



# Number: Multiplication and Division with Reasoning

MULTIPLICATION & DIVISION FACTS					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
count in multiples of twos, fives and tens (copied from Number and Place Value)	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward (copied from Number and Place Value)	count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value)	count in multiples of 6, 7, 9, 25 and 1 000 (copied from Number and Place Value)	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 (copied from Number and Place Value)	
	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables	recall multiplication and division facts for multiplication tables up to $12 \times 12$		
	<p><b>Missing numbers</b>  <math>10 = 5 \times \square</math>            What number could be written in the box?</p> <p><b>Making links</b>            I have 30p in my pocket in 5p coins. How many coins do I have?</p>	<p><b>Missing numbers</b>  <math>24 = \square \times \square</math>            Which pairs of numbers could be written in the boxes?</p> <p><b>Making links</b> Cards come in packs of 4. How many packs do I need to buy to get 32 cards?</p>	<p><b>Missing numbers</b>  <math>72 = \square \times \square</math>            Which pairs of numbers could be written in the boxes?</p> <p><b>Making links</b> Eggs are bought in boxes of 12. I need 140 eggs; how many boxes will I need to buy?</p>	<p><b>Missing numbers</b>  <math>6 \times 0.9 = \square \times 0.03</math>  <math>6 \times 0.04 = 0.008 \times \square</math>            Which numbers could be written in the boxes?</p> <p><b>Making links</b> Apples weigh about 170 g each. How many apples would you expect to get in a 2 kg bag?</p>	<p><b>Missing numbers</b>  <math>2.4 \div 0.3 = \square \times 1.25</math>            Which number could be written in the box?</p> <p><b>Making links</b></p>
MENTAL CALCULATION					
		write and calculate mathematical statements for multiplication and division using the	use place value, known and derived facts to multiply and divide mentally, including:	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed operations and large numbers



# Number: Multiplication and Division with Reasoning

		<p>multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)</p>	<p>multiplying by 0 and 1; dividing by 1; multiplying together three numbers</p>		
		<p><b>Use a fact</b></p> <p><math>20 \times 3 = 60.</math> Use this fact to work out  <math>21 \times 3 =</math>   <math>22 \times 3 =</math>  <math>23 \times 3 =</math>   <math>24 \times 3 =</math></p>	<p><b>Use a fact</b></p> <p><math>63 \div 9 = 7</math> Use this fact to work out  <math>126 \div 9 =</math>  <math>252 \div 7 =</math></p>	<p><b>Use a fact</b></p> <p><math>3 \times 75 = 225</math> Use this fact to work out  <math>450 \div 6 =</math>  <math>225 \div 0.6 =</math></p> <p>To multiply by 25 you multiply by 100 and then divide by 4. Use this strategy to solve  <math>48 \times 25</math>   <math>78 \times 25</math>  <math>4.6 \times 25</math></p>	<p><b>Use a fact</b></p> <p><math>12 \times 1.1 = 13.2</math> Use this fact to work out  <math>15.4 \div 1.1 =</math>  <math>27.5 \div 1.1 =</math></p>
	<p>show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p>		<p>recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers)</p>	<p>multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</p>	<p><i>associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. <math>\frac{3}{8}</math>) (copied from Fractions)</i></p>
<p><b>Making links</b> If one teddy has two apples, how many apples will three teddies have?</p>	<p><b>Making links</b> Write the multiplication number sentences to describe this array</p>	<p><b>Making links</b> <math>4 \times 6 = 24</math></p>	<p><b>Making links</b> How can you use factor pairs to solve this calculation?</p>	<p><b>Making links</b> <math>7 \times 8 = 56</math></p>	<p><b>Making links</b> <math>0.7 \times 8 = 5.6</math></p>



