Knowledge Organiser: Teaching Multiplication Tables in Year 3 & 4

Sarah SquarEd
Leading Learning in English & Mathematics

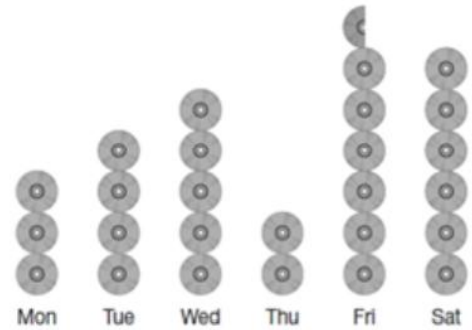
Multiplication

A multiplication has three parts:

	1 3	Multiplicand	Number which is multiplied by another number.
x	6	Multiplier	The number of times the multiplicand is to be multiplied.
	7 8	Product	The result of the multiplication

It's as easy as …
F F P

This pictogram shows how many DVDs a shop sells in one week.



On **Monday**, 24 DVDs were sold.

How many DVDs were sold on **Friday**?

MTC Outcomes 2024 Headlines

Average attainment score
20.6
An increase of 0.5 since 2023

▶ National average score

Percentage of eligible pupils scored 25 marks
34%
This is the most common mark (full marks)

- **34% of eligible pupils scored 25 marks**, an increase of 4 percentage points compared to 2023 from 29%.
- Of eligible year 4 pupils, **96% took the multiplication tables check**, the same as in 2023. Among **the 4% of pupils who did not take the check**, most of these pupils were working below the level of the assessment.
- **Disadvantaged pupils performed less well** in the multiplication tables check than other pupils. The average attainment score of pupils who took the check increased for disadvantaged pupils from 18.3 to 18.9, and for non-disadvantaged pupils from 20.9 to 21.3.
- **Boys continue to perform better than girls**, both groups improved by 4% so the gap remains
- The percentage of eligible pupils who achieved 25 marks increased by 3 percentage points for pupils with **SEN support from 13% to 16%.** For pupils with an **Education and Health Care plan, this increased by 1 percentage point from 7% to 8%** compared to 2023.



Our data is indicating …

Mathematics Research Review

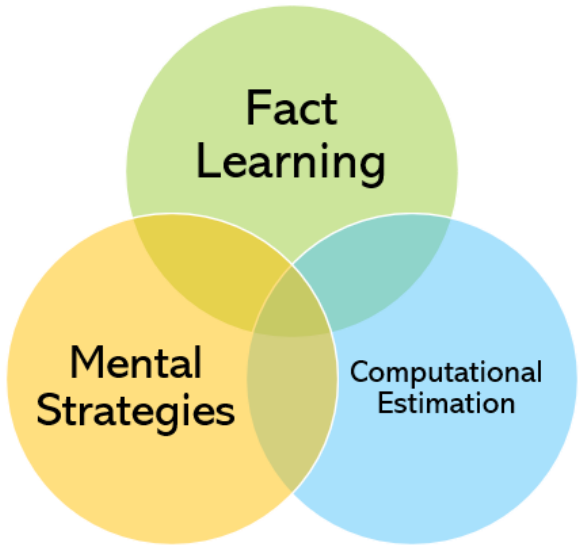
- Classifying mathematical content into three core 'themes' … with extras!

Declarative Knowledge	*"I know that…"*	Rules, facts, principles
Procedural Knowledge	*"I know how…"*	Methods, procedures, steps
Conditional Knowledge	*"I know when…"*	Apply the right 'bits', reason, problem solve
	"I know why…"	Exploration of how structures work using representations and manipulatives. Make generalisations using what they have found out.

What are the national expectations?

