year 2</p>	<p>Use a place value chart to show to change a 10 into 10 ones.</p>  <p>ones.</p>	<p>Draw a place value chart to show to change a 10 into 10 ones.</p> <table border="1" data-bbox="1116 791 1518 972"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table> <p><math>20 - 4 =</math></p> <table border="1" data-bbox="1116 1058 1518 1239"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table> <p>Use 'exchange' and 'take and make'.</p>	Tens	Ones			Tens	Ones			<p><math>20 - 4 = 16</math></p>
Tens	Ones										
											
Tens	Ones										
											

Key Vocabulary: take away, less than, the difference, subtract, minus, fewer, decrease.

<p>Subtract two 2-digit numbers (exchanging 10) Included in Year 2</p> <p>Subtraction Year 2</p>	<p>Use dienes, exchange a 10 for ten 1s/units. <b>Subtract ones/units first.</b> <math>34 - 16 =</math></p> 	<p>Use drawings of dienes in a place value chart and to exchange 10, cross out 10s rod and draw ten ones then cross out amount to subtract.</p> 	
<p>Subtract with an empty number line</p> <p>Subtraction Year 2</p>	<p>Subtract multiples of ten <math>47 - 30 =</math></p>  <p>Subtract 1-digit numbers <math>23 - 5 =</math></p>  <p>Subtract pairs of 2-digit numbers <math>45 - 23 =</math></p>  <div data-bbox="1151 591 1503 853" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>For <b>concrete</b> support use a 100 square alongside or dienes.</p> <p>For the <b>pictorial</b> stage, subtract on ready drawn number lines.</p> </div>	<p>Independently use the empty number line method (apparatus can still be used alongside).</p>	

Key Vocabulary : take away, less than, the difference, subtract, minus, fewer, decrease.

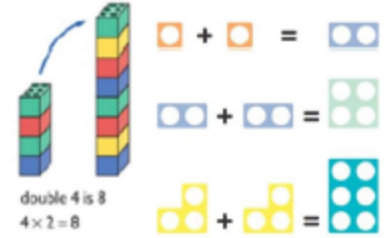

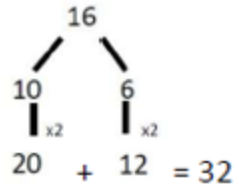

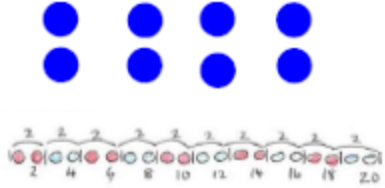
# Mathematics Progression Map – Multiplication and Division

- EYFS Goal**
- Automatically recall some double facts to 10.
  - Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.



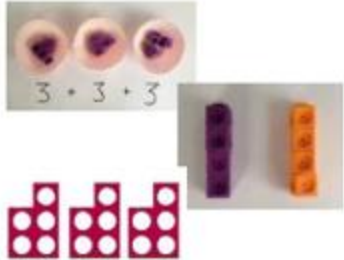
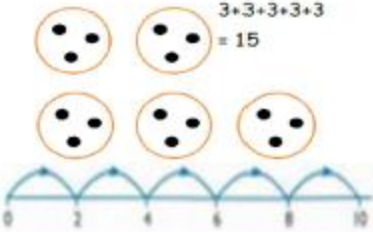


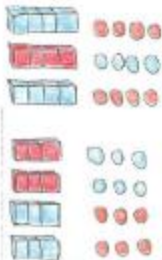
	Multiplication and Division Facts	Order of Operations	Mental Calculations
<b>1</b>			
<b>2</b>	<ul style="list-style-type: none"> <li>• Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables,</li> </ul>		<ul style="list-style-type: none"> <li>• Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.</li> </ul>

Problem Solving	
<b>1</b>	<ul style="list-style-type: none"> <li>• Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>• Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.</li> </ul>

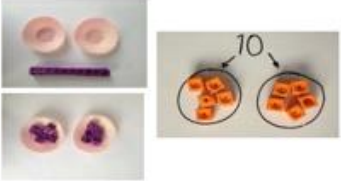
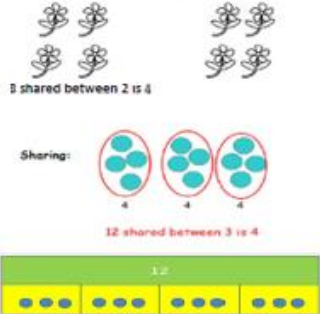
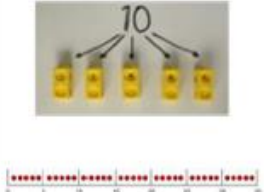
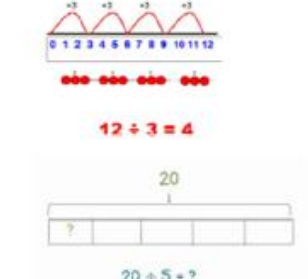
Written Calculations	
<b>1</b>	
<b>2</b>	<ul style="list-style-type: none"> <li>• Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs.</li> </ul>