# Number: Multiplication and Division with Reasoning

<p>Here are 10 lego people If 2 people fit into the train carriage, how many carriages do we need?</p>	<table border="1"> <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? Write the division sentences.</p>	X	X	X	X	X	X	<p>How does this fact help you to solve these calculations?</p> <p><math>40 \times 6 =</math></p> <p><math>20 \times 6 =</math></p> <p><math>24 \times 6 =</math></p>	<p><math>13 \times 12</math> (<math>13 \times 3 \times 4</math>, <math>13 \times 3 \times 2 \times 2</math>, <math>13 \times 2 \times 6</math>)</p>	<p>How can you use this fact to solve these calculations?</p> <p><math>0.7 \times 0.8 =</math></p> <p><math>5.6 \div 8 =</math></p>	<p>How can you use this fact to solve these calculations?</p> <p><math>0.7 \times 0.08 =</math></p> <p><math>0.56 \div 8 =</math></p>
X	X	X									
X	X	X									
<b>WRITTEN CALCULATION</b>											
	<p>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 (<math>=</math>) signs</p>	<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 (appears also in Mental Methods)</p>	<p>multiply two-digit and three-digit numbers by a one-digit number using formal written layout</p>	<p>multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers</p>	<p>multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</p>						
				<p>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</p>	<p>divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context</p> <p>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</p>						



# Number: Multiplication and Division with Reasoning

					number remainders, fractions, or by rounding, as appropriate for the context						
					<i>use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))</i>						
<p><b>Practical</b> If we put two pencils in each pencil pot how many pencils will we need?</p>	<p><b>Prove It</b> Which four number sentences link these numbers? 3, 5, 15? Prove it.</p>	<p><b>Prove It</b> What goes in the missing box?</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>?</td> <td>?</td> </tr> <tr> <td>4</td> <td>80</td> <td>12</td> </tr> </table> <p>Prove it.</p> <p><b>How close can you get?</b></p> <p style="text-align: center;"> <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> <span style="font-size: 2em;">x</span> <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> </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	<p><b>Prove It</b> What goes in the missing box?</p> <p>6 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> x 4 = 512 Prove it.</p> <p><b>How close can you get?</b></p> <p style="text-align: center;"> <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> <span style="font-size: 2em;">x</span> 7         </p> <p>Using the digits 3, 4 and 6 in the calculation above how close can you get to 4500? What is the largest product? What is the smallest product?</p>	<p><b>Prove It</b> What goes in the missing box?</p> <p>12 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 2 ÷ 6 = 212</p> <p>14 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 4 ÷ 7 = 212</p> <p>22 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 3 ÷ 7 = 321 r 6</p> <p>323 x <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 1 = 13243</p> <p>Prove it.</p>	<p><b>Prove It</b> What goes in the missing box?</p> <p>18 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 4 ÷ 12 = 157</p> <p>38 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 5 ÷ 18 = 212.5</p> <p>33 <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> 2 ÷ 8 = 421.5</p> <p>38 x <span style="background-color: #4a7ebb; color: white; padding: 2px 5px;"> </span> .7 = 178.6</p> <p>Prove it.</p> <p><b>Can you find?</b> Can you find the smallest number that can be added to or subtracted from 87.6 to make it exactly divisible by 8/7/18?</p>
x	?	?									
4	80	12									
PROPERTIES OF NUMBERS: MULTIPLES, FACTORS, PRIMES, SQUARE AND CUBE NUMBERS											
			recognise and use factor pairs and commutativity	identify multiples and factors, including finding							



