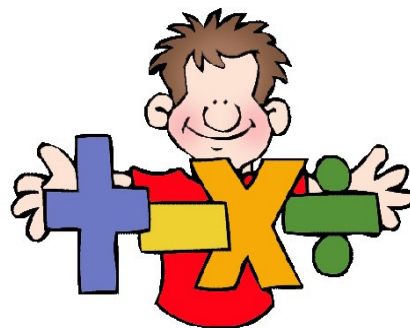


Progression  
in  
Mental Calculation Skills



**MULTIPLICATION AND DIVISION**

## YEAR 1

<u>Recall</u>	<u>Mental calculation skills</u>	<u>Mental methods or strategies</u>
<b>Children should be able to derive and recall:</b>	<b>Working mentally – with jottings if needed – children should be able to do the following:</b>	<b>Children should be able to apply the following strategies/methods appropriately:</b>
<ul style="list-style-type: none"><li>• doubles of all numbers to 10, e.g. double 6</li><li>• odd and even numbers to 20</li></ul>	<ul style="list-style-type: none"><li>• count in multiples of twos, fives and tens from different multiples.</li></ul>	<ul style="list-style-type: none"><li>• Use the patterns of the last digits e.g. 0 and 5 when counting in 5s. Knowing that all multiples of 2 are even.</li></ul>

## YEAR 2

<u>Recall</u>	<u>Mental calculation skills</u>	<u>Mental methods or strategies</u>
<b>Children should be able to derive and recall:</b>	<b>Working mentally – with jottings if needed – children should be able to do the following:</b>	<b>Children should be able to apply the following strategies/methods appropriately:</b>
<ul style="list-style-type: none"><li>• doubles of all numbers to 20, e.g. double 13 and corresponding halves.</li></ul>	<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>• <b>partition</b> – double the tens and ones separately then recombine</li></ul>

<ul style="list-style-type: none"> <li>• doubles of multiples of 10 to 50, e.g. double 40 and corresponding halves</li> <li>• multiplication facts for the 2, 5 and 10 times tables and corresponding division facts</li> <li>• odd and even numbers to 100</li> </ul>	<ul style="list-style-type: none"> <li>• double any multiple of 5 up to 50, e.g. 35.</li> <li>• halve any multiple of 10 up to 100, e.g. halve 90</li> <li>• find half of even numbers to 40</li> <li>• find the total number of objects when they are organised into groups of 2, 5 or 10</li> </ul>	<ul style="list-style-type: none"> <li>• use knowledge that halving is the inverse of doubling and that doubling is equivalent to multiplying by two.</li> <li>• use knowledge of multiplication facts from the 2, 5 and 10 times tables, e.g. recognise that there are 15 objects altogether because there are three groups of five</li> <li>• use the commutative law and inverse relations to develop multiplicative reasoning (e.g. <math>4 \times 5 = 20</math> and <math>20 \div 5 = 4</math>).</li> </ul>
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### YEAR 3

<p style="text-align: center;"><b><u>Recall</u></b></p> <p style="text-align: center;"><b>Children should be able to derive and recall:</b></p>	<p style="text-align: center;"><b><u>Mental calculation skills</u></b></p> <p style="text-align: center;"><b>Working mentally – with jottings if needed – children should be able to do the following:</b></p>	<p style="text-align: center;"><b><u>Mental methods or strategies</u></b></p> <p style="text-align: center;"><b>Children should be able to apply the following strategies/methods appropriately:</b></p>
<ul style="list-style-type: none"> <li>• multiplication facts for the 2, 3, 4, 5, 8 and 10 times tables and corresponding division facts.</li> </ul>	<ul style="list-style-type: none"> <li>• count on or back in 1s, 10s or 100s starting from any 2 or 3 digit number.</li> </ul>	<ul style="list-style-type: none"> <li>• use doubling to connect the 2, 4 and 8 times table.</li> <li>• <b>partition</b> – when doubling, double the tens and ones separately, then</li> </ul>

