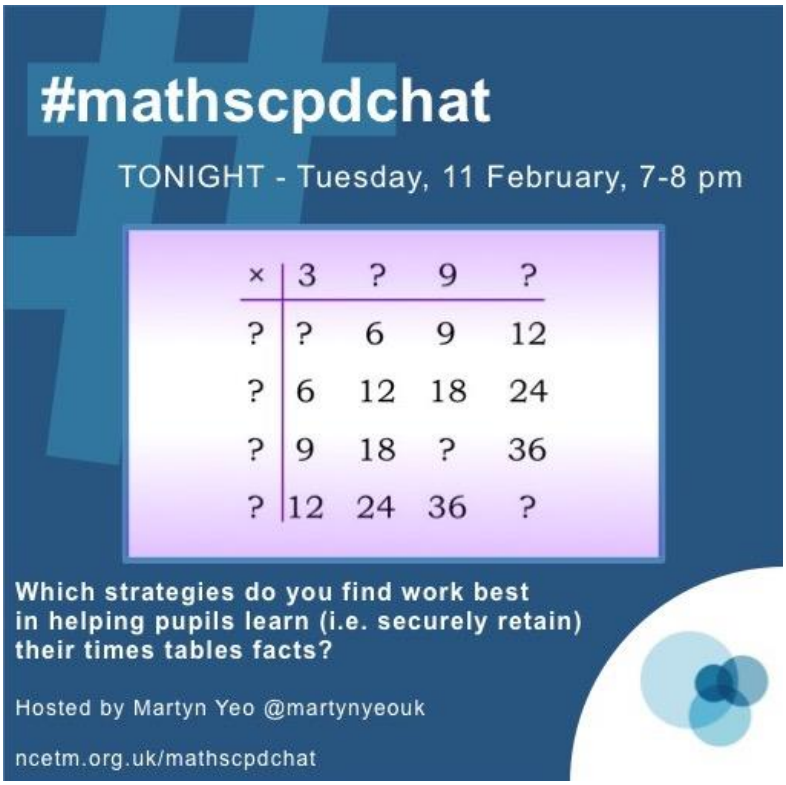
National Centre for Excellence in the Teaching of Mathematics

#mathscpdchat 11 February 2020

Which strategies do you find work best in helping pupils learn (i.e. securely retain) their times tables facts?

Hosted by Martyn Yeo

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:

the host tweeted a poll about **participants' own knowledge of times-tables facts**:

- 75.6% … fully secure;
- 22% … partially secure;
- 2.4% not secure;

- some participants had originally learned times-tables facts by **repeated 'chanting'**, and believed that learning the facts in that way had **not got in the way of acquiring deeper understanding** … some participants regretted that when they were very young they did not learn their times tables by rote;
- some participants only **became fully secure in times-tables knowledge after becoming maths teachers**;
- one participant **still used their finger**s to find facts in the 9-times table;

how to interpret 'knowing' times-tables facts, and **why it is important for pupils to be able fluently to recall them**:

- that 'being able to recall the facts quickly' is an important skill because it **facilitates mathematical actions**, such as factorising quadratic expressions;
- that pupils should be expected to be able to recall times-tables facts fluently **before starting secondary school;**
- that achieving 'times-tables fluency' **gives pupils confidence**, and enables them to start **reasoning multiplicatively more widely**;
- that achieving 'times-tables fluency' requires **'practice, practice, practice'**;

how to **support pupils** in learning times-tables facts:

- how to help **post-16 students** who don't know their times tables … what are appropriate/effective approaches as students get older … that it is difficult to motivate older students (who habitually use calculators) to learn times-tables facts 'from scratch' … using links between times tables (such as working out n × 8 using knowledge of n × 2 or n × 4) … getting-to-know all the factors of particular numbers, such as 24 … using a two-way chart showing all times-tables facts from '1 × 1 = 1' to '12 × 12 = 24', cutting-it-up into 'jigsaw-pieces' and challenging students to fit them together … challenging students to solve puzzles, such as Tarsia and Yohaku puzzles (links below);
- pointing out to 'reluctant learners' **every time that knowing a times-tables fact is useful**;
- playing **whole-class 'Countdown-style' games**;
- providing pupils with **'varied exposure'** to times tables … via, for example, repetition of facts ('chanting'), multiple representations including images, application during problem solving;
- that research suggests that **computer-based times-tables practice** is more effective than pencil and paper practice;
- pupils learning to **find unknown products using times-tables facts that they know** (for example working out 12 × 7 = 84 as 10 × 7 + 2 × 7 = 70 +14) …

challenging pupils to find, and encouraging them to make use of, **equivalent products** (such as 6 × 10 and 12 × 5);