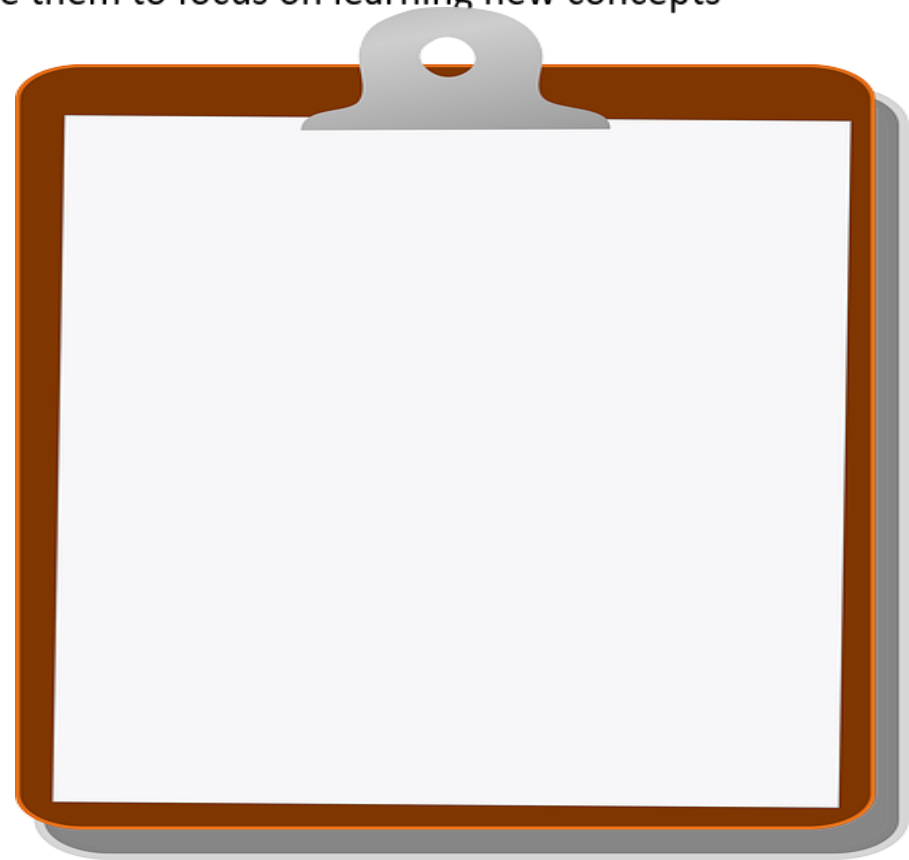
- Pupils should be able to **choose** and **use efficient calculation methods** for addition, subtraction, multiplication and division.
- They must also have **automatic recall of a core set of multiplicative and additive facts** to enable them to focus on learning new concepts

Arithmetical fluency relies on …



Conceptual and Procedural Knowledge

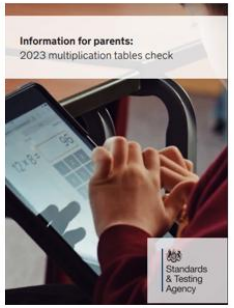
- Repeated addition
- Commutivity
- Inverse
- **Number families**
- **Skip counting**
- **Instant recall**
- **Derived facts – 'super-size' & 'super-skinny'**
- Multiple representations – arrays, PV counters, grids, Cuisenaire, number line
- ***Standard written method***



MTC Guidance Documents

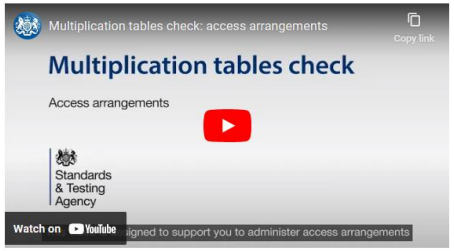
- **MTC: A Guide for Parents**
- *MTC: Administration Guidance – Live web pages*
- **KS2 ARA – MTC Section**

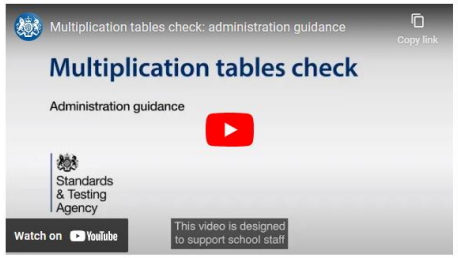
https://www.gov.uk/government/collections/multiplication-tables-check











Preparing for the MTC ….