Year 1 Multiplication			
Objective/Strategy	Concrete	Pictorial	Abstract
Doubling Multiplication Year 1	Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling.  <p>double 4 is 8  <math>4 \times 2 = 8</math></p>	Draw pictures to show how to double numbers. Double 4 is 8 	Partition a number and then double each part before recombining it back together. 
Counting in multiples (2s, 5s, 10s) Multiplication Year 1	Count the groups of 2, 5 or 10 using bead strings, number lines, 100 square, Numicon, looking at images of groups. Children could use their fingers as they are counting. 	Children draw representations to show counting in multiples. 	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30

Key Vocabulary: double, times, multiplied by, the product of, groups of, lots of, equal groups.

<p>Making equal groups and counting the total</p> <p>Multiplication Year 1</p>	<p>Use different objects to add equal groups.</p> 	<p>Draw and make representations.</p> <p>Draw  to show <math>2 \times 3 = 6</math></p>	<p><math>4 \times 2 = 8</math></p>
<p>Repeated addition</p> <p>Multiplication Year 1</p>	<p>Use different objects to add equal groups e.g. Numicon, cubes, counters, bead strings.</p> 	<p>Draw pictures to show solutions. Jump in steps on a number line.</p> <p>There are 3 sweets in one bag. How many sweets are in 5 bags altogether?</p> 	<p>Write addition sentences to describe objects and pictures.</p>  <p><math>2 + 2 + 2 + 2 + 2 = 10</math></p>
<p>Understanding Arrays</p> <p>Multiplication Year 1</p>	<p>Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.</p> 	<p>Draw representations of arrays to show understanding.</p> 	<p><math>3 \times 2 = 6</math> <math>2 \times 3 = 6</math></p>

Key Vocabulary: double, times, multiplied by, the product of, groups of, lots of, equal groups.


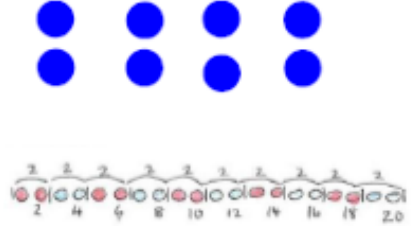
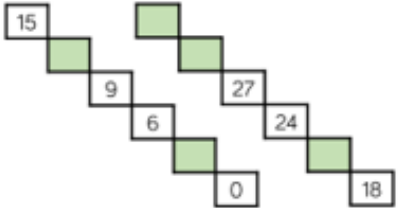
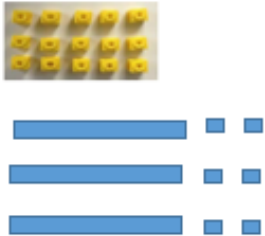
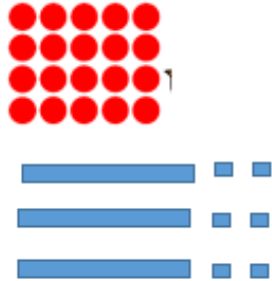

Year 1 Division			
Objective/Strategy	Concrete	Pictorial	Abstract
Division as sharing (children do not need to be familiar with the symbol yet)  Division Year 1	I have 10 <u>cubes</u> , can you share them equally in 2 groups?  	Children use pictures and bar models to share quantities. E.g draw pictures of sharing 10 muffins between 2 plates.  	12 shared between 3 is 4. $(12 \div 3 = 4)$
Introduce division as grouping (children do not need to be familiar with the symbol yet)  Division Year 1	Divide quantities into equal groups e.g. 20 counters in total how many equal groups of <u>2</u> can you make? Use cubes, counters, objects or place value counters to aid understanding.  	If you have a total of 12, how many equal groups of 3 will you have? Use a number line or a bar model.  	Divide 28 into 4s. How many equal groups do you get? $(28 \div 4 = \underline{\quad})$

Key language: share, group, divide, divided by, half.



