Progression: Learning Times Tables

From the 2019-20 academic year, all year 4 children will be expected to complete an online, national times table test. This is in line with the expectation in the national curriculum that all children should be able to rapidly recall times tables facts to 12 x 12, along with the associated division facts.

In the trials carried out in 2018, children had 7 seconds to answer each question and type it into the computer – very rapid recall indeed!

In order for children to fully and expertly understand their times tables, the Hampshire Maths team recommend following a concrete, pictorial and abstract progression. This should start in KS1 and continue into KS2.

Progression:

1. Concrete: using 'lots of' to reinforce the ideas of groups. i.e. how many socks in 4 pairs? How many wheels on 3 cars? If 4 children each have 2 pencils, how many pencils are there in total?

   The idea of multiplication being repeated addition is important.

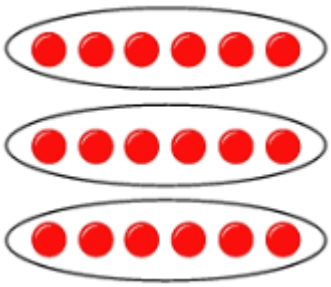
   Representing the multiplication in many ways is important. Eg.
   - Numicon is a good resource to show the 'groups' or 'lots of'.
   - Can make groups of items with hoops and beanbags, or multi-link eg.

4 x 2 = 2 + 2 + 2 + 2 = 8

3 x 4 = 4 + 4 + 4 = 12

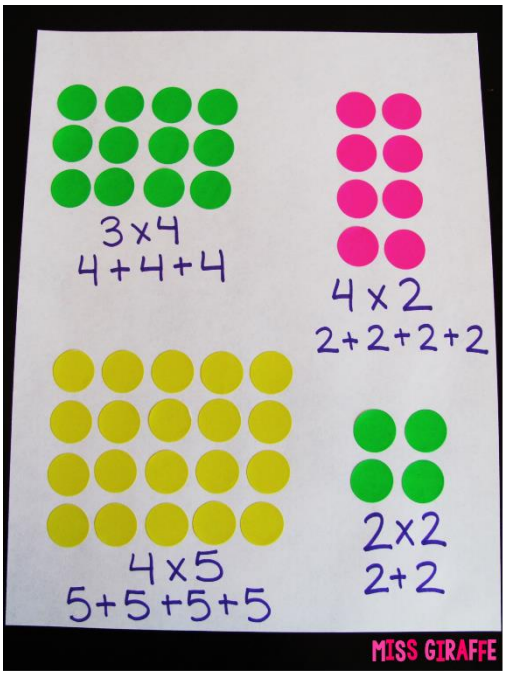
4 x 3 = 3 + 3 + 3 + 3 = 12

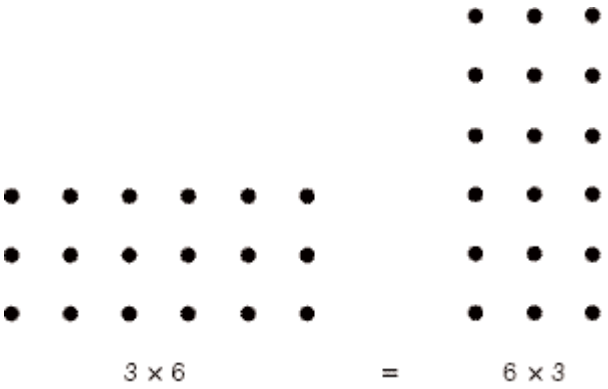
2. Pictorial: drawing diagrams of the concrete groups you have made is an excellent start to moving away from using manipulatives such as those shown in step 1 above.



3 x 6 = 18

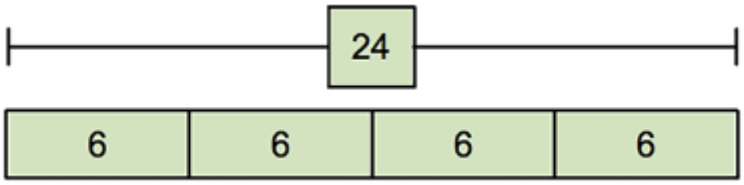
Moving on from drawing groups to arrays is the next step: it is an excellent way to show the relationship between multiplication and division, and to explain the commutative law (that 5 x 3 = 3 x 5 eg.)



