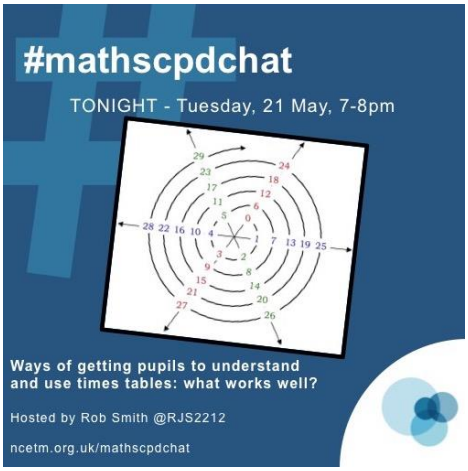
#mathscpdchat 21 May 2019

Ways of getting pupils to understand and use times tables: what works well?
Hosted by Robert Smith

This is a brief summary of the discussion – to see all the tweets, follow the hashtag ***#mathscpdchat*** *in Twitter*



Some of the areas where discussion focussed were:

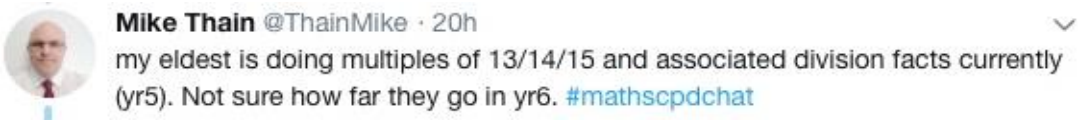
- that pupils **need to know multiplication facts when working in most areas of mathematics** … particularly when working with fractions, ratios and proportion … that pupils with fluent knowledge of times tables can venture into interesting areas of mathematics with more confidence than those without it;
- that **real fluency** combines deep conceptual understanding with an ability to recall accurately and rapidly;
- the **value of parents and carers supporting their children** in learning multiplication facts outside the classroom;
- that **tests of times-tables-knowledge** can be structured in a way that supports conceptual and relational understanding;
- using a **1-to-10 by 1-to-10 multiplication grid**;

- the (largest) natural **numbers up to which it is necessary/appropriate for pupils to learn times tables** … for example whether pupils should be able to recall-instantly multiplication facts only to 10 × 10, or whether it is a significant advantage to learn them to 12 × 12, or to 15 × 15, or to 20 × 20, or to … and, if so, how it is an advantage;
- whether pupils' learning is best supported by **substituting 'multiply', 'multiplied-by' and 'multiplication' for 'times'** in, for example, 'times tables', 'what is 5 times 4?' or 'should I times 7 by 8?' … whether it is helpful for further/later learning (e.g. about factors and factorising) to talk about **'multiples of n'** rather than **'the n times table'**;
- developing pupils' awarenesses of the wide range of **'new known facts' that follow from knowledge of a single multiplication fact** … for example, if you know 9 × 6 = 54, you also know that 9 is a factor of 54, 1/6 of 54 is 9, 540 ÷ 6 is 90, and so on … from the fact that 12 × 12 = 144 it follows that 12 × 13 = 144 + 12 = 156 … that it is necessary to remember only 21 multiplication facts in order to know/derive all the multiplication facts from 1 × 1 to 10 × 10;
- **using knowledge of number-structure** to simplify the evaluation of some products … for example using the facts that × 8 is equivalent to × 2 × 2 × 2, and × 5 is equivalent to × 10 ÷ 2 … working out 7 × 9 as 7 × 10 – 7 = 70 − 7 = 63 … working out 97 × 74 as 100 × 74 − 3 × 74 = 7400 − 222 = 7178;
- representing multiplication facts (e.g. 9 × 8 = 72) using **visual images**, for example as **arrays of dots or as rectangles on a square grid** … the kinds of product for which this is less/not appropriate/helpful (e.g. 273 × 54) … 'grid multiplication' representations, with their potential to support pupils' understanding, and use of, the factorising of both numerical and algebraic expressions … other 'idiosyncratic' visual representations of products, including understanding why ('trick') methods work;
- **using a number stick** to help pupils learn times tables … e.g. using a number stick to learn the 17 times table, as demonstrated by Jill Mansergh in the ATM video 'Times Tables in 10 minutes' (link provided below);
- investigating sets of products **using Cuisenaire rods** … e.g. showing the 3 times table by arranging Cuisenaire rods systematically in 'staircases' of adjacent rows of rods;
- using **John Mason's interactive and infinite Number Grid** (which is one of his interactive Structural Variation Grids) as a powerful aid in learning times tables … for example by predicting/extending patterns … the empty cells invite pupils to anticipate, imagine and to conjecture, and to reason on the basis of properties they perceive (link provided below);

