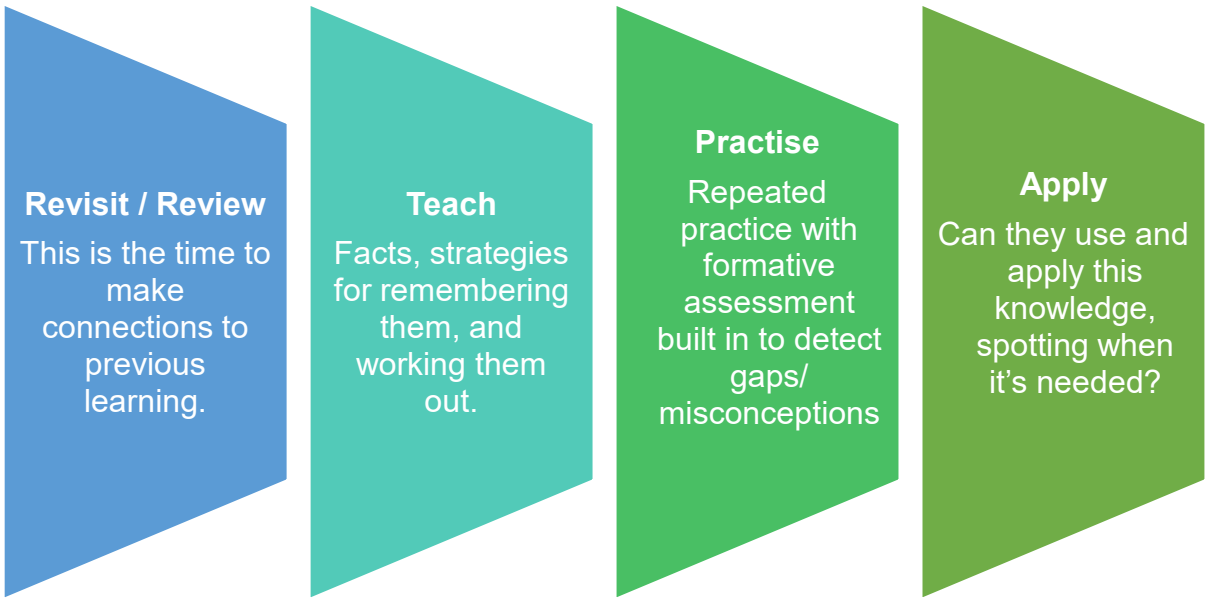
Practise Does Not Make Perfect! The Importance of TEACHING the Multiplication Facts

By Sarah Carpenter and Jason Horne, Primary Maths Advisers for The Education People

June 2022 saw the first statutory assessment of Year 4 pupils' knowledge of the multiplication facts up to x12. This has presented many primary head teachers, and maths leaders, with their first set of measurable data on multiplication facts; not everyone has been happy with what they have seen. Despite investing in programmes that enable pupils to practise at speed in the classroom and at home, the impact has been less than might have been expected, leaving many leaders scratching their heads.

Look closely though at many of the programmes that are in use in schools, and you begin to realise that the focus is on practising the recall of multiplication facts at speed. However, you cannot recall what you have not been taught, certainly not at speed. If we look at the Teaching Sequence that is the recommended processes for securing any new learning, we see that the 'Practise' element is the third step in the learning journey, not the first or only step.



The other issue that the first set of data from the Multiplication Tables Check (MTC) has revealed is even less surprising. Our vulnerable pupils have not performed as well as their peers.

Why is this not surprising you ask?

If the expectation to practise their times tables relies on support from home, which in some households is not forthcoming, those pupils will be disadvantaged in the MTC. Furthermore, once pupils have learned their times tables, true mastery relies on them being able to apply this knowledge to reduce the cognitive load when performing calculations, both written mental. For those pupils who have not learned the multiplication facts, they are going to be unable to rely on having this knowledge

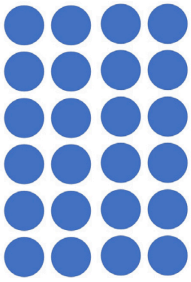
at their fingertips and must resort to working the facts out each and every time they need to use them.

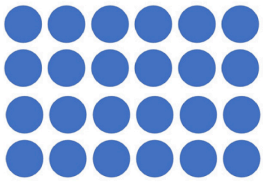
The following four top tips are intended to support all teachers, particularly those in Years 2, 3 and 4, in preparing pupils for the MTC.

Tip Number 1: Provide Models and Images to Develop Visual Memory

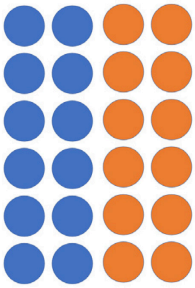
The Multiplication Tables Check is checking pupils' fluency however, it is still important for pupils to gain a deep conceptual understanding of the structure of multiplication. One of the ways to provide this is by using models and images to represent the multiplication tables. This should be approached in a skilful way with a clear rationale behind why any manipulative or representation is used. In the Education Endowment Foundations "Improving Mathematics in Key Stages Two and Three Guidance Report" it states that teachers should "enable pupils to understand the links between the manipulatives and the mathematical ideas they represent. This requires teachers to encourage pupils to link the materials (and the actions performed on or with them) to the mathematics of the situation, to appreciate the limitations of concrete materials, and to develop related mathematical images, representations, and symbols" (Education Endownment Foundation, 2017).

