

# Times Tables

OCTOBER 2023



How well do you know your numbers?

# How did you learn times tables at school?

- ▶ Have you learned your times tables?
- ▶ Did you once learn them and have subsequently forgotten them?

# National Curriculum

Expectations for times tables for each year group:	
Year 1	Count in multiples of 2, 5 and 10. Recall and use all doubles to 10 and corresponding halves.
Year 2	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
Year 3	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
Year 4	Recall and use multiplication and division facts for multiplication tables up to 12x12.
Year 5	Revision of all times tables and division facts up to 12x12.
Year 6	Revision of all times tables and division facts up to 12x12.

## White Rose Maths

Planning follows the national curriculum.

Year 2 (2, 5 & 10) Spring Term

Year 3 (3, 4 & 8) Autumn Term

Year 4 (6, 7, 9, 11 & 12) Autumn Term

# Multiplication in Key Stage 1

- ▶ Concrete resources
- ▶ Visual representations- arrays
- ▶ Reinforcing the relationships in multiplication

# The teaching of times tables

- ▶ Understanding multiplication & times tables as two closely linked, **but separate**, things
- ▶ In KS1, having a clear understanding of the process of multiplication & its structure without actually knowing times tables by heart

# Lower Key Stage 2 (Years 3 & 4)

- ▶ By the end of Year 4, children need to recall all times table facts up to  $12 \times 12$
- ▶  $9 \times 9$  or  $12 \times 12$ ?

# Why learning times tables is important

## Research: Daniel Willingham: reducing cognitive load

**TB:** In the UK there is currently a long debate about need for children to memorise multiplication tables, and a variety of arguments against it. 'Why up to 12? We have calculators. It's harmful/kills their love of mathematics...' etc.

**DW:** I find [this] very puzzling. There's an enormous amount of research indicating that students that don't memorise maths facts have a much harder time with mathematics further down the line. That work started in the '60s and '70s, and by the time the US National Maths Panel issued its report in 2008 there was really a great deal of evidence that they were able to draw on, so I find that

report very useful, and I hope it's part of the debate in the UK. I don't think there's much question that kids succeed in mathematics at a much higher rate if they memorise maths facts as part of the curriculum. In terms of it being boring: it certainly has the potential to be boring and I think that making it interesting and fun is challenging because it's so repetitive – doing things to the point of automaticity is going to be repetitive. So yeah, that requires ingenuity and creativity on the part of the teachers. It doesn't strike me as inevitable that it's going to be a miserable experience and it's going to kill the love of mathematics. I think many teachers would know better than I would how you make this sort of thing more fun and interesting.

