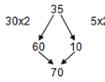
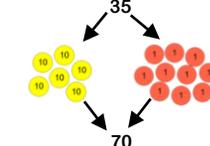
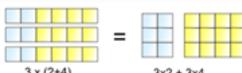


**John Randall Primary School and Nursery
Multiplication Key Stage 2 Calculation Policy**



<p>KS1</p> <p>Appendix 2: Pupil target grids</p>	<p>KS1</p> <p>Pupils should memorise and reason with numbers in 2, 5 and 10 times tables.</p> <p>They should see ways to represent odd and even numbers and know how they are represented in tables. This will help them to understand the pattern in numbers.</p> <p>Pupils should begin to understand multiplication as scaling in terms of double and half (e.g. that tower of cubes is double the height of the other tower).</p> <p>Commutative law shown on array.</p> <p>Repeated addition can be shown mentally on a number line.</p> <p>Inverse relationship between multiplication and division.</p> <p>Use an array to explore how numbers can be organised into groups.</p>	
<p>Year</p>	<p>3</p>	<p>4</p>
<p>Layers of vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary</p> <p>Appendix 1b: Vocabulary book</p>	<p>Basic to subject specific (Beck's Tiers): lots of, groups of ×, times, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition, array, row, column, double, halve, share, share equally, one each, two each, three each...</p> <p>Instructional vocabulary: carry on, continue, repeat, predict, describe the pattern, describe the rule, find, find all, find different, investigate, choose, decide, collect, What comes next?</p> <p>Language of tests and questions estimate, write...in order, complete, circle, estimate, tick, draw, draw two, draw the arrow, show your working, use the, complete, shade, write in, true or false, tick two, circle all, use a ruler, write a possible, What numbers could be? How many are left? What is next...? What is...? How many...? What number...? Which of these...?</p>	<p>Basic to subject specific (Beck's Tiers): lots of, groups of times, multiply, multiplication, multiplied by, multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition, array, row, column, double, halve, factor, multiple</p> <p>Instructional vocabulary: carry on, continue, repeat, predict, describe the pattern, describe the rule, pattern, puzzle, calculate, calculation, mental calculation, method, jotting, answer right, correct, wrong, number sentence sign, operation, symbol, equation, What comes next? What could we try next? How did you work it out...?</p> <p>Language of tests and questions write, order, complete, draw three, write....in the boxes, show your working, use the method, write the missing, shade, write in order, tick, write your answer as..., write the letter (can be used more than once), describe, write one word, write your answer in, match, to make...you need, draw four, on which, calculate, write these numbers, use the coordinates to draw, estimate, in each box, write these</p>