The National Centre for Excellence in the Teaching of Mathematics (NCETM) also advocates the use of representations "to expose the mathematical structure being taught" rather than objects to assist children in performing calculations which "may encourage a child to become dependent on them" (NCETM, 2022). With this in mind, a child who has not developed automatic recall of the multiplication fact 6x4, might already know 4x6. In this instance we may wish to use an array so that the child is able to see the commutative nature of multiplication.



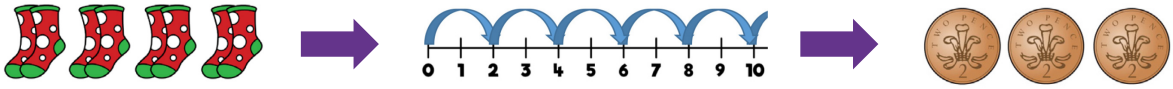


They may be able to see relationships between other multiplication facts, such as 6x4 is the same as 6x2 + 6x2.



By exploring the multiplication tables using representations and manipulatives, a stronger conceptual understanding will be built. This is far more effective than learning tricks.

The White Rose Maths Calculation Policies, which can be found at https://whiterosemaths.com, support teachers to identify the most appropriate manipulatives to use and how they should use them. In the calculation policy for multiplication and division we can see how we might sequence the manipulatives that we use to teach multiplication, for example to teach the two times table facts, we may use the following representations:



Tip Number 2: Identify Unknown Facts - Find the Gaps!

With the Multiplication Tables Check now statutory in Year 4, it is vital that we focus our attention on finding any specific multiplication tables gaps that our pupils have. This is important as we may begin to fall into the trap of continuous testing with our pupils. It is important that we are aware that the children have a secure understanding of their multiplication tables and that they can recall these easily, however the more we test, the less time we have to teach.

In finding immediate gaps we can focus our teaching on the unknown facts and can even begin to personalise our approach for each pupil. The table below shows the weighting of questions from each multiplication table in the MTC. We can see that there will be more questions from the 6, 7, 8, 9 and 12 multiplication tables because these have been determined to be the most difficult multiplication tables. For this reason, we might want to ensure that our pupils are most secure with these Multiplication tables.

Multiplication Table	Minimum number of items in each form	Maximum number of items in each form
1	Not applicable	Not applicable
2	0	2
3	1	3
4	1	3
5	1	3
6	2	4
7	2	4
8	2	4
9	2	4
10	0	2
11	1	3
12	2	4

5.2.1 Table 1 – Multiplication table limits in the MTC Multiplication tables check assessment framework https://www.gov.uk/government/publications/multiplication-tables-check-assessment-framework

Tip Number 3: Teach Strategies for Remembering Unknown Facts

Occasionally, certain facts may not 'stick'. For example, you may find yourself reciting a rhyme you were taught at school whenever you spell 'because'. It was a memory aide that served you well and enabled you to hold onto some tricky learning. This is not the best way to learn all of the multiplication facts, and it will certainly not give us a deep conceptual understanding or allow us to make links and think about relationships with other multiplication tables. However, when we do have a mental block, a solution could be to use a rhyme such as:

Six and eight are running late! How many minutes? Forty-eight! Six times eight is forty-eight!

A list of similar rhymes can be found here: https://www.lewispalmer.org/cms/lib/CO01900635/Centricity/Domain/874/MultiplicationRhymes.docx.pdf. Sir Linkalot (https://www.sirlinkalot.org/) is also developing animated rhymes to support those pupils' 'sticky learning' You might like to take a look at this sample video for 7x7=49.

The use of rhymes and 'tricks' should be a last resort, but if this is what is needed to allow a pupil to memorise particular facts to aide automatic recall, then this can be a helpful strategy. It is important that pupils have a positive view of themselves as mathematicians, and we do all we can to relieve Maths anxiety.

Tip Number 4: Include Regular Oral Practice of Times Tables in and out of Sequence

Although we want to focus mainly on the teaching of multiplication tables rather than the testing of multiplication tables, the use of low stakes, regular quizzes can be useful. Utilising those unplanned gaps in the day such as lining up to go to assembly or that spare minute before home time, can be a great opportunity to practise our retrieval of facts, providing equity for our vulnerable pupils. We know that regularly practising the retrieval of knowledge allows us to recall this more efficiently when we need to.

If you wish to further develop your understanding of how you teach multiplication, you may wish to purchase the E-learning module “Developing fluency in multiplication facts”- https://www.theeducationpeople.org/products/professional-development/developing-fluency-in-multiplication-facts/