## Year 2 Multiplication

Children should be able to recall and use the multiplication and division facts for 2, 5 and 10 x table  
Links between multiplication and division in the division section

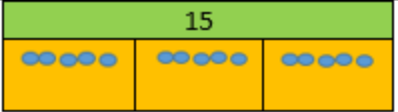
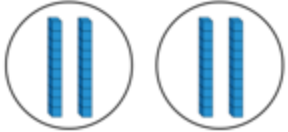





Objective/Strategy	Concrete	Pictorial	Abstract
<p>Counting in multiples of 3 (recap 2, 5 and 10)</p> <p>Multiplication Year 2</p>	<p>Count the groups of 2, 5, 10 and 3s using bead strings, number lines, 100 <a href="#">square</a>, Numicon, looking at images of groups.</p> 	<p>Draw number lines counting in groups for hops.</p> 	<p>Count in multiples of a number aloud. Write sequences with multiples of numbers (fill in missing numbers from pattern).</p> <p>0, 3, 6, 9, 12, 15</p> 
<p>Using arrays to solve multiplication calculations</p> <p>Multiplication Year 2</p>	<p>Use objects including dienes laid out in arrays to find the answers to 3 x 5, 3 x 12 etc.</p> 	<p>Draw representations of arrays to solve multiplication calculations.</p> 	<p>Write different calculations for an image of an array including + and x.</p>  <p> <math>5 + 5 + 5 + 5 = 20</math>  <math>4 + 4 + 4 + 4 + 4 = 20</math>  <math>4 \times 5 = 20</math>  <math>5 \times 4 = 20</math> </p>

Key Vocabulary: double, times, multiplied by, the product of, groups of, lots of, equal groups.

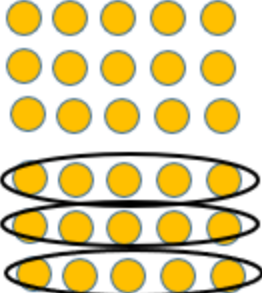




## Year 2 Division

Children should be able to recall and use the multiplication and division facts for 2, 5 and 10 x table

Objective/Strategy	Concrete	Pictorial	Abstract
Division as sharing (with ÷ symbol)  Division Year 2	 <p>Use a bar model or draw groups to solve division calculations with counters, cubes or dienes.</p>  $40 \div 2 = 20$	Draw a bar model/draw pictures to solve division calculations.  $60 \div 4 =$  <p>Children will need to exchange 2 tens for 20 ones/units so they can put 1 ten and 5 ones in each group.</p>	How many different ways can you divide/share equally 20? $20 \div 1 = 20 \quad 20 \div 20 = 1$ $20 \div 2 = 10 \quad 20 \div 10 = 2$ $20 \div 4 = 5 \quad 20 \div 5 = 4$
Division as grouping (with ÷ symbol)  Division Year 2	Divide quantities into equal groups e.g. $12 \div 3 = 4$ ; get 12 counters/cubes divide them into 3s. How many groups are there? $3 \qquad 6$  $9 \qquad 12$ 	Use bar modelling and a number line to aid solving division problems by grouping. 	How many groups of 4 in 24? $24 \div 4 = ?$ $24 \div ? = 4$

Key language: share, group, divide, divided by, half.

<p>Division with arrays (link division and multiplication-Inverse)</p> <p>Division Year 2</p>	<p>Link division to multiplication by creating an array using cubes, counters, numicon</p> <p>E.g. for <math>3 \times 5 = 15</math> (3 rows of 5)</p> <p>Model how <math>15 \div 3 = 5</math></p> 	<p>Draw an array and use lines to split the array into groups to make multiplication and division Sentences.</p> <p>Group the socks into pairs.</p>  <p>Complete the number sentences.</p>  <p><input type="text"/> <math>\div</math> <input type="text"/> = <input type="text"/></p> <p><input type="text"/> <math>\times</math> <input type="text"/> = <input type="text"/></p>	<p>Find the inverse of multiplication and division sentences by creating eight linking number sentences</p> <p>E.g.</p> <p><math>7 \times 4 = 28</math></p> <p><math>4 \times 7 = 28</math></p> <p><math>28 \div 7 = 4</math></p> <p><math>28 \div 4 = 7</math></p> <p><math>28 = 7 \times 4</math></p> <p><math>28 = 4 \times 7</math></p> <p><math>4 = 28 \div 7</math></p> <p><math>7 = 28 \div 4</math></p>
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Key language: share, group, divide, divided by, half.

# Mathematics Progression Map – Fractions

- EYFS Goal**
- Automatically recall some double facts to 10.
  - Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

Counting in Fractions	Recognising Fractions	Comparing Fractions (Equivalence)
<p><b>1</b></p>	<ul style="list-style-type: none"> <li>• Recognise, find and name a half as one of two equal parts of an object, shape or quantity.</li> <li>• Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.</li> </ul>	
<p><b>2</b></p> <ul style="list-style-type: none"> <li>• Pupils should count in halves and quarters up to 10.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise, find, name and write fractions <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{2}{4}</math> and <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity.</li> </ul>	<ul style="list-style-type: none"> <li>• Write simple fractions e.g. <math>\frac{1}{2}</math> of 6 = 3 and recognise the equivalence of <math>\frac{2}{4}</math> and <math>\frac{1}{2}</math>.</li> </ul>

