

Unit Overview and Guidance

- The exemplification has been taken from the NCETM Resource Toolkit, with additions in order to ensure full coverage.
- White Rose planning links (with questions categorised into the three aims of the national curriculum i.e. fluency, problem solving and reasoning) are hyperlinked to each of the objectives.
- NCETM reasoning questions have been incorporated and are identified in pale purple boxes
- The 'big Ideas' sections from the NCETM 'Teaching for Mastery' documents have been included at the start of each unit. Hyperlinks to the full NCETM 'Teaching for Mastery' documents have also been included for easy reference.
- Hyperlinks to NRich activities have also been added to this version. These are found by clicking on the blue buttons like this one 1 at the bottom of relevant objective.
- Some additional content has been added in order to support mixed-aged planning. Any additional content is in italics and strikethrough has been used to identify when an objective has been altered.
- Each unit is sub-divided into sections for ease of planning. Sub-categories in this unit are;
 1. Multiplication and division
 2. Derive and recall x÷
 3. Checking
 4. Number Types
 5. Solving Problems
 6. Ratio and Proportion (Year 6)

	Yr2	Yr 3	Yr 4
NCETM Teaching for Mastery Questions, tasks and activities to support assessment	<p>The Big Ideas</p> <p>It is important that pupils both commit multiplication facts to memory and also develop an understanding of conceptual relationships. This will aid them in using known facts to work out unknown facts and in solving problems.</p> <p>Pupils should look for and recognise patterns within tables and connections between them (e.g. 5x is half of 10x).</p> <p>Pupils should recognise multiplication and division as inverse operations and use this knowledge to solve problems. They should also recognise division as both grouping and sharing.</p> <p>The recognition of pattern in multiplication helps pupils commit facts to memory, for example doubling twice is the same as multiplying by four, or halving a multiple of ten gives you the related multiple of five.</p>	<p>The Big Ideas</p> <p>It is important for children not just to be able to chant their multiplication tables but also to understand what the facts in them mean, to be able to use these facts to figure out others and to use in problems. It is also important for children to be able to link facts within the tables (e.g. 5x is half of 10x).</p> <p>They understand what multiplication means, see division as both grouping and sharing, and see division as the inverse of multiplication.</p>	<p>The Big Ideas</p> <p>It is important for children not just to be able to chant their multiplication tables but to understand what the facts in them mean, to be able to use these facts to figure out others and to use them in problems.</p> <p>It is also important for children to be able to link facts within the tables (e.g. 5x is half of 10x).</p> <p>They understand what multiplication means and see division as both grouping and sharing, and to see division as the inverse of multiplication.</p> <p>The distributive law can be used to partition numbers in different ways to create equivalent calculations. For example, $4 \times 27 = 4 \times (25 + 2) = (4 \times 25) + (4 \times 2) = 108$.</p> <p>Looking for equivalent calculations can make calculating easier. For example, 98×5 is equivalent to $98 \times 10 \div 2$ or to $(100 \times 5) - (2 \times 5)$. The array model can help show equivalences.</p>
	Teaching for Mastery Year 2	Teaching for Mastery Year 3	Teaching for Mastery Year 4

NUMBER: Multiplication and Division (NMD - 5 weeks)