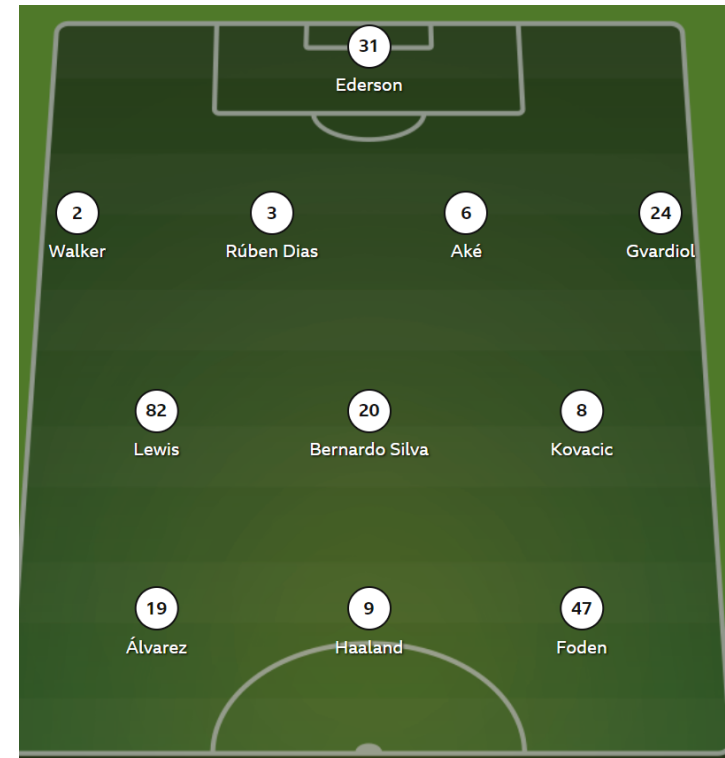
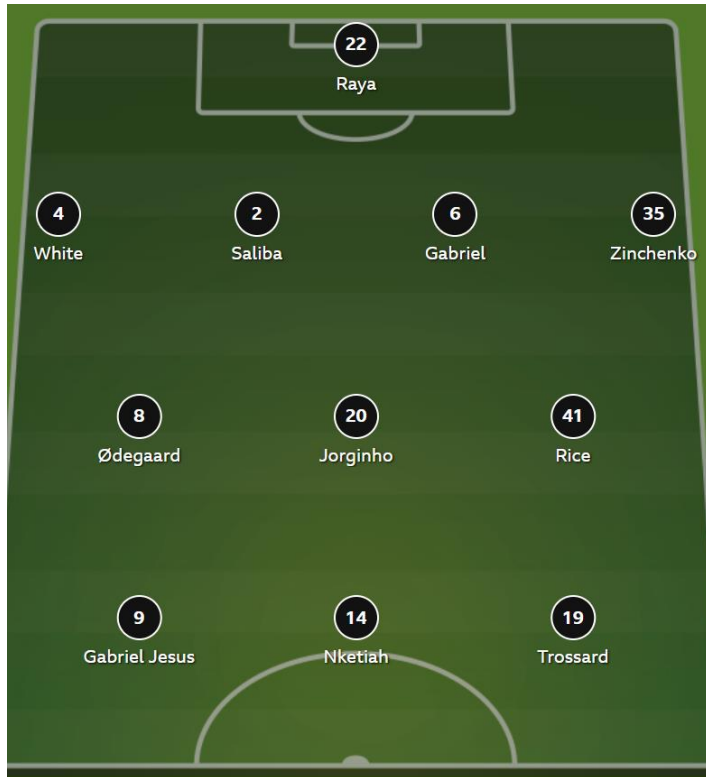
Willingham also discusses 'cognitive load'. If information is in our long term memory (e.g. multiplication facts), then problem solving using these facts will require less of a 'cognitive load' (essentially less brain power) than if these facts are only in our short term memory.

# Links between maths ability, confidence and knowledge of times tables

- ▶ Children who find maths difficult CAN learn their times tables

# How & why we learn (retain) information

- This week's line up for the Arsenal v Man City game



# How you knew the answers to the opening exercise

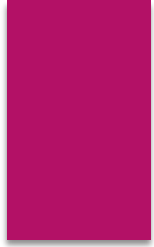
- ▶ How we can learn times tables
- ▶ Songs & Dances
- ▶ Mnemonics
- ▶ Favourites
- ▶ We need to learn a fact- an association
- ▶ Rice Krispies- who's the third member?
- ▶ Times tables- what's the third number in this multiplication fact?

