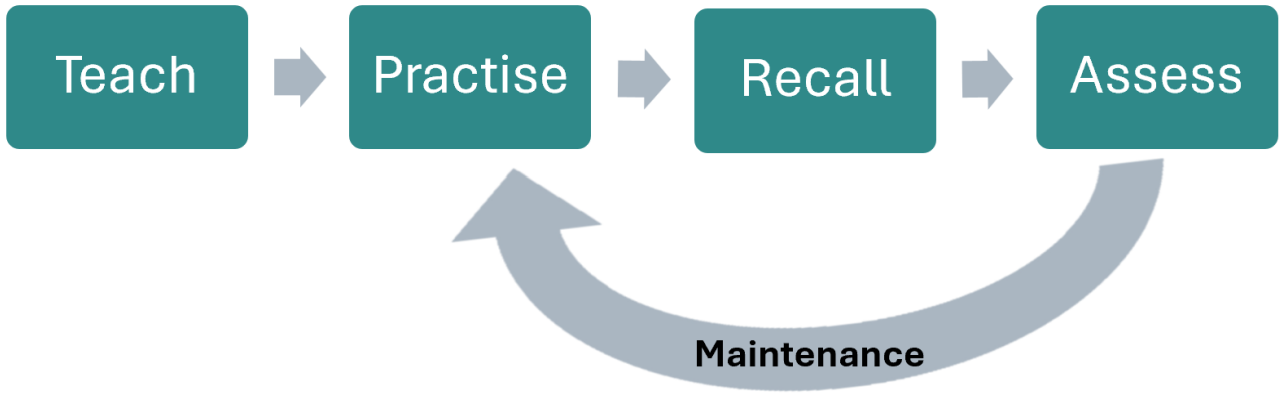
Times Tables Progression

The National Curriculum stipulates that children should be fluent in all times tables and their related division facts up to 12x12 by the end of Year 4. This document aims to provide further detail about the progression required for pupils to reach this expectation, supporting teachers with a clear breakdown of the content and suggesting effective teaching strategies.

Times table acquisition is achieved through the following sequence of events:



This cycle should be repeated every new times table the pupil learns.

Teach

Pupils must be actively taught each times table in order for them to eventually be able to retrieve the facts. Research conducted by the Institute for Effective Education (IEE) found that a combination of conceptual and procedural approaches to the teaching and learning of times tables was the most effective, suggesting that there is still a place for retrieval tasks such as low-stakes tests. However, this must be done in conjunction with actively teaching pupils concepts surrounding times tables, such as looking for patterns and applying reasoning to solve larger or unknown facts.

Practise

This step is for pupils to explore concepts related to times tables in more detail and opportunities to rehearse the facts. At this stage, pupils are not necessarily expected to be able to recall every fact within the multiplication table, but their accuracy should be improving through carefully constructed opportunities for practice.

Recall

At this stage, pupils are able to fluently recall the facts related to the table they have learnt in a variety of ways. Pupils will be able to respond to straightforward times table questions as well as the related divisions. They should also be able to retrieve the correct facts required to solve more complex problems involving reasoning and problem-solving.

Assess

The final step in any new learning is to assess the depth at which pupils know it in order to consider next steps. This should be through both formative and summative approaches. Low-stakes tests are a great way of checking that pupils have the facts at their fingertips, but they also need to be alongside observations of pupils tackling questions in class. For example, are they able to identify which fact they need to solve the wider problem?

Maintenance

For pupils to reach complete automaticity with their times tables recall, there must be ample opportunity for maintenance, which will take pupils back through the stages Practise, Recall and Assess, as appropriate, throughout the key stages.

Times Table Teaching Progression

This grid suggests how the National Curriculum Statements related to times tables could be broken down sequentially and makes explicit links across the curriculum for a 'holistic' view of times tables across the phases. Please note that some decisions have been made regarding particular times tables in order to make logical connections through the teaching sequence. This may include some elements being introduced slightly earlier in preparation for the actual teaching sequence. For example, the 6 times table has been moved to the Y3 Spring term, as it can be matched with the 3 times table using knowledge of doubles in the same way that the 4 and 8 times tables can.

Despite the National Curriculum expectation that pupils be fluent in all times tables up to 12x12 by the end of year 4, this grid continues until year 6 to ensure the maintenance of times tables continues and appropriate links across the curriculum are made.

The progression grid also includes references to suggested teaching strategies for each stage. This is not an exhaustive list, but it should provide some guidance for effective teaching and practice.