<ul style="list-style-type: none"> <li>doubles of multiples of 10 to 100, e.g. double 90 and corresponding halves.</li> </ul>	<ul style="list-style-type: none"> <li>double any multiple of 5 up to 100, e.g. 75.</li> <li>halve any multiple of 10 up to 200, e.g. halve 170.</li> <li>multiply one-digit or two-digit numbers by 10 or 100, e.g. <math>7 \times 100</math>, <math>46 \times 10</math>, <math>54 \times 100</math></li> <li>find unit fractions of numbers and quantities involving halves, thirds, quarters, fifths and tenths</li> </ul>	<p>recombine. When halving, halve the tens and ones separately, then recombine</p> <ul style="list-style-type: none"> <li>use knowledge that halving and doubling are inverse operations</li> <li>using the commutative law to make calculations easier (rearranging numbers), e.g. <math>4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240</math>.</li> <li>recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero as a place holder.</li> <li>use multiplication and division facts (e.g. using <math>3 \times 4 = 12</math>, <math>12 \div 4 = 3</math> and <math>3 = 12 \div 4</math>) to derive related facts (<math>30 \times 4 = 120</math>, <math>120 \div 4 = 30</math> and <math>30 = 120 \div 4</math>).</li> <li>Recognise that finding a unit fraction is equivalent to dividing by the denominator and use knowledge of division facts.</li> </ul>
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## YEAR 4

<p><b><u>Recall</u></b></p> <p><b>Children should be able to derive and recall:</b></p>	<p><b><u>Mental calculation skills</u></b></p> <p><b>Working mentally – with jottings if needed – children should be able to do the following:</b></p>	<p><b><u>Mental methods or strategies</u></b></p> <p><b>Children should be able to apply the following strategies/methods appropriately:</b></p>
<ul style="list-style-type: none"><li>• recall multiplication and division facts for multiplication tables up to 12 x 12.</li><li>• doubles of numbers 1 to 100, e.g. double 58 and corresponding halves</li><li>• doubles of multiples of 10 to 100 and corresponding halves</li><li>• factor pairs for known multiplication facts</li></ul>	<ul style="list-style-type: none"><li>• count in multiples of 6, 7, 9, 25 and 1000</li><li>• double any 2 digit number, e.g. double 39</li><li>• double any multiple of 10 or 100, e.g. double 340, double 800 and halve the corresponding multiples of 10</li><li>• multiply and divide numbers to 1000 by 10 and then 100, e.g. <math>325 \times 10</math>, <math>42 \times 100</math>, <math>120 \div 10</math>, <math>600 \div 100</math>, <math>850 \div 10</math></li><li>• multiply a multiple of 10 to 100 by a single digit number, e.g. <math>40 \times 6</math>.</li></ul>	<ul style="list-style-type: none"><li>• <b>partition</b> – double or halve the tens and ones separately, then recombine</li><li>• use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right and zero is used as a place holder</li><li>• use knowledge of multiplication facts and place value, e.g. <math>7 \times 8 = 56</math> to find <math>70 \times 8</math>, <math>7 \times 80</math></li><li>• use partitioning and the distributive law to multiply, e.g. <math>16 \times 7 = (10 + 6) \times 7</math> <math>= (10 \times 7) + (6 \times 7)</math> <math>= 70 + 42 = 112</math></li></ul>

	<p>Multiply numbers to 20 by a single digit, e.g. <math>17 \times 3</math></p> <ul style="list-style-type: none"> <li>• give the factor pair associated with a multiplication fact, eg. identify that if <math>2 \times 3 = 6</math> then 6 has the factor pair 2 and 3</li> <li>• divide a 2-digit number by a single-digit number, e.g. <math>84 \div 3</math></li> </ul>	<ul style="list-style-type: none"> <li>• use the associative law to multiply (rearranging operations), e.g. <math>(2 \times 3) \times 4 = 2 \times (3 \times 4)</math></li> <li>• use branching to chunk off multiples of the divisor using knowledge of multiplication facts and multiplying by multiples of 10, e.g. <math>84 \div 3 = (\underline{20} \times 3) + (\underline{8} \times 3) = 28</math></li> </ul>
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## YEAR 5

<u>Recall</u>	<u>Mental calculation skills</u>	<u>Mental methods or strategies</u>
<p><b>Children should be able to derive and recall:</b></p>	<p><b>Working mentally – with jottings if needed – children should be able to do the following:</b></p>	<p><b>Children should be able to apply the following strategies/methods appropriately:</b></p>
<ul style="list-style-type: none"> <li>• recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math>.</li> <li>• square numbers to <math>12 \times 12</math></li> </ul>	<ul style="list-style-type: none"> <li>• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000</li> <li>• multiply and divide two digit numbers by 4, 5, 8 or 20, e.g. <math>26 \times 4</math>, <math>320 \times 5</math>, <math>14 \times 20</math>, <math>96 \div 8</math></li> </ul>	<ul style="list-style-type: none"> <li>• multiply or divide by 4 or 8 by repeated doubling or halving. To multiply by 5, multiply by 10 then halve; to multiply by 20, double, then multiply by 10</li> </ul>