Access arrangements may be appropriate for pupils with specific needs who require additional arrangements so they can take part in the MTC. This includes pupils:

- with an education, health and care (EHC) plan
- with special educational needs and disabilities (SEND), and who have related provision and support in school
- whose learning difficulty or disability significantly affects their ability to access the check
- who have behavioural, emotional or social difficulties
- with English as an additional language (EAL) and limited fluency in English

Schools do not need to request permission to use access arrangements. However, the support given should be based on normal classroom practice and must never advantage pupils.

What access arrangements are available?

- Colour contrast
- Font size
- Pause ‘next’ button
- Remove on screen number pad
- Input assistance
- Audio version
- Audible time alert
- Additional time



Who may need access arrangements?

How important are tables?

- ✓ Facility with times tables is needed in order to perform higher-order mathematical processes efficiently (Westwood. 2003)
- ✓ Building block for procedural knowledge
- ✓ ***Learning tables doesn't mean that a pupil will be good at later mathematics***
- ✓ Working memory alongside reasoning increases the transition into long term memory

3 x 4 =

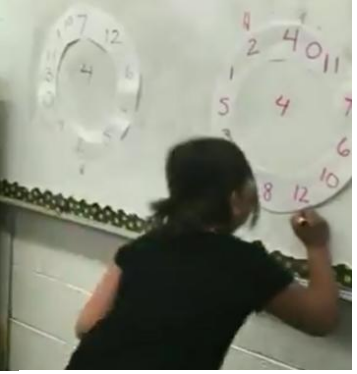
4 three times **OR** 3 four times?

NCETM TRG - What worked?

- Clear expectations – make it matter; make it fun!
- Have a class '*table of the week*' – overview of what is taught and when
- Counting stick work
- Chant – rolling numbers, songs etc
- Set practice challenges – 'Do now'
- Understand the effect of 1x and 0x – automatic
- Make connections – doubling
- Inverse and derived facts

Learn	Rehearse	Recall	Play & apply	Assess
• Map of facts • Order that we teach it • **Frequency** of teaching • Structure to session	• Skip counting • Rote recall - chanting • Spot patterns/ make links • 0x 1x	• 'Do now' tasks – progression • Weekly quizzes • APPs and games • Flashcards	• SAT style questions • Edited multiplication grids • Derived facts – rules of divisibility	• Exit tickets • Arithmetic tests • Inverse/mixed practice • MTC practice

Counting | Structured Teaching | Repeated Practice | Connect/Apply It



What facts do you already remember?	Which are harder to remember? Why?
8x	
How can we remember the tricky ones?	Can we use other facts to help?



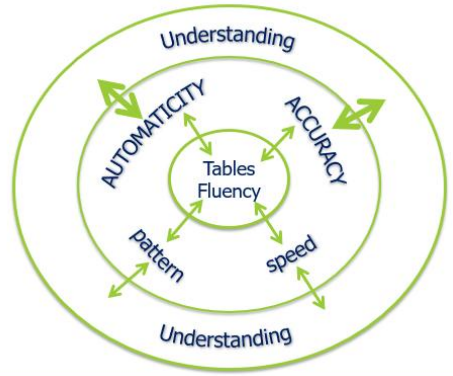
The five ways to help children learn key facts ...

- **Kinaesthetic** - this involves memorising through movement, learning by matching facts to specific ways of moving, such as finger counting or action sequences.
- **Visual** - some children have a good visual memory, and can 'see' facts on the page or on the board. Flash cards can be helpful, as can visual representations of the facts in question.
- **Aural** - some children remember things by 'hearing' them repeated. Chanting the sequence of numbers, or the number facts in order can be useful strategies for such children, as can matching facts to rhymes, songs or music.
- **Written** - writing something can help the facts to travel from the pen to the brain! Children can also see how the facts connect together when they are presented in written form.
- **Pattern** - some children find it much easier to recall facts when they understand the structure of patterns in which they are embedded.

A pathway for teaching tables...

- Don't confuse the 'learning' with the rehearsal and recall!

- Seeing the table in focus 'build' from 1x
- Array arrangements to visualise
- Explore '0' groups
- Skip counting (fingers / counting stick)
- Create 'fact cards'
- Repeated rehearsal – don't rush to out of order and speed rounds!
- Revisit to keep fresh!