- **providing opportunities** for pupils to show times-tables facts in their own pleasing and original ways (for example by creating their own images or 'lay outs of manipulatives');
- aiming for pupils not only to **know by heart multiplication facts**, but also to learn (gain deeper understanding) by **exploring them in relation to each other** … discerning relationships and implications by looking at all the times tables facts they know together;

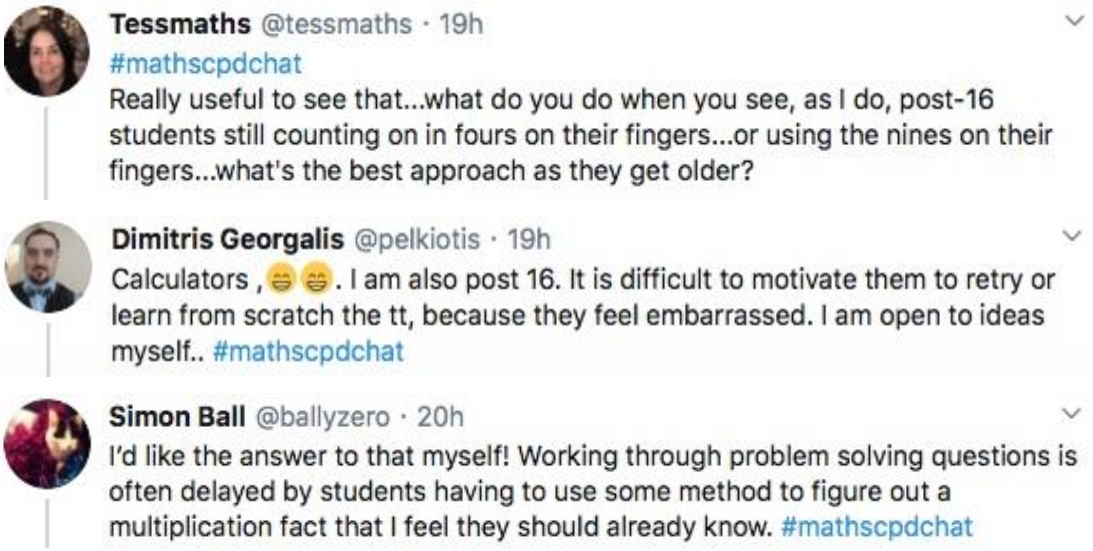
strategies that failed to help pupils learn their times tables:

- sending a 'challenging' group outside to '**shout tables facts at objects in the playground**'!!!

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

This is a part of a conversation about how best to support older, post-16, students who have not yet learned most times-tables facts. The conversation was soon generated by this tweet from Martyn Yeo:

and included these from Mary Pardoe, Tessmaths, Dimitris Georgalis and Simon Ball:



these from Tim Stirrup, Mars @ MarsMaths #FE, Alison Hopper and Simon Ball:

these from Mary Pardoe and Tessmaths:

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110		
12	0	12	24	36	48	60	72	84	96	108	120		

Tessmaths @tessmaths · Feb 11

Lovely ...
I like the maths drills frenzies where they are all muddled up...requires thinking
math-drills.com/multiplication..
and the ones up to 15 times table...
#mathscpdchat

×	6	8	7	4	10	2	3	9	5	12
2	12	16	14	8	20	4	6	18	10	24
11	66	88	77	44	110	22	33	99	55	132
6	36	48	42	24	60	12	18	54	30	72
8	48	64	56	32	80	16	24	72	40	96
5	30	40	35	20	50	10	15	45	25	60
12	72	96	84	48	120	24	36	108	60	144
7	42	56	49	28	70	14	21	63	35	84
3	18	24	21	12	30	6	9	27	15	36
9	54	72	63	36	90	18	27	81	45	108
10	60	80	70	40	100	20	30	90	50	120