Year Group	Autumn	Spring	Summer
1	Doubles and halves within twenty. Begin to count in twos related to even numbers. Count in twos using a counting stick.	Count in multiples of twos, fives, and tens on a counting stick, using concrete objects and pictorial representations. Repeated addition using dual number lines to link with counting in equal groups.	Continue to count in twos, fives and tens with increasing fluency. Create arrays using concrete resources for twos, fives and tens. Introduce the multiplication and equals signs for known facts for twos, fives and tens.
2	Count in twos, fives and tens with increasing fluency. Link the repeated equal groups with the number of groups on dual number lines. Make links with odd and even numbers.	Teach the 2, 5 and 10 times tables through actively building and creating the facts using concrete resources and pictorial representations. Introduce commutativity through the use of concrete resources, starting with addition and then exploring multiplication. Count in threes.	Rehearse the 2, 5 and 10 times tables in sequential order as well as out of order (recall of facts). Continue to count in threes with increasing fluency using a counting stick and dual number lines.

3	Count in twos, threes, fours, fives and tens. Recall multiplication and division facts with automaticity for the 2, 5 and 10 times tables.	Teach the 3, 6, 4 and 8 times tables, linking with division facts. Make links between times tables, such as the 8x being double the 4x and the 6x being double the 3x. Continue to explore commutativity for known facts, and introduce distributivity as a strategy for unknown facts, using concrete resources and pictorial representations.	Apply known times table facts to solve multiplication questions involving 2-digit x 1-digit numbers. Continue to recall multiplication and division facts with increasing automaticity for the 2,3,4,5,6,8 and 10 times tables.
4	Count in multiples of six, seven, and nine while maintaining fluency in counting in twos, fives, tens, threes, fours, and eights. Make connections of known facts with factor pairs and other times tables. Teach the 7, 9, 11, and 12 times tables through dual number lines and develop an understanding of distributivity for unknown facts (e.g., 7 x 9 = 5 x 7 + 4 x 7) using concrete resources and pictorial representations.	Rehearse and recall multiplication and division facts for 7, 9, 11 and 12 times tables. Maintain recall of multiplication and division facts for 2, 3, 4, 5, 6, 8, and 10 times tables. Identify square numbers on a hundred square and explore how they can be used as benchmarks to reach unknown facts. Make links to the laws of divisibility.	Recall multiplication and division facts for multiplication tables up to 12 × 12 with automaticity. Make connections with multiplication and division facts when finding the area of rectilinear shapes. Apply recall of multiplication tables up to 12 x 12 to formal methods of multiplication and division. Recall multiplication facts up to 12 x 12 to solve a wide range of problems, including integer scaling problems and correspondence problems where *n* objects are connected to *m* objects.

5	Recall multiplication and division facts for multiplication tables up to 12 × 12 with automaticity. Continue to make explicit connections to factor pairs and common factors.	Apply knowledge of multiplication tables up to 12 x 12 to a wide range of problems including: fractions, decimals, percentages and calculation (both formal and mental methods)	Maintain automaticity of times tables, including the related division facts, and apply them to a wide range of problems.
6	Recall multiplication and division facts for multiplication tables up to 12 × 12 with automaticity. Efficiently use multiplication facts as 'base facts' when solving questions involving larger numbers (eg 2700 ÷ 9)	Apply knowledge of multiplication tables up to 12 x 12 to a wide range of problems, including: ratio, fractions, decimals, percentages and calculation.	Maintain automaticity of times tables, including the related division facts, and apply them to a wide range of problems.

Teaching Strategies

Counting

Counting in equal groups is vital as a starting point when learning times tables. This helps children become familiar with the multiples in sequential order and builds fluency.

Counting sticks are very useful as a model for rehearsing all times tables. They show that in each timestable, there are 12 equal groups (for the facts we learn), and it is just the size of the group that changes. This aids memory because pupils are able to visualise the counting stick and, therefore, the multiples that are placed on it. Below are some suggestions for strategies using a counting stick.

Boomerang: Places on the stick are marked to signify where to count up and back from. For example: 0, 4, 8, 12, 16, 12, 8, 4, 0, 4…

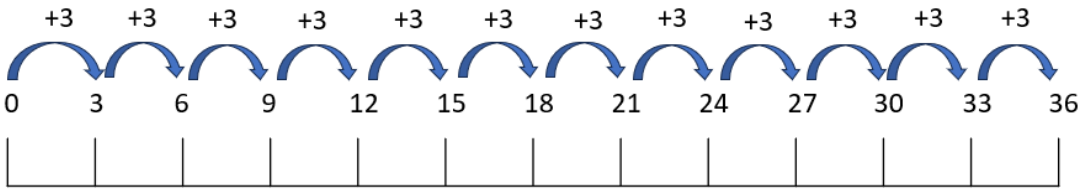
Hiccup: Pupils count forwards or backwards as usual until the teacher adds a hiccup sound. Pupils then go back to the previous number and then continue. For example: 0, 4, 8, 12, 16, (*hiccup)*, 12, 16, 20, 24, *(hiccup),* 20, 24, 28, 32, *(hiccup),* 28, 32 ...