X	0	1	2	3	4	5	6	7	8	9	10	11	12
4													

0 x 4 = 4 x 1 =	4 x 0 = 1 x 4 =	0 ÷ 4 = 4 ÷ 1 =			
4 x 2 = 2 x 4 = 8 ÷ 2 = 8 ÷ 4 =	4 x 4 = 16 ÷ 4 =	4 x 8 = 8 x 4 = 32 ÷ 4 = 32 ÷ 8 =	4 x 3 = 3 x 4 = 12 ÷ 3 = 12 ÷ 4 =	4 x 6 = 6 x 4 = 24 ÷ 4 = 24 ÷ 6 =	4 x 12 = 12 x 4 = 48 ÷ 4 = 48 ÷ 12 =
4 x 5 = 5 x 4 = 20 ÷ 4 = 20 ÷ 5 =	4 x 10 = 10 x 4 = 40 ÷ 4 = 40 ÷ 10 =		4 x 7 = 7 x 4 = 28 ÷ 4 = 28 ÷ 7 =	4 x 9 = 9 x 4 = 36 ÷ 4 = 36 ÷ 9 =	4 x 11 = 11 x 4 = 44 ÷ 4 = 44 ÷ 11 =

DEPTH LEARNING



TABLES STICK

1, 2, 3… Counting is key

- Counting starts before pupils are beginning to develop understanding and reasoning (stable order principle)
- Times tables can be counted through sequentially at speed
- Exploit links to manipulatives
- Fingers can be used to count through any multiplication table quickly
- Move to chanting – using the counting stick

Rolling numbers

'We practise times tables through rolling numbers (call-and-response chanting the times tables while counting off on our fingers as we go). The physical movement combined with the catchy chants help to energise the class, give us the chance to be loud in maths (that's a good thing) and ultimately support faster recall of the times tables.'

Memorising Tables

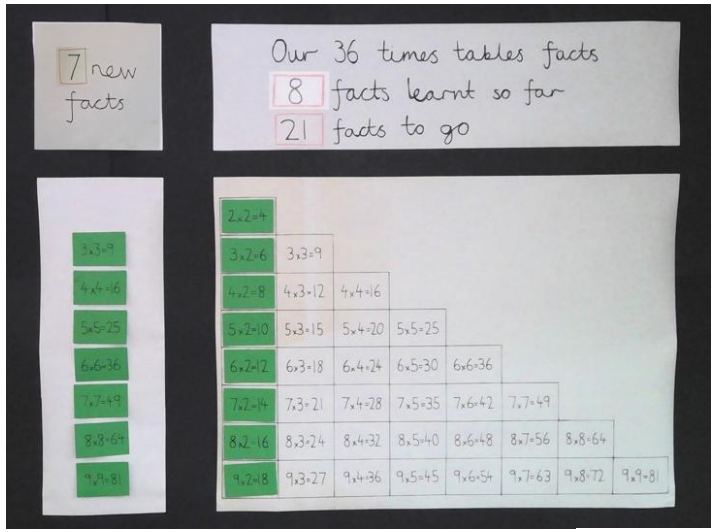
- Understanding commutivity leads to an easier route into memorising tables
- Use what you know!
- Make connections – 3x → 6x
- Subitising – linking skip counting to facts
- Daily practice of key facts

Memorising Tables: A Systematic Approach

- Fire just 1x#, 2x#, 5x# and 10x# first – most secure existing table facts
- Add in 3x#, 4x# - when step 1 is recalled frequently, correctly and with pace
- Build in 6x#, 7x# and 8x#
- Finally add 9x#, 11x# and 12x# - look at 10x then adjusting

x	2	3	4	5	6	7	8	9	11	12
2	4	6	8	10	12	14	16	18	22	24
3		9	12	15	18	21	24	27	33	36
4			16	20	24	28	32	36	44	48
5				25	30	35	40	45	55	60
6					36	42	48	54	66	72
7						49	56	63	77	84
8							64	72	88	96
9								81	99	108
11									121	132
12										144