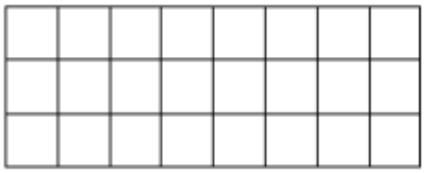


By drawing arrays, it is also possible to demonstrate the associative law (that 3 x 6 = 2 x 6 + 1 x 6).

Bar models can also be used as a way to draw multiplication questions, as can repeated jumps on a numberline.

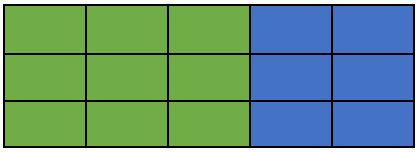


Important note: by the end of year 3, children should be moving away from drawing arrays with dots/circles and onto drawing **arrays using the squares** in their books. This will be important as they progress through the school.



3 x 8 = 24

This allows the children to reason more deeply and obtain a deeper understanding of number. It again reinforces the commutative and associative law.



3 x 5 = 15,

or 3 x 3 + 2 x 3 = 15

Again, with all arrays, it is easy to highlight the relationship between multiplication and division.

3. Abstract: once children understand times tables through the representations detailed above, they will be able to 'figure out' times tables by themselves. This will lead into the 'rapid recall' of all multiplication and division facts 😊

One, 10, five… derive

An incredibly powerful resource to encourage children to calculate their own times tables facts is ‘one, 10, five… derive’.

Multiplicand	7	7	7	7	7	7	7	7	7	7	7	7
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product												

This grid is all you need! Children can be given printed slips, and then move on to creating their own – can be used for the rest of their lives whenever needed!

Step-by-step guide

1. Always start off by inputting the product for 1x and 10x. Then the children can find 5x by halving the product of 10x.

Multiplicand	7	7	7	7	7	7	7	7	7	7	7	7
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product	*7*				*35*					*70*		

2. Then, start filling in the rest of the grid. You can do so by adding/subtracting 7 from the numbers you already know.

Multiplicand	7	7	7	7	7	7	7	7	7	7	7	7
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product	7	*14*		*28*	35	*42*			*63*	70	*77*	

Some may find it easier to double 1x in order to find 2x, then double again to find 4x and so on. For instance:

Multiplicand	7	7	7	7	7	7	7	7	7	7	7	7
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product	7	*14*		*28*	35			56		70		

You can then easily finish off the grids by adding/subtracting 7 each time.

Multiplicand	7	7	7	7	7	7	7	7	7	7	7	7
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product	7	14	21	28	35	42	49	56	63	70	77	84

The idea is then for children to highlight the squares where they can rapidly recall the answer – the squares which aren't highlighted are then the calculations which the children have to focus to learn!

Eg. Vicky's grid: next she needs to learn only these 4 calculations.

Multiplicand	7	7	7	7	7	7	7	7	7	7	7	7
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product	7	14	21	28	35	42	49	56	63	70	77	84

Extension for those in UKS2:

These grids can be used in many other contexts. For instance:

- Substituting a whole number for a decimal in the multiplicand row.

Multiplicand	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product												

- Multiply by factors of 10, 100 or 1000.

Multiplicand	60	60	60	60	60	60	60	60	60	60	60	60
Multiplier	1	2	3	4	5	6	7	8	9	10	11	12
Product												

When to use 'One, 10, five… derive'

This can be used for any children who are confident with the concrete and pictorial aspects detailed above in steps 1 and 2. All they need to be able to do is multiply by 10, double/halve and add/subtract numbers of 12 and less (all KS1 objectives).

These should be explicitly taught in Maths lessons during our 'Mental Calculations' unit in the Autumn term. They can also be practised in EMA time or on Friday afternoon Maths for Year 3/4. Children should then be encouraged and reminded to use this method whenever needed!

TT Rockstars

Please continue to use the TT Rockstars website and app. It is excellent practise for all children, but will be most effective when used alongside the concrete and pictorial approaches detailed above.