<ul style="list-style-type: none"> <li>percentage equivalents of one half, one quarter, three quarters, tenths and hundredths</li> <li>factor pairs to 100</li> <li>prime numbers up to 19</li> </ul>	<ul style="list-style-type: none"> <li>multiply by 25 or 50, e.g. <math>48 \times 25</math>, <math>32 \times 50</math></li> <li>multiply and divide whole numbers and decimals by 10, 100 or 1000, e.g. <math>4.3 \times 10</math>, <math>0.75 \times 100</math>, <math>673 \div 100</math></li> <li>multiply pairs of multiples of 10, e.g. <math>60 \times 30</math> and a multiple of 100 by a single digit number, e.g. <math>900 \times 8</math></li> <li>divide a multiple of 10 by a single digit number, e.g. <math>80 \div 4</math>, <math>270 \div 3</math></li> <li>find factor pairs for numbers to 100. E.g. 30 has the factor pairs <math>1 \times 30</math>, <math>2 \times 15</math>, <math>3 \times 10</math> and <math>5 \times 6</math>.</li> <li>Multiply and divide 2-digit decimals such as <math>0.8 \times 7</math>, <math>4.8 \div 6</math></li> <li>divide a 3-digit number by a single-digit number, e.g. <math>154 \div 7</math></li> </ul>	<ul style="list-style-type: none"> <li>to multiply by 5, multiply by 10 then halve; to multiply by 20, double then multiply by 10 or multiply by 10 then double</li> <li>use knowledge of doubles/halves and understanding of place value, e.g. when multiplying by 50 multiply by 100 and divide by 2</li> <li>use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right relative to the decimal point and zero is used as a place holder.</li> <li>use the distributive (<b>partitioning</b>), commutative (rearranging numbers) and associative law (rearranging operations) for multiplication to make calculations easier</li> <li>doubling one number and halving another to get to the product, e.g. <math>25 \times 32 = 50 \times 16 = 100 \times 8</math></li> </ul>
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		<ul style="list-style-type: none"> <li>use branching to chunk off multiples of the divisor using knowledge of multiplication facts and multiplying by multiples of 10, e.g.  <math>154 \div 7 = (20 \times 7) + (2 \times 7) = 22</math></li> </ul>
<u><b>YEAR 6</b></u>		
<b><u>Recall</u></b>	<b><u>Mental calculation skills</u></b>	<b><u>Mental methods or strategies</u></b>
<b>Children should be able to derive and recall:</b>	<b>Working mentally – with jottings if needed – children should be able to do the following:</b>	<b>Children should be able to apply the following strategies/methods appropriately:</b>
<ul style="list-style-type: none"> <li>recall multiplication and division facts for multiplication tables up to 12 x 12</li> <li>identify common factors and common multiples</li> <li>prime numbers up to 100</li> <li>equivalent fractions, decimals, percentages for hundredths e.g. 35% is equivalent to 0.35 or 35/100</li> </ul>	<ul style="list-style-type: none"> <li>count on or back in tenths, hundredths and thousandths</li> <li>multiply pairs of 2-digit and single digit numbers e.g. 28 x 3</li> <li>divide by 25 or 50 e.g. 480 divided by 25, 3000 divide by 50</li> <li>double decimals to 1dp e.g. double 7.6 and find the corresponding halves e.g. half of 15.2</li> </ul>	<ul style="list-style-type: none"> <li>to divide by 25, divide by 100 and then multiply by 4; to divide by 50, divide by 100 and double it</li> <li>use the distributive (partitioning) commutative (rearranging numbers) and associative law (rearranging operations) for multiplication to make calculations easier</li> <li>doubling one number and halving another to get to the product e.g. <math>25 \times 32 = 50 \times 16 = 100 \times 8</math></li> </ul>



	<ul style="list-style-type: none"><li>• multiply pairs of multiples of 10 and 100 e.g. <math>50 \times 30</math>, <math>600 \times 20</math></li><li>• divide multiples of 100 by a multiple of 10 or 100 (whole number answers) e.g. 600 divided by 20, 2100 divide by 300</li><li>• divide a 3-digit number by a 2-digit number, e.g. <math>336 \div 14</math></li></ul>	<ul style="list-style-type: none"><li>• use branching to chunk off multiples of the divisor using knowledge of multiplication facts and multiplying by multiples of 10, e.g. <math>336 \div 14 = (\underline{20} \times 14 = 280) + (\underline{4} \times 14 = 56) = 24</math></li><li>• recognise how to scale up or down using multiplication and division, e.g. if 3 oranges cost 24p:</li></ul>
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