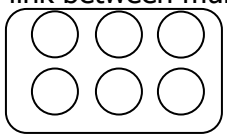
Multiplication

Year Group: Key Objectives	Written Strategies	Representations/Vocabulary
Year 1: ✓ Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	<u>Activities/recording</u> Practical apparatus, coins, Numicon etc. Children **count repeated groups** of objects by counting in 2s, 5s or 10s, for example, the amount of money in a line of 2p coins. They explore what numbers they can land on by starting at zero on a number line then jumping along in jumps of 2, 5 or 10. Children continue to count on and back twos, fives and tens. They describe and extend number sequences such as 16, 14, 12, 10, ... or 15, 17, 19, 21, …. They fill in missing numbers in sequences such as 12, 14, ☐, 18, 20, ☐or 25, 20, 15, ☐, ☐. When they count on or back in twos, fives and tens, **children use number lines or the 100-square** to see how the words they are saying connect with the structure of the number system. Children use arrays of practical apparatus/everyday objects to begin to develop an understanding of the <u>link between</u> multiplication and division  e.g. An egg box has three groups of 2 and two groups of 3 which make 6 eggs (multiplication) or the 6 eggs are split into two groups of 3 or three groups of 2 (division)	Number line, Number track, 100 square, Deines apparatus, Numicon, Coins and notes, Practical apparatus e.g. counters, Number mobiles, Pictorial representations of problems, Dominoes, arrays, groups of, Pictorial representations of calculation methods e.g. number lines Calculation, together, altogether, total, sum, multiple, multiply, groups of, lots of, sets of, double,
Year 2: ✓ Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs ✓ Recall and use multiplication facts for the 2, 5 and 10 multiplication tables,	<u>Activities/recording</u> Practical apparatus, coins, Numicon etc. Children establish multiplication and division facts for the **2, 5 and 10 times-tables** by counting in twos, fives and tens. If necessary, they use practical apparatus, counting or drawing to support them. They use **patterns and relationships** to support their learning of these facts. Children chant the tables in unison, using rhythm and the patterns of words to help them to commit facts to memory. Chanting of tables is supported with a counting stick or number line. This helps to establish the relationship between the increasing steps and corresponding products.	As above plus: Arrow Cards (TU), Column representations of Tens and Units, Models of written and mental strategies used for calculation, Numbers partitioned in different ways e.g. 23 = 20 +3 = 10 + 13, meanings of < > =, As above plus:

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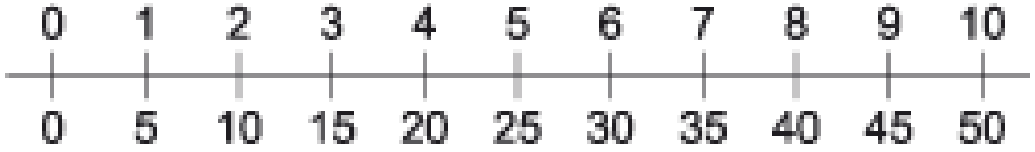
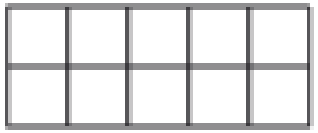
<td>including recognising odd and even numbers
✓ Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</td>
<td> 

Children continue to use arrays to develop their understanding of the relationship between multiplication and division . For example, they state two multiplication sentences and two division sentences that relate to a particular array, for example:
 
5 x 2 = 10, 2 x 5 =10
10 ÷ 2 = 5, 10 ÷ 5 = 2
They use the image of an array to explain why, for example, 2 x 5 gives the same answer as 5 x 2.</td>
<td>tens, ones, change, columns, place value, boundary, partition
Twice, multiple, times, near double, method, strategy, inverse, inverse operation, repeated addition, calculate</td>
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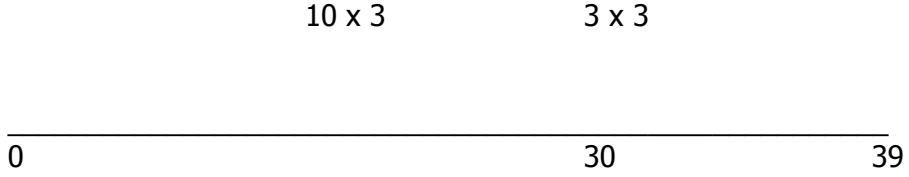
<td>Year 3:
✓ Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
✓ Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</td>
<td><u>Recording</u>
Children begin to use practical and informal methods to solve simple TU × U calculations. For example, to find 12 × 5 they appreciate that 10 fives are 50 and add on another 2 fives to make 60.
 