Sneezing: Place sticky notes with the multiples in the correct position on the counting stick. Pupils to count in 4s to 40. The teacher then 'sneezes' and blows several sticky notes off the counting stick. Pupils are to count in 4s again, including the numbers that are now not visible. Ask pupils to find a range of different ways of working out the missing value.

Spot the swap: Place sticky notes with the multiples in the correct position on the counting stick. Teacher to swap two of the multiples and ask pupils to identify the swap.

Number lines

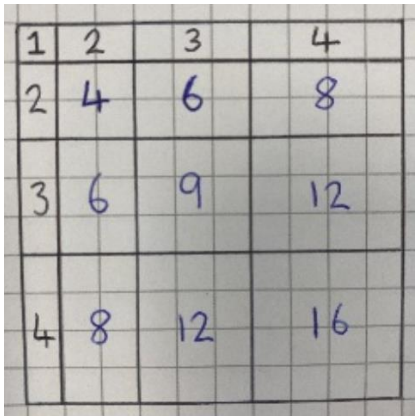
A number line is a helpful model to introduce early when teaching a new times table, and even more helpful is to show a dual number line showing the number of groups alongside. This also reinforces the repeated addition involved.



Building the times table

Children should have the opportunity to discover and 'build' times table facts for themselves to increase retention of facts through concrete and pictorial representations. Building arrays using counters and multilink help to reinforce the concept of equal groups and enable pupils to count on in ones to reach the next multiple. From these practical experiences, pupils can then create their own times tables flashcards to be used in a variety of ways in the future whilst rehearing the facts and maintaining the recall.

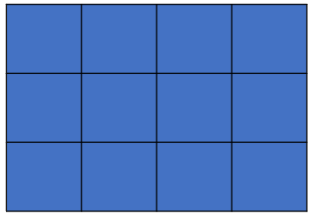
A scaled times table grid can also be explored with pupils, building on their understanding of arrays and linking this with traditional multiplication grids.



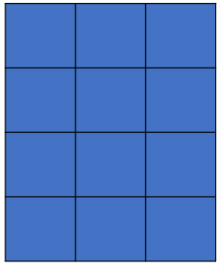
1	2	3	4
2	4	6	8
3	6	9	12
4	8	12	16

Commutativity

The commutative law is when a multiplication can be completed in any order with the same result. For example, 5 x 2 = 2 x 5. It works for both multiplication and addition but not subtraction or division. This is a very useful strategy for pupils to employ when learning their times tables because it instantly halves the number of facts they are required to recall. If they know 4 x 3 = 12, then they also know 3 x 4 = 12. Exploring this through concrete resources will also build an understanding of the difference between group size and number of groups. This is particularly helpful when they learn to divide through grouping.



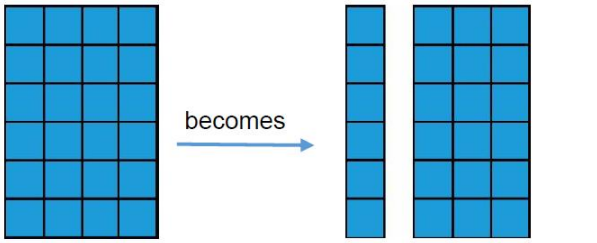
4 x 3 = 12



3 x 4 = 12

Distributivity

For pupils to develop fluency in multiplication, the distributive law is a crucial concept to understand. Distributivity is when a calculation is split into 2 or more smaller calculations, which, when totalled, create the same answer. For example:



This is particularly helpful when trying to recall unknown facts, as pupils can fall back on smaller facts that they are already secure with. This concept can also be applied when working with larger numbers to make a calculation more manageable.

Benchmarks

Using known and secure facts, like the 5 and 10 times tables, can help children reach unknown facts more quickly than counting from 0. For example, the fact 5 x 4 can be used as a starting point for finding 6 x 4 by counting on 1 more group of 4 from 20. These benchmarks can be made explicit when counting in multiples and using number lines. Using benchmarks for estimation purposes can also be useful, in the same way we encourage pupils to do when exploring number magnitude.

Recall of the square numbers is another useful benchmark and a helpful memory hook for times table facts. For example, 6 x 6 = 36 is a good stepping stone towards the facts that are more difficult to remember, such as 8 x 6.

Making connections

To make learning stick, pupils need to make connections across the maths curriculum. These could include (but are not restricted to) doubles and halves, factor pairs, and finding the area of a rectilinear shape. Depending on the year group, the connections made will differ, but time should be allocated to make these explicit.