Strand	Yr2	Yr3	Yr4												
Multiplication and Division	Mental Calculations	<p>calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and =</p> <p>Add equal groups</p> <p>The multiplication symbol</p> <p>Multiplication from pictures</p> <p>Make equal groups – sharing</p> <p>Make equal groups – grouping</p> <p>Children should be able to:</p> <p>Find missing numbers or symbols in a calculation:</p> <p>$4 \times _ = 20$ $_ \div 10 = 3$</p> <p>Anna has 3 boxes of cakes. Each box contains 5 cakes. How many cakes does she have altogether? Show how you worked this out.</p> <div style="display: flex; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">1</div> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">2</div> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">3</div> </div>	<p>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</p> <p>Multiplication – equal groups</p> <p>Comparing statements</p> <p>One orange costs nineteen pence. How much will three oranges cost?</p> <p>Mark drives 19 miles to work every day and 19 miles back. He does this on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays. How many miles does he travel to work and back in one week?</p>	<p>use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers</p> <p>Multiply by 10</p> <p>Multiply by 100</p> <p>Divide by 10</p> <p>Divide by 100</p> <p>Multiply by 1 and 0</p> <p>Divide by 1</p> <p>Efficient multiplication</p> <p>Practise mental methods and extend this to three-digit numbers to derive facts for example $200 \times 3 = 600$ into $600 \div 3 = 200$.</p> <p>Plants are sold in trays of 20. Hannah buys 7 trays. How many plants does she buy?</p> <p>Eggs are sold in trays of 30 eggs. The trays can be stacked in six layers. How many eggs are in this picture?</p>											
	Written Calcs - Multiplication		<p>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</p> <p>Multiply 2-digits by 1-digit (1)</p> <p>Multiply 2-digits by 1-digit (2)</p> <p>Divide 2-digits by 1-digit (1)</p> <p>Divide 2-digits by 1-digit (2)</p> <p>Divide 2-digits by 1-digit (3)</p>	<p>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</p> <p>Written methods</p> <p>Multiply 2 digits by 1 digit</p> <p>Multiply 3 digits by 1 digit</p> <p>Divide 2 digits by 1 digit (1)</p> <p>Divide 2 digits by 1 digit (2)</p> <p>Divide 3 digits by 1 digit</p> <p>e.g. 68×7 and 358×9</p>											
	NGETM Reasoning	<p>Making links</p> <p>Write the multiplication number sentences to describe this array</p> <table border="1" style="margin-left: 20px;"> <tr> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>X</td> <td>X</td> <td>X</td> </tr> </table> <p>What do you notice?</p> <p>Write the division sentences.</p> <p>Prove It</p> <p>Which four number sentences link these numbers? 3, 5, 15?</p> <p>Prove it.</p>	X	X	X	X	X	X	<p>Use a fact</p> <p>$20 \times 3 = 60$. Use this fact to work out</p> <p>$21 \times 3 =$ $22 \times 3 =$ $23 \times 3 =$ $24 \times 3 =$</p> <p>Prove It What goes in the missing box?</p> <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>?</td> <td>?</td> </tr> <tr> <td>4</td> <td>80</td> <td>12</td> </tr> </table> <p>How close can you get?</p> <p><input type="checkbox"/> <input type="checkbox"/> \times <input type="checkbox"/></p> <p>Using the digits 2, 3 and 4 in the calculation above how close can you get to 100? What is the largest product? What is the smallest product?</p>	x	?	?	4	80	12
X	X	X													
X	X	X													
x	?	?													
4	80	12													

NUMBER: Multiplication and Division (NMD - 5 weeks)

Derive and Recall x:-	Derive and Recall x:-	<p>recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</p> <p>Recognise equal groups</p> <p>Make equal groups</p> <p>The 2 times table</p> <p>The 5 times table</p> <p>The 10 times table</p> <p>Divide by 2</p> <p>Odd and even numbers</p> <p>Divide by 5</p> <p>Divide by 10</p> <p>The children should be able to:</p> <p>Recognise a multiple of 2, 5 or 10 and use their knowledge of multiplication facts to find corresponding division facts. They can say which numbers are odd and which are even.</p> <p>e.g. $2 \times 5 = 10$, show me three more number facts using these numbers.</p> <p>Is 34 an odd number? How do you know?</p> <div style="text-align: center;">  </div> <p>show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p> <p>Use arrays</p> <p>Children should be able to:</p> <p>Use their knowledge of triangles of numbers to show related number facts.</p> <p>e.g. If $6 \times 2 = 12$ then $2 \times 6 = 12$ and $12 \div 6 = 2$.</p>	<p>recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</p> <p>Multiply by 3</p> <p>Divide by 3</p> <p>The 3 times table</p> <p>Multiply by 4</p> <p>Divide by 4</p> <p>The 4 times table</p> <p>Multiply by 8</p> <p>Divide by 8</p> <p>The 8 times table</p> <p>Related facts</p> <p>multiply seven by three; what is four multiplied by nine? Etc.</p> <p>Circle three numbers that add to make a multiple of 4</p> <p>11 12 13 14 15 16 17 18 19</p> <p>Leila puts 4 seeds in each of her pots. She uses 6 pots and has 1 seed left over. How many seeds did she start with?</p> <p>At Christmas, there are 49 chocolates in a tin and Tim shares them between himself and 7 other members of the family. How many chocolates will each person</p>	<p>recall multiplication and division facts for multiplication tables up to 12×12</p> <p>Multiply and divide by 6</p> <p>6 times table and division facts</p> <p>Multiply and divide by 9</p> <p>9 times table and division facts</p> <p>Multiply and divide by 7</p> <p>7 times table and division facts</p> <p>11 and 12 times table and division facts</p> <p>Children should be able to continue to practise recalling and using multiplication tables and related division facts to aid fluency.</p> <p>One orange costs eleven pence, how much will three oranges cost?</p> <div style="text-align: center;">  </div> <p>recognise and use factor pairs and commutativity in mental calculations</p> <p>Multiply 3 numbers</p> <p>Factor pairs</p> <p>Children should be able to write statements about the equality of expressions (e.g. use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$).</p> <p>They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations e.g. $2 \times 6 \times 5 = 10 \times 6$.</p> <p><i>Example of commutative law</i> $8 \times 15 = 15 \times 8$</p> <p><i>Example of associative law</i> $6 \times 15 = 6 \times (5 \times 3) = (6 \times 5) \times 3 = 30 \times 3 = 90$</p> <p><i>Example of distributive law</i> $18 \times 5 = (10 + 8) \times 5 = (10 \times 5) + (8 \times 5) = 50 + 40 = 90$</p>
	NCETM Reasoning	<p>Missing numbers</p> <p>$10 = 5 \times ?$</p> <p>What number could be written in the box?</p> <p>Making links</p> <p>I have 30p in my pocket in 5p coins. How many coins do I have?</p> <p>True or false?</p> <p>When you count up in tens starting at 5 there will always be 5 units.</p>	<p>Missing numbers</p> <p>$24 = ? \times ?$</p> <p>Which pairs of numbers could be written in the boxes?</p> <p>Making links Cards come in packs of 4. How many packs do I need to buy to get 32 cards?</p>	<p>Missing numbers</p> <p>$72 = ? \times ?$</p> <p>Which pairs of numbers could be written in the boxes?</p> <p>Making links Eggs are bought in boxes of 12. I need 140 eggs; how many boxes will I need to buy?</p> <p>Making links $4 \times 6 = 24$</p> <p>How does this fact help you to solve these calculations?</p> <p>$40 \times 6 =$ $20 \times 6 =$ $24 \times 6 =$</p>