19 facts to learn in Y2 21 facts to learn in Year 3 15 Facts to learn in Year 4

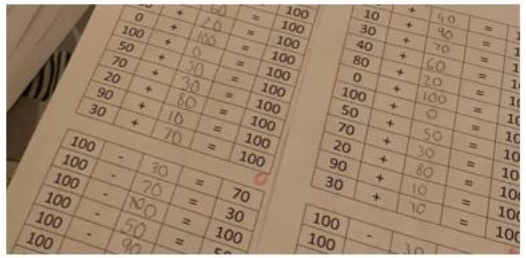


Number Sense Maths

'Do now' Recall Tasks …

Resources to support retrieval of core facts

- Repetitive recall – beat your own time



- Flashcards – what works in phonics …
- Gareth Metcalfe – twitter/website www.iseemaths.co.uk
- https://www.bosburyprimaryschool.co.uk/Curriculum/The-99-Club/
- www.candomaths.org

Edit it! **Remember it!** **Signpost it!**

‘We need to be explicit with **how** to learn, **what** to learn and to create **contexts to over-learn**, repeat and practise’

(Camden Primary Partnership Teaching School Alliance, 2017)

Memorisation through songs and rhymes

- **Aural** - some children remember things by 'hearing' them repeated. Chanting the sequence of numbers, or the number facts in order can be useful strategies for such children, as can matching facts to rhymes, songs or music.



https://www.youtube.com/playlist?list=PLU00esrkogUlR9VQzGPf_RT4CUTCP9OO9



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The ‘when’ and the ‘how’ …

Teach Up

Mathematics Lessons

Intelligent Practice

Linger Longer

Maths On Track Meetings

Deliberate Practice

Longer Lasting

Keep Up

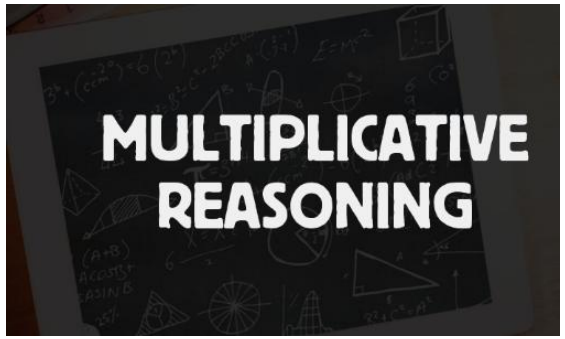
Secure and Sustainable Progress

- **Counting stick work**
- **Chant** – rolling numbers, songs etc
- Flashcard work – SPECIFIC
- Set **practice challenges** – ‘Do now’, recall tasks, tables grids
- Understand the effect of 1x and 0x – automatic
- **Make connections** – doubling
- **Apply** – SAT style questions, games etc
- **Rhymes to remember** – not necessarily linked to the table!
- Inverse and derived facts

Whole school key messages:

- A broad understanding of what fluency is, is critical to embed deep and permanent learning
- There are routines and strategies established that help children to memorise key facts
- A clear message that 'remembering stuff matters' is embedded in school culture
- A suite of simple routines and activities are needed to develop reasoning about multiplication facts, **alongside** the expectation of fluent recall

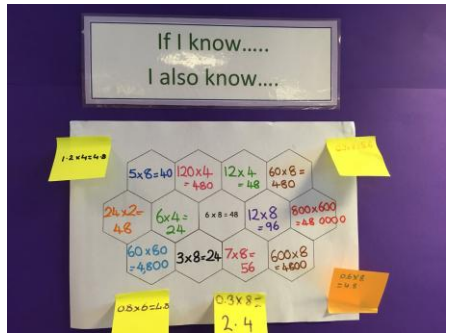
If we can achieve …



- *Proficiency in recall of tables*
- Unitising
- Multiplication as EQUAL groups
- Multiplication as repeated addition
- Using arrays to explore multiplicative laws
- Introducing the symbol
- Developing calculation methods – mental and written

In conclusion …

' …children who were truly fluent didn't just know the core facts, they knew ***what these facts unlocked***, how to use and apply them and could articulate what they were doing'







Day Two

Wednesday 24th April 2024

3.45pm – 5pm

Zoom Training (Remote)

My actions as a result of this CPD are to …

1

2

3

***Return to Mathematics SL by the end of this week**