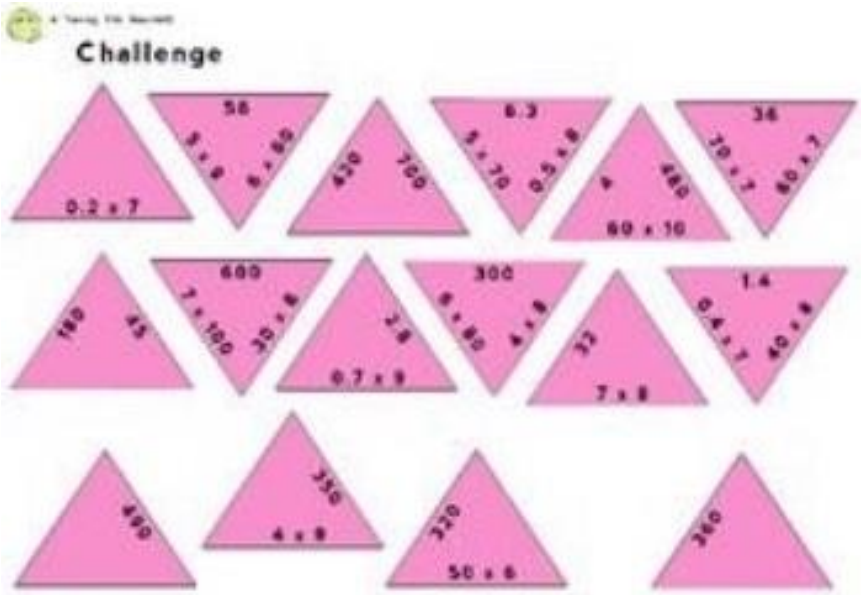
these from Mars @ MarsMaths #FE and Martyn Yeo:

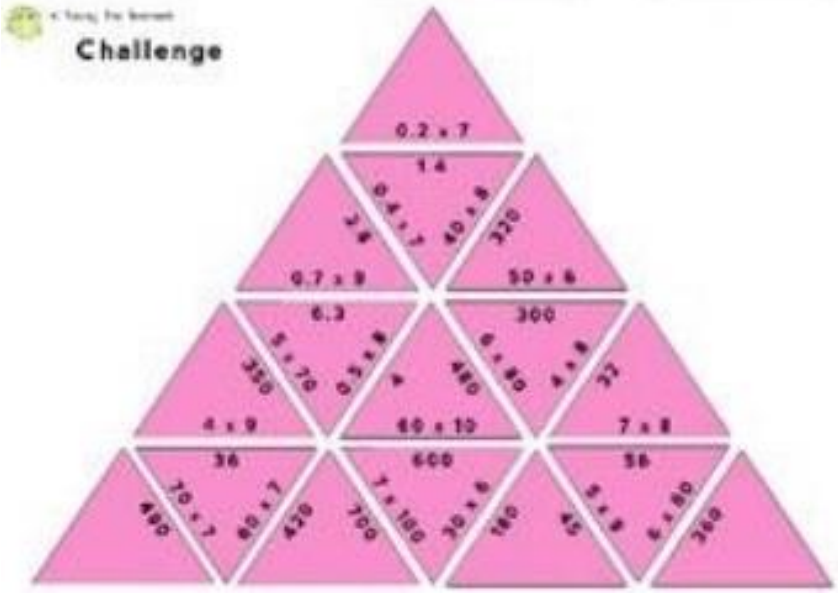
Mars @ MarsMaths #FE @MarsMaths · Feb 11

Replying to @PardoeMary @martynyeouk and 6 others
Also, Tarsia puzzles for specific timestables??? #mathscpdchat

Martyn @martynyeouk · Feb 11
What are they? #mathscpdchat

Mars @ MarsMaths #FE @MarsMaths · Feb 11
They look like the one below, made in different shapes and can be created using a free software, called Tarsia.