NUMBER: Multiplication and Division (NMD - 5 weeks)

Checking	Checking		<p>estimate the answer to a calculation and use inverse operations to check answers</p> <p>Matthew says if he has 75 sweets shared by 5 friends, they will each have 17 sweets. Write down a multiplication question that you could do to check this?</p>	
	NCETM Reasoning	<p>Use the inverse</p> <p>Use the inverse to check if the following calculations are correct:</p> <p>$12 \div 3 = 4$</p> <p>$3 \times 5 = 14$</p>	<p>Use the inverse</p> <p>Use the inverse to check if the following calculations are correct</p> <p>$23 \times 4 = 82$</p> <p>$117 \div 9 = 14$</p> <p>Size of an answer</p> <p>Will the answer to the following calculations be greater or less than 80</p> <p>$23 \times 3 =$</p> <p>$32 \times 3 =$</p> <p>$42 \times 3 =$</p> <p>$36 \times 2 =$</p>	<p>Use the inverse</p> <p>Use the inverse to check if the following calculations are correct:</p> <p>$23 \times 4 = 92$</p> <p>$117 \div 9 = 14$</p> <p>Size of an answer</p> <p>Will the answer to the following calculations be greater or less than 300</p> <p>$152 \times 2 =$</p> <p>$78 \times 3 =$</p> <p>$87 \times 3 =$</p> <p>$4 \times 74 =$</p>
Solving Problems	Solving Problems	<p>solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</p> <p>Children should be able to:</p> <p>Use various methods and apparatus to help them solve word problems such as:</p> <p>There are 10 lollies in a bag. Charlie needs 30 lollies for his party. How many bags does he need to buy? Show how you worked this</p>	<p>solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects</p> <p>Scaling</p> <p>How many ways</p> <p>Miss West needs 28 paper cups. She has to buy them in packs of 6. How many packs does she have to buy?</p> <p>Tom is laying tiles. He has 84 tiles; how many complete rows and columns could he make?</p> <p>Fill in the missing digits in these calculations</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> $\begin{array}{r} 2 \square \\ \times 8 \\ \hline 176 \end{array}$ </div> <div style="text-align: center;"> $\begin{array}{r} 2 \square \\ \times \square \\ \hline 112 \end{array}$ </div> <div style="text-align: center;"> $\begin{array}{r} 1 \square 4 \\ \times \square \\ \hline 736 \end{array}$ </div> </div>	<p>solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects</p> <p>Correspondence problems</p> <p>Children should be able to solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.</p> <p><i>e.g. 185 people go to the school concert. They pay £1.35 each. How much ticket money is collected?</i></p> <p><i>Programmes cost 15p each. Selling programmes raises £12.30. How many programmes are sold?</i></p>

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7