		values, circle the best, complete the table, round each number, draw one line, circle all, tick three, plot, check, How many...? What is...? How much...? What number...? Who takes...?														
NC 2014	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including 2 digit numbers times 1 digit numbers progressing to formal written methods.	Multiply 2 digit and 3 digit numbers by a 1 digit number using formal written layout. Solve problems involving multiplying and adding.														
Developing Conceptual/ Procedural Understanding	<p>Building tables</p>  <p>For example, build tables using counting stick-forwards and backwards and with missing jumps</p> <p>Using known facts If $3 \times 2 = 6$, then $30 \times 2 = 60$, $60 \div 3 = 20$ and $30 = 60 \div 2$.</p> <p>Associativity $(2 \times 3) \times 4 = 2 \times (3 \times 4)$ $(2 \times 3) \times 4 = 6 \times 4 = 24$ $2 \times (3 \times 4) = 2 \times 12 = 24$</p>  <p>Partitioning strategy to double Double 35</p>  <p>Place value materials to represent calculations Place value counters</p>  <p>Partitioning Informal recording of partitioned numbers $15 \times 5 = 75$ $10 \times 5 = 50$ $5 \times 5 = 25$ $27 \times 3 = 81$ $20 \times 3 = 60$ $7 \times 3 = 21$ "20 multiplied by 3 equals 60 and 7 multiplied by 3 equals 21. 60 add 21 equals 81."</p> <p>Grid method $23 \times 8 =$ $20 \times 8 = 160$ $3 \times 8 = 24$ $23 \times 8 = 184$</p> <table border="1" data-bbox="829 495 955 544"> <tr><td>x</td><td>20</td><td>3</td></tr> <tr><td>8</td><td></td><td></td></tr> </table> <p>Short multiplication Expanded</p> $\begin{array}{r} 23 \\ \times 8 \\ \hline 160 \\ 184 \end{array}$ <p>leading to compact</p> $\begin{array}{r} 23 \\ \times 8 \\ \hline 184 \\ 2 \end{array}$ <p>Representing problems A group of aliens live on Planet Xert. Tinions have three legs, Quinions have four legs. The group has 22 legs altogether. How many Tinions and Quinions might there be? Is there more than one solution?</p>	x	20	3	8			<p>Building tables</p>  <p>For example, build tables using counting stick-forwards and backwards and with missing jumps</p> <p>Using known facts If $2 \times 3 = 6$ then $200 \times 3 = 600$ and $600 \div 3 = 200$</p> <p>Distributivity $3 \times (2 + 4) = 3 \times 2 + 3 \times 4$ So the '3' can be 'distributed' across the '2 + 4' into 3 times 2 and 3 times 4</p>  <p>leading to $13 \times 4 = 10 \times 4 + 3 \times 4 = 52$</p>   <p>Place value materials to represent calculations Place value counters 346×9</p>  $\times 9 = 2700$  $\times 9 = 360$  $\times 9 = 54$ <p>Grid method (if needed for conceptual understanding)</p> 346×9 <table border="1" data-bbox="1354 795 1522 844"> <tr><td>x</td><td>300</td><td>40</td><td>6</td></tr> <tr><td>9</td><td></td><td></td><td></td></tr> </table> <p>Short multiplication Expanded</p> $\begin{array}{r} 346 \\ \times 9 \\ \hline 54 \quad (9 \times 6) \\ 360 \quad (9 \times 40) \\ 2700 \quad (9 \times 300) \\ \hline 3114 \end{array}$ <p>leading to compact</p> $\begin{array}{r} 346 \\ \times 9 \\ \hline 3114 \\ 45 \end{array}$ <p>Representing problems Multiply a number by itself and then make one factor one more and the other one less. What do you notice? Does this always happen? E.g. $4 \times 4 = 16$ $6 \times 6 = 36$ $5 \times 3 = 15$ $7 \times 5 = 35$ Try out more examples to prove your thinking. Place $<$, $>$, or $=$ in these number sentences to make them correct: 50×4 4×50 4×50 40×5 200×5 3×300</p>	x	300	40	6	9			
x	20	3														
8																
x	300	40	6													
9																
Known facts	Recall and use \times and \div facts for the 3, 4 and 8 \times tables.	Recall \times and \div facts for \times tables up to 12×12 .														
Essential knowledge	Review 2x, 5x and 10x	Double 2 digit numbers	4x and 8x tables	10x bigger												
	4x table	3x table	3x, 6x and 12x tables	Double larger numbers and decimals												
	8 x table	6x table	3x and 9x tables	11x and 7x tables												
Year	5		6													
Layers of	Basic to subject specific (Beck's Tiers):		Basic to subject specific (Beck's Tiers):													

<p>vocabulary</p>  <p>Appendix 1a Beck's Tiers of Vocabulary</p> <p>Appendix 1b: Vocabulary book</p>	<p>lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition, array, row, column double, halve, share, share equally, factor, multiple, prime, composite</p> <p>Instructional vocabulary: carry on, continue, repeat, predict, describe the pattern, describe the rule, find, find all, find different, investigate, What comes next?</p> <p>Language of tests and questions complete the sequence, circle the same as, draw four lines, circle the, circle the number that is not, circle two, circle two, write yes or no to a statement, circle all, write the, write the missing, circle the incorrect, show your method, show your working, circle three, who gets the most, by how much, calculate, estimate, shade, write the missing, use the diagram, complete the table, circle the number that is both, write a, b, c, d, label, true or false, order, draw a line, write the missing digits, circle true and false, tick two, What number is? Which is the closest? Which one of these must also? What is the total number...?</p>	<p>lots of, groups of times, multiply, multiplication, multiplied by, multiple of, product once, twice, three times... ten times... times as (big, long, wide... and so on) repeated addition, array, row, column, double, halve, share, share equally, factor, multiple, prime, composite</p> <p>Instructional vocabulary: carry on, continue, repeat, predict, describe the pattern, describe the rule, find, find all, find different, investigate, What comes next?</p> <p>Language of tests and questions write three, complete, draw the, explain why, write each number, show your method, tick the, calculate, increase by, complete the tables, circle all, calculate, What was the...? What is the difference? Which expression? How much...? What are...? What is...? What could...? What number is...? Which of these...?</p>
<p>NC 2014</p>	<p>Multiply numbers up to 4 digits by a 1 or 2 digit number using a formal written method, including long multiplication for 2 digit numbers.</p> <p>Solve problems involving multiplication and division including using 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 multiplication and division including scaling by simple fractions and problems involving simple rates.</p>	<p>Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using the formal written method of long multiplication.</p> <p>Solve problems involving addition, subtraction, multiplication and division.</p>
<p>Developing Conceptual/ Procedural Understanding</p>	<p>Building tables</p>  <p>For example, apply tables knowledge to multiples of 10, 100 and</p> <p>Grid method (if needed for conceptual understanding) 28 x 27 =</p>	<p>Building tables</p>  <p>For example, apply tables knowledge to decimals using counting stick- forwards and backwards and with missing jumps</p> <p>If place value is secure, use grid method for decimal multiplication 0.75 x 6</p> <p>0.7 x 6 = 4.2 0.05 x 6 = 0.3</p>