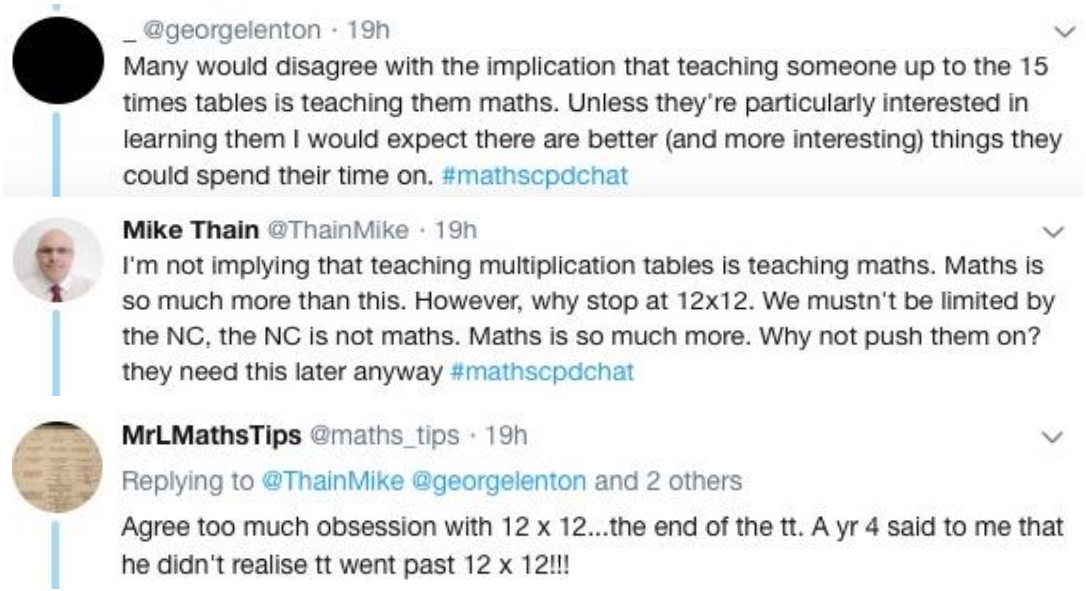
- **representing multiples so that they can be subitised** (recognised without counting) … e.g. 2 × 7 can be seen as 2 × 5 plus 2 × 2, which is easy to see as 10 plus 4, which is 14;
- multiplying numbers (expressed) in **bases other than base 10;**
- **Vedic methods** of multiplication.

In what follows, click on any screenshot-of-a-tweet to go to that actual tweet on Twitter.

This is part of a very long 'conversation' of tweets, about whether the ability to recall from memory, instantly and accurately, multiplication facts beyond 10 × 10 = 100, is, or is not, a desirable achievement in relation to mathematical learning. The conversation was generated by this tweet from Mike Thain:



including these from George Lenton, Mike Thain and MrLMathsTips:



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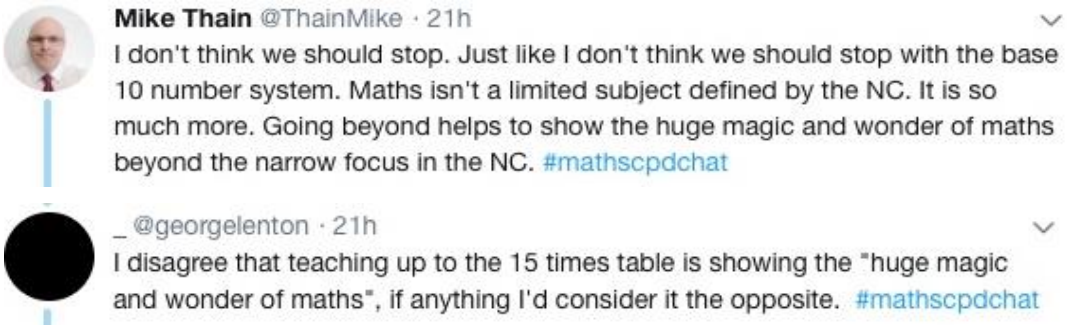
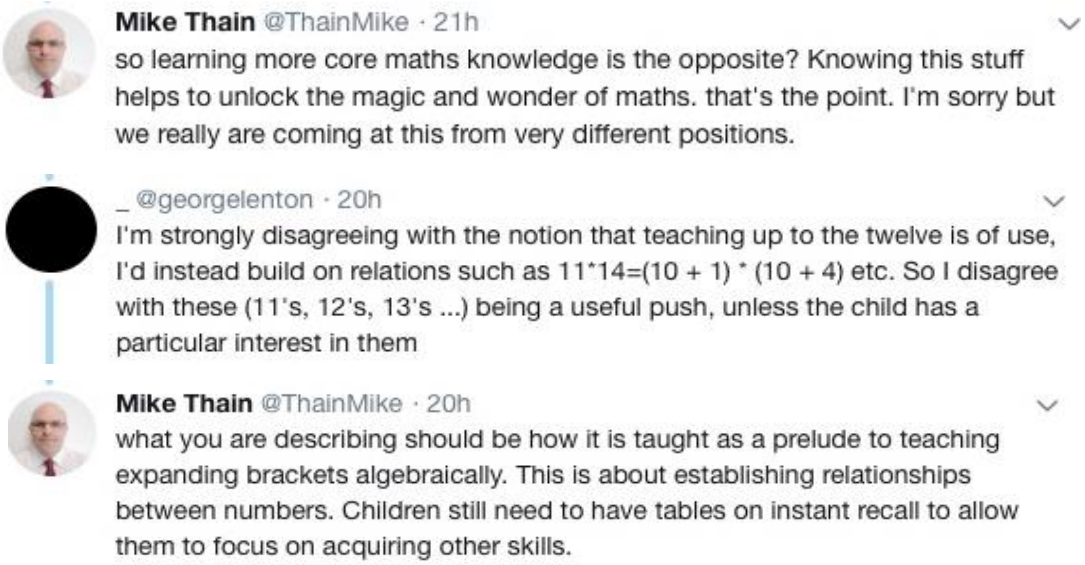
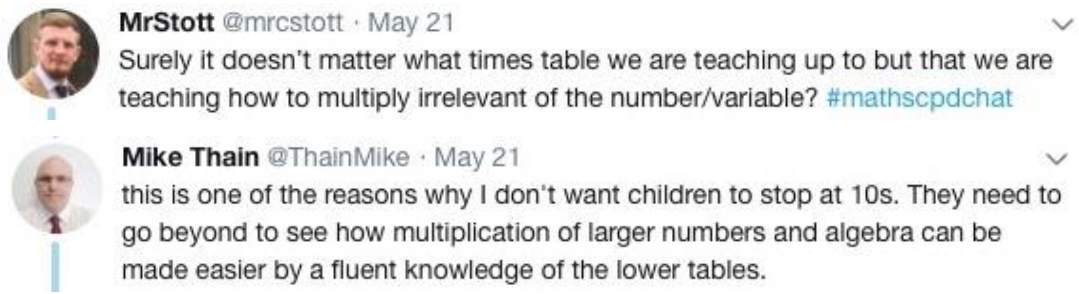