# Number: Multiplication and Division with Reasoning

			in mental calculations (repeated)	<p>all factor pairs of a number, and common factors of two numbers.</p> <p>know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers</p> <p>establish whether a number up to 100 is prime and recall prime numbers up to 19</p>	<p>identify common factors, common multiples and prime numbers</p> <p><i>use common factors to simplify fractions; use common multiples to express fractions in the same denomination</i> (copied from Fractions)</p>
				<p>recognise and use square numbers and cube numbers, and the notation for squared (<math>^2</math>) and cubed (<math>^3</math>)</p>	<p><i>calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (<math>cm^3</math>) and cubic metres (<math>m^3</math>), and extending to other units such as <math>mm^3</math> and <math>km^3</math></i> (copied from Measures)</p>
<p><b>Spot the mistake</b> Use a puppet to count but make some deliberate mistakes.</p> <p>e.g. 2 4 5 6 10 9 8 6</p> <p>See if the pupils can spot the deliberate mistake and correct the puppet</p>	<p><b>True or false?</b></p> <p>When you count up in tens starting at 5 there will always be 5 units.</p>	<p><b>True or false?</b></p> <p>All the numbers in the two times table are even.</p> <p>There are no numbers in the three times table that are also in the two times table.</p>	<p><b>Always, sometimes, never?</b></p> <p>Is it always, sometimes or never true that an even number that is divisible by 3 is also divisible by 6.</p> <p>Is it always, sometimes or never true that the sum of four even numbers is divisible by 4.</p>	<p><b>Always, sometimes, never?</b></p> <p>Is it always, sometimes or never true that multiplying a number always makes it bigger</p> <p>Is it always, sometimes or never true that prime numbers are odd.</p> <p>Is it always, sometimes or never true that when</p>	<p><b>Always, sometimes, never?</b></p> <p>Is it always, sometimes or never true that dividing a whole number by a half makes the answer twice as big.</p> <p>Is it always, sometimes or never true that when you square an even number, the result is divisible by 4</p>



# Number: Multiplication and Division with Reasoning

				<p>you multiply a whole number by 9, the sum of its digits is also a multiple of 9</p> <p>Is it always, sometimes or never true that a square number has an even number of factors.</p>	<p>Is it always, sometimes or never true that multiples of 7 are 1 more or 1 less than prime numbers.</p>
<b>ORDER OF OPERATIONS</b>					
					<p>use their knowledge of the order of operations to carry out calculations involving the four operations</p>
					<p><b>Which is correct?</b>          Which of these number sentences is correct?  <math>3 + 6 \times 2 = 15</math>  <math>6 \times 5 - 7 \times 4 = 92</math>  <math>8 \times 20 \div 4 \times 3 = 37</math></p>
<b>INVERSE OPERATIONS, ESTIMATING AND CHECKING ANSWERS</b>					
		<p><i>estimate the answer to a calculation and use inverse operations to check answers</i>          (copied from Addition and Subtraction)</p>	<p><i>estimate and use inverse operations to check answers to a calculation</i>          (copied from Addition and Subtraction)</p>		<p>use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy</p>



# Number: Multiplication and Division with Reasoning

	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct:  <math>12 \div 3 = 4</math>  <math>3 \times 5 = 14</math></p>	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct  <math>23 \times 4 = 82</math>  <math>117 \div 9 = 14</math></p> <p><b>Size of an answer</b> Will the answer to the following calculations be greater or less than 80  <math>23 \times 3 =</math>  <math>32 \times 3 =</math>  <math>42 \times 3 =</math>  <math>36 \times 2 =</math></p>	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct:  <math>23 \times 4 = 92</math>  <math>117 \div 9 = 14</math></p> <p><b>Size of an answer</b> Will the answer to the following calculations be greater or less than 300  <math>152 \times 2 =</math>  <math>78 \times 3 =</math>  <math>87 \times 3 =</math>  <math>4 \times 74 =</math></p>	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct:  <math>4321 \times 12 = 51852</math>  <math>507 \div 9 = 4563</math></p> <p><b>Size of an answer</b> The product of a two digit and three digit number is approximately 6500. What could the numbers be?</p>	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct:  <math>2346 \times 46 = 332796</math>  <math>27.74 \div 19 = 1.46</math></p> <p><b>Size of an answer</b> The product of a single digit number and a number with two decimal places is 21.34. What could the numbers be?</p>
<b>PROBLEM SOLVING</b>					
<p>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</p>	<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>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>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>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</p> <p>solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</p>	<p>solve problems involving addition, subtraction, multiplication and division</p>



# Number: Multiplication and Division with Reasoning

				solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	<i>solve problems involving similar shapes where the scale factor is known or can be found</i> (copied from Ratio and Proportion)
--	--	--	--	---	--