# Mathematics Progression Map – Measures

## Reception

**Development Matters** Compare length, weight and capacity  
**Statement**

### Comparing and Estimating

- |          |  |
|----------|--|
| <b>1</b> | <ul style="list-style-type: none"><li>Compare, describe and solve practical problems for: lengths and heights (e.g. long/short, longer/shorter, tall/short, double/half); mass/weight (e.g. heavy/light, heavier than, lighter than); capacity and volume (e.g. full/empty, more than, less than, half, half full, quarter); time (e.g. quicker, slower, earlier, later).</li><li>Sequence events in chronological order using language.</li></ul> |
| <b>2</b> | <ul style="list-style-type: none"><li>Compare and order lengths, mass, volume/capacity and record the results using <math>&gt;</math>, <math>&lt;</math> and <math>=</math>.</li><li>Compare and sequence intervals of time.</li></ul>   |

### Measuring and Calculating

- |          |   |
|----------|---|
| <b>1</b> | <ul style="list-style-type: none"><li>Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time (hours, minutes, seconds).</li><li>Recognise and know the value of different denominations of coins and notes.</li></ul>   |
| <b>2</b> | <ul style="list-style-type: none"><li>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (<math>^{\circ}</math>C); capacity (litres/ml).</li><li>Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value.</li><li>Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.</li></ul> |

# Mathematics Breadth and Progression Map – Measures

## Telling the Time

- |          |   |
|----------|---|
| <b>1</b> | <ul style="list-style-type: none"><li>• Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.</li><li>• Recognise and use language relating to dates, including days of the week, weeks, months and years.</li></ul> |
| <b>2</b> | <ul style="list-style-type: none"><li>• Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.</li><li>• Know the number of minutes in an hour and the number of hours in a day.</li></ul> |

## Converting Units of Measurement

- |          |   |
|----------|---|
| <b>2</b> | <ul style="list-style-type: none"><li>• Know the number of minutes in an hour and the number of hours in a day.</li></ul> |
|----------|---|

# Mathematics Progression Map – Geometry : Properties of Shapes

<b>Reception Development Matters Statement</b>	<b>Select, rotate and manipulate shapes to develop spatial reasoning skills. Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can.</b>
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	Identifying and Drawing Shapes and their Properties	Comparing and Classifying Shapes
<b>1</b>	<ul style="list-style-type: none"> <li>Recognise and name common 2-D and 3-D shapes, including: 2-D shapes e.g. rectangles (including squares), circles and triangles; 3-D shapes e.g. cuboids (including cubes), pyramids and spheres.</li> </ul>	
<b>2</b>	<ul style="list-style-type: none"> <li>Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line.</li> <li>Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces.</li> <li>Identify 2-D shapes on the surface of 3-D shapes.</li> </ul>	<ul style="list-style-type: none"> <li>Compare and sort common 2-D and 3-D shapes and everyday objects.</li> </ul>

# Mathematics Breadth and Progression Map – Geometry : Position and Direction

	Position, Direction and Movement	Pattern
<b>1</b>	<ul style="list-style-type: none"><li>Describe position, direction and movement, including half, quarter and three-quarter turns.</li></ul>	
<b>2</b>	<ul style="list-style-type: none"><li>Use mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).</li></ul>	<ul style="list-style-type: none"><li>Order and arrange combinations of mathematical objects in patterns and sequences.</li></ul>



EYFS Mathematics  
Key Instant Recall Facts  
KIRFs

**Autumn Term 1** - I can say the numbers from 0 to 5 and back from 5 to 0 in order.

**Autumn Term 2** - I can say the numbers from 0 to 10 and back from 10 to 0 in order.

**Spring Term 1** - I can partition numbers to 5, into two groups.

**Spring Term 2** - I can partition numbers, to 10, into two groups.

**Summer Term 1** - I can count, read and write numbers to 20.

**Summer Term 2** - I can use physical representations to add and subtract two single digit numbers and count on or back to find the answer.

YEAR 1 Mathematics  
Key Instant Recall Facts  
KIRFs

**Autumn Term 1** - I know one more and one less with numbers up to 20.

**Autumn Term 2** - I know number bonds for each number to 6.

**Spring Term 1** - I know number bonds for each number up to 10.

**Spring Term 2** - I know doubles and halves of numbers to 10

**Summer Term 1** - I can tell the time using o'clock and half past.

**Summer Term 2** - I know number bonds for each number from 6 to 9.

YEAR 2 Mathematics  
Key Instant Recall Facts  
KIRFs

**Autumn Term 1** - I know number bonds to 20.

**Autumn Term 2** – I know doubles and halves of numbers to 20.

**Spring Term 1** - I know the multiplication and division facts for the 2 times table.

**Spring Term 2** - I know the multiplication and division facts for the 10 times table.

**Summer Term 1** - I can tell the time using quarter past and quarter to.

**Summer Term 2** - I know the multiplication and division facts for the 5 times table.