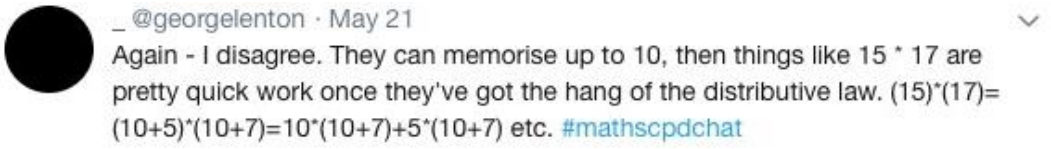
these from Mike Thain and George Lenton:



these from egtexts:

these from Mr Stott, Mike Thain and George Lenton:





and this from Robert Smith:

(to read the discussion-sequence generated by any tweet look at the 'replies' to that tweet)

Among the links shared were:

Tables with a Number Stick which is an ATM video in which Jill Mansergh uses a number stick to teach the 17 times table to a group of learners in less than 10 minutes! It was shared by Mr Allan

Number Grid (a Structured Variation Grid) which is a two dimensional interactive grid of cells devised by John Mason. Each cell has two parts, a form (p × q), and a result (the evaluated product of p and q). The visible grid can be thought of as a window onto an infinite grid extending in all directions. This resource can be used powerfully to explore multiplication facts when learners anticipate, imagine, conjecture and reason about what they see. It was shared by Mary Pardoe

Times Table Reasoning Activities which is a TES teaching resource in which pupils 'use known facts' in their reasoning to solve problems involving calculations. It was shared by Sharon Malley

Times Tables Quiz which is a manipulative from La Salle Education that enables the user to generate a times-tables-quiz by selecting the times tables to be tested and the number of questions to be in the quiz. It was shared by Robert Smith

Kenny's Pouch: Times Tables which is a collection of resources from Kangaroo Maths which are designed 'to improve pupils' recall of the multiplication and division facts up to 12 × 12'. It was shared by Steve L

Regarding times tables tests: a plague on both your houses! which is a blog by Tim Stirrup in which he discusses reasons for his suggested format for low stakes, ‘personalisable’ tests of pupils’ knowledge of multipliation facts. It was shared by Tim Stirrup

TTRockStars tools which are interactive applets designed to help learners understand and use multiplication tables. It was shared by Baz Wynter

Times Tables Rock Stars (TTRockStars) which is a ‘carefully sequenced programme of daily times tables practice’, in either paper form or online. It was shared by Baz Wynter

Strategies for learning, understanding and remembering the times tables which is a maths blog by Mr Reddy about how pupils might be taught to be able to recall any multiplication fact up to 12 × 12 = 144 in less than 3 seconds. It was shared by Baz Wynter

'Can Do Maths' Resources and Links which is a collection of resources including *CanDo21: Helping students understand the 21 key facts of the times tables*. It was shared by Steve L

Spot On With Numbers which is a teaching aid in which pegs are placed in pegboard-constructions; these materials can be used to aid exploration of multipliation facts. It was shared by Spot On With Numbers