$$\begin{array}{r}
 28 \\
 \times 27 \\
 \hline
 196 \\
 560 \\
 \hline
 756
 \end{array}$$

	<p>1000 using counting stick- forwards and backwards and with missing jumps</p> <p>Using known facts If $2 \times 3 = 6$ then $2000 \times 3 = 6000$ and $200 \times 30 = 6000$</p> <p>Place value materials to represent calculations $4346 \times 8 =$</p> <p> $\times 8 = 3200$ (4000)</p> <p> $\times 8 = 2400$ (300)</p> <p> $\times 8 = 320$ (40)</p> <p> $\times 8 = 48$ (6)</p> <p>Short multiplication Use expanded method first if needed to build conceptual understanding</p> $\begin{array}{r} 4346 \\ \times \quad 8 \\ \hline 34768 \\ 234 \end{array}$	<table border="1" data-bbox="527 196 688 277"> <tr><td>x</td><td>20</td><td>8</td></tr> <tr><td>20</td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td></tr> </table> <p>Addition to be done mentally or across followed by column addition</p> <p>Long multiplication Expanded</p> $\begin{array}{r} 28 \\ \times 27 \\ \hline 56 \quad (7 \times 8) \\ 140 \quad (7 \times 20) \\ 160 \quad (20 \times 8) \\ 400 \quad (20 \times 20) \\ \hline 756 \end{array}$	x	20	8	20			7			<p>Extend to HTU x TU or ThHTU x TU as appropriate</p> <p>Representing problems 40 cupcakes cost £3.60, how much do 20 cupcakes cost? How much do 80 cupcakes cost? How much do 10 cupcakes cost?</p>	<p>Using known facts If $2 \times 3 = 6$ then $0.2 \times 3 = 0.6$ and $0.02 \times 3 = 0.06$</p> <p>Long multiplication Use expanded method first if needed to build conceptual understanding</p> $\begin{array}{r} 5172 \\ \times \quad 27 \\ \hline 36204 \\ 151 \\ \hline 103440 \\ 1 \\ \hline 139644 \end{array}$	<p>$0.75 \times 6 = 4.5$</p> <p>Make explicit links between decimals and money</p> <table border="1" data-bbox="1598 302 1797 367"> <tr><td>x</td><td>0.7</td><td>0.05</td></tr> <tr><td>6</td><td></td><td></td></tr> </table> <p>Representing problems Amy is given the calculation 5413×600. She says "I can do this without a written method." Write down the mental steps you think Amy could do.</p>	x	0.7	0.05	6		
x	20	8																		
20																				
7																				
x	0.7	0.05																		
6																				
Known facts	<p>Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. Recall prime numbers up to 19. Recognise and use square and cube numbers and the notation for squared (²) and cubed (³) BIDMAS.</p>		<p>Identify common factors, common multiples and prime numbers. Recognise and use square and cube numbers and the notation for squared (²) and cubed (³) BIDMAS.</p>																	
Essential knowledge	4x and 8x tables	100, 1000 times bigger	Multiplication facts up to 12 x 12	Partition to multiply mentally																
	3x, 6x and 12x tables; 3x and 9x tables	10, 100, 1000 times smaller	Apply place value to derive multiplication facts, e.g. $3 \times 4 = 12$ so $3 \times 0.4 = 1.2$	Double larger numbers and decimals																
	11x and 7x tables	Double larger numbers and decimals																		