Mars @ MarsMaths #FE @MarsMaths · 19h
Replying to @martynyeouk @CentralMathsHub and 4 others
Replying to
@martynyeouk
Think it has to be a combination of strategies rather than just one. Repetition of facts, visual representation, application, reasoning, problem-solving, etc - in other words: varied exposure to timestables #mathscpdchat

and these from Robert J smith and Martyn Yeo:

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

Among the links shared were:

Mr Yeo's Maths Mastery: Times Tables Playlists which is a varied collection of resources to aid the learning of times tables. It is part of *Mr Yeo's Maths* which has been created on YouTube by Martyn Yeo. It was shared by Martyn Yeo

What is Fluency In Maths at Primary School and How to develop it at KS2 which is a *Third Space Learning* blog by Rebecca Jakes. It gives a definition of what fluency is and means, including in using times-tables facts, and what fluency looks like within a mastery curriculum. It was shared by Martyn Yeo

Hit the Button which is a free interactive times tables game. The player selects a times table. Then the player has to 'hit' the product (from those displayed) that gives a number that appears (at the bottom of the screen). It was shared by Martyn Yeo

Times Tables is an interactive 'teaching-tool' from Complete Maths. The user selects a times table and the number of questions, and so creates a quiz in which the question style varies: the user may be challenged to complete a times-tables statement, decide which multiplication fact is represented by a rectangular array of dots, or shade part of a square grid to represent a given product. It was shared by Robert J Smith

NCETM Primary Mastery Materials: Spine 2 Multiplication and Division which provides comprehensive guidance and support for teachers. The *Multiplication and Division* spine is presented in 30 segments, for each of which there is a detailed teacher guide, including text and images. The images are also presented as animated PowerPoint slides that can be used in the classroom. It was shared by Mary Pardoe

You Can't Do Simple Maths Under Pressure which is an interactive resource in which the user clicks the number (selected from those displayed) that is the result of a displayed arithmetical operation (such as '5 - 3' or '4 × 5' at 'level 1' of 10 increasingly demanding 'levels'). It was shared by Tessmaths

Funkey times tables cards which is a website from where you can obtain a pack of 59 colourful Funkey cards (each showing a number and its factors), and simple instructions that explain how the times tables cards work and all the maths games that can be played with them. The instructions also give the meanings of some relevant mathematical words such as 'product', 'factor' and 'prime'. It was shared by Tessmaths

Five Minute Multiplying Frenzy which is the Multiplication Worksheets Page at *Math-Drills.com*. From there you can downdoad 'empty' two-way multiplication grids for students to complete in which the numbers to be multiplied (along the top and down the left-hand side) are in different random orders on each grid. Solution (completed) grids are also provided. It was shared by Tessmaths

Jill Mansergh - Tables with a Number Stick which is a video from the *Association of Teachers of Mathematics (ATM)*. Jill Mansergh uses a number stick to teach the 17 times table in less than 10 minutes. Jill demonstrates a fascinating and powerful mathematics teaching strategy that can be adapted to any times table. It was shared by Mary Pardoe

Learning and Assessing Times Tables is one of the *Espresso* articles from *Cambridge Mathematics w*hich present current reliable research findings about various aspects of mathematics teaching and learning. In this issue Lucy Rycroft-Smith considers the evidence for learning times tables and how we might test pupils on them. It was shared by Mary Pardoe

Tables Cubes which is a set of ingenious cubes designed by Jon Millington, with which students can practice times tables in a different and active way! It was shared by Heather Massey

4 minute times tables tests - done differently! which is a format of times tables tests that takes only 4 minutes for a whole class, introduces some differentiation, and that also helps pupils learn the times tables as they take the test. It was shared by Tim Stirrup

Regarding times tables tests: a plague on both your houses! which is a blog by Tim Stirrup. It was shared by Tim Stirrup

9 times table plus which is a video in which Tim Stirrup demonstrates how to extend the well-known ‘fingers’ method of doing the 9 times table for products greater than 10 × 9. It was shared by Tim Stirrup

CanDo21 are resources (including PDF files for the teacher, a poster, tetrahedrons and a class pack of stickers) to support students’ learning that if they know the 2, 5 and 10 times table there are only 21 other facts that they need to know, and what those facts are. It was shared by Steve LMMXX

Times Tables Target Circles Worksheets which are worksheets from *Math-Aids.Com* for testing students’ knowledge of the times tables using target circle puzzles. It was shared by Mars @ MarsMaths #FE

Yohaku: A New Type of Number Puzzle which are additive or multiplicative puzzles in which the task is to fill in the empty cells so that they give the sum or product shown for each row and column. It was shared by Yohaku

Yohaku: 3-by-3 multiplication puzzles which are multiplicative puzzles in which the task is to fill in the empty cells so that they give the product shown for each row and column. It was shared by Pierre Tranchemontagne