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<tr><td>X</td><td>3</td></tr>
<tr><td>10</td><td>30</td></tr>
<tr><td>3</td><td>9</td></tr>
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Children are introduced to the grid method as above. The larger number is partitioned down the side, as this promotes the link to column addition.</td>
<td>As above plus:
models of multiplication strategies, Arrays

As above plus:
Hundreds, tenths, decimal, decimal point, decimal place,</td>
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<td>Year 4:
✓ Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
✓ Recall multiplication and division facts for multiplication tables up to 12 × 12
✓ Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers</td>
<td><u>Recording</u>
They refine their written methods for multiplying TU by U and HTU x U, including remainders.
38 x 7 = (30 x 7) + (8 x 7) = 210 + 56 = 266
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<tr>
<td><table>
<tr><td>X</td><td>7</td></tr>
<tr><td>30</td><td>210</td></tr>
<tr><td>8</td><td>56</td></tr>
<tr><td></td><td>266</td></tr>
</table></td>
<td>30 + 8
x 7
56 (8 x 7 = 56)
210 (30 x 7 = 210)
266</td>
</tr>
<tr>
<td>The number with the most digits is always placed in the left-hand column of the grid so that it is easier to add the partial products.</td>
<td>The next step is to reduce the method of recording to a column format, but showing the working. Point out the links with the grid method on the left. Working out should begin with the digit of lowest value as this supports the most compact method that may be developed later.</td>
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<td>As above plus:
Arrow Cards (ThHTU), models of multiplication strategies

As above plus:
Thousands, hundredths, negative number, round</td>
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<td>Year 5:
✓ 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
✓ Multiply numbers mentally drawing upon known facts
✓ Multiply whole numbers and those involving decimals by 10, 100 and 1000</td>
<td><u>Recording</u>
Children use their understanding of whole-number and decimal place value to extend written methods for multiplication and division (including ThHTU × U, TU x TU, HTU ×TU, U.t ×U and).
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<td>For TU ×TU, estimate first. When children are confident, reduce the recording to a list of partial products that need to be calculated before they are totaled.</td>
<td>56 x 27 is approximately 60 x 30 = 1800
5 6
x 2 7
7 x 6 = 4 2
7 x 50 = 3 5 0
20 x 6 = 1 2 0
20 x 50 = 1 0 0 0
1 5¹1 2</td>
</tr>
<tr>
<td>Where necessary, children may be shown the grid method for these calculation so that links between these calculations can be made and the partial products can be identified more easily</td>
<td><table>
<tr><td>X</td><td>20</td><td>7</td><td></td></tr>
<tr><td>50</td><td>1000</td><td>350</td><td>1 3 5 0</td></tr>
<tr><td>6</td><td>120</td><td>42</td><td>¹1 6 2</td></tr>
<tr><td></td><td></td><td></td><td>1 5 1 2</td></tr>
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<td>As above plus:
Place value charts to Millions/thousandths, models of multiplication strategies

As above plus:
Tens/hundreds of thousands, Millions, factors, factor pairs, common factors, square number, squared (^{2}), cube numbers, cubed (^{3}), mixed numbers, improper fractions, percentage (%)</td>
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<td>The final step is to reduce the working to the shortest number of steps. Digits are carried to the right of the next column and are placed within the same line of working.</td>
<td>5 6
x 2 7
56 x 7 = 3 9^{4} 2
56 x 20 = 1 1^{1}2 0
1 ^{1}5 1 2</td>
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<td>Children should use the method to begin to work with decimal problems</td>
<td>1 2 . 7
x 3
3 8^{2} .1

2 1 4 . 6
x 3 2
4 2 9^{1}.2
6 4^{1}3 ^{1}8 .0
6 8 6^{1}7 .2</td>
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<td>Year 6:
✓ Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
✓ Perform mental calculations, including with mixed operations and large numbers.</td>
<td>Recording
Children should continue to use the compact method to solve multiplication calculations. The examples below show the increased grading of difficulty and we aim for children in Year 6 to be able to multiply 4 digit whole numbers by two digit numbers and numbers with one decimal place by TU. Where necessary, children should use a less compact method if they need reinforcement of place value or need support in structuring their work and understanding where each partial product comes from.
1. Within 10 x 10 — 7 x 6 — 9 x 8
2. TU x U in teens numbers — 14 x 7 — 17 x 6
3. TU x U beyond teens numbers — 34 x 8 — 52 x 6
4. HTU x U no carrying — 132 x 3 — 121 x 4
5. Th/HTU x U with carrying — 146 x 3 — 2137 x 5
6. Th/HTU x U with 0 — 607 x 8 — 2790 x 7
6. TU x TU — 23 x 45 — 67 x 89
7. HTU x TU — 614 x 42 — 732 x 62
8. Th/HTU/TU x TU with 0 — 705 x 27 — 465 x 70 — 8096 x 57
9. H/T/U.t x U/TU — 7.6 x 8 — 14.7 x 7 — 214.6 x 32</td>
<td>As above plus:
Place value charts up to Tens of millions, models of multiplication strategies, , pictorial representations of multiplication with decimals, Pictorial representations of ratio and proportion e.g. mixing paint/ ingredients/recipes

As above plus:
tens of millions, ratio, proportion</td>
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