8 x 6 =

# There aren't that many facts to learn

- Don't make things daunting with traditional times tables posters

<b>Times 1</b> 1 × 1 = 1 2 × 1 = 2 3 × 1 = 3 4 × 1 = 4 5 × 1 = 5 6 × 1 = 6 7 × 1 = 7 8 × 1 = 8 9 × 1 = 9 10 × 1 = 10 11 × 1 = 11 12 × 1 = 12	<b>Times 2</b> 1 × 2 = 2 2 × 2 = 4 3 × 2 = 6 4 × 2 = 8 5 × 2 = 10 6 × 2 = 12 7 × 2 = 14 8 × 2 = 16 9 × 2 = 18 10 × 2 = 20 11 × 2 = 22 12 × 2 = 24	<b>Times 3</b> 1 × 3 = 3 2 × 3 = 6 3 × 3 = 9 4 × 3 = 12 5 × 3 = 15 6 × 3 = 18 7 × 3 = 21 8 × 3 = 24 9 × 3 = 27 10 × 3 = 30 11 × 3 = 33 12 × 3 = 36	<b>Times 4</b> 1 × 4 = 4 2 × 4 = 8 3 × 4 = 12 4 × 4 = 16 5 × 4 = 20 6 × 4 = 24 7 × 4 = 28 8 × 4 = 32 9 × 4 = 36 10 × 4 = 40 11 × 4 = 44 12 × 4 = 48
<b>Times 5</b> 1 × 5 = 5 2 × 5 = 10 3 × 5 = 15 4 × 5 = 20 5 × 5 = 25 6 × 5 = 30 7 × 5 = 35 8 × 5 = 40 9 × 5 = 45 10 × 5 = 50 11 × 5 = 55 12 × 5 = 60	<b>Times 6</b> 1 × 6 = 6 2 × 6 = 12 3 × 6 = 18 4 × 6 = 24 5 × 6 = 30 6 × 6 = 36 7 × 6 = 42 8 × 6 = 48 9 × 6 = 54 10 × 6 = 60 11 × 6 = 66 12 × 6 = 72	<b>Times 7</b> 1 × 7 = 7 2 × 7 = 14 3 × 7 = 21 4 × 7 = 28 5 × 7 = 35 6 × 7 = 42 7 × 7 = 49 8 × 7 = 56 9 × 7 = 63 10 × 7 = 70 11 × 7 = 77 12 × 7 = 84	<b>Times 8</b> 1 × 8 = 8 2 × 8 = 16 3 × 8 = 24 4 × 8 = 32 5 × 8 = 40 6 × 8 = 48 7 × 8 = 56 8 × 8 = 64 9 × 8 = 72 10 × 8 = 80 11 × 8 = 88 12 × 8 = 96
<b>Times 9</b> 1 × 9 = 9 2 × 9 = 18 3 × 9 = 27 4 × 9 = 36 5 × 9 = 45 6 × 9 = 54 7 × 9 = 63 8 × 9 = 72 9 × 9 = 81 10 × 9 = 90 11 × 9 = 99 12 × 9 = 108	<b>Times 10</b> 1 × 10 = 10 2 × 10 = 20 3 × 10 = 30 4 × 10 = 40 5 × 10 = 50 6 × 10 = 60 7 × 10 = 70 8 × 10 = 80 9 × 10 = 90 10 × 10 = 100 11 × 10 = 110 12 × 10 = 120	<b>Times 11</b> 1 × 11 = 11 2 × 11 = 22 3 × 11 = 33 4 × 11 = 44 5 × 11 = 55 6 × 11 = 66 7 × 11 = 77 8 × 11 = 88 9 × 11 = 99 10 × 11 = 110 11 × 11 = 121 12 × 11 = 132	<b>Times 12</b> 1 × 12 = 12 2 × 12 = 24 3 × 12 = 36 4 × 12 = 48 5 × 12 = 60 6 × 12 = 72 7 × 12 = 84 8 × 12 = 96 9 × 12 = 108 10 × 12 = 120 11 × 12 = 132 12 × 12 = 144



2 x	5 x	3 x	4 x	6 x	7 x	8 x	9 x
2 x 2							
3 x 2	3 x 5	3 x 3					
4 x 2	4 x 5	4 x 3	4 x 4				
5 x 2	5 x 5						
6 x 2	6 x 5	6 x 3	6 x 4	6 x 6			
7 x 2	7 x 5	7 x 3	7 x 4	7 x 6	7 x 7		
8 x 2	8 x 5	8 x 3	8 x 4	8 x 6	8 x 7	8 x 8	
9 x 2	9 x 5	9 x 3	9 x 4	9 x 6	9 x 7	9 x 8	9 x 9
8 facts	7 facts	6 facts	5 facts	4 facts	3 facts	2 facts	1 fact

# Current position at Downsway

- ▶ White Rose planning structure
- ▶ TT Rockstars
- ▶ Times Table Test
- ▶ Attainment is inconsistent

# Multiplication Tables Check

- ▶ Summer Term Year 4
- ▶ 25 question test
- ▶ 6 seconds to answer each question, with 3 seconds pause between questions
- ▶ No pass mark
- ▶ Data compared locally and nationally

# Downsway MTC Data

score	2019 (trial)	2022	2023
25	13%	27%	19%
21+	37%	43%	31%
16+	60%	63%	72%
13+	93%	83%	88%
<13	7%	17%	13%

Mean score in 2023 was 18.4, compared to 2022 result of 18.5

# vs Local & National Data

KS2 – Year 4: Multiplication Tables Check	Downsway		West Berkshire		National*	
	2022	2023	2022	2023	2022	2023
	18.5	18.4	19.1	19.7	20.3	20.3

*\*=National figures are based on results from a limited number of LAs*

# A 'new' approach

- Systematic, whole class approach to learning the times tables.
- Aims to break down the learning of the times tables into manageable chunks learning a times table at a time.
- Importance of the commutative law and the relationship with division facts.
- Rote learning in which children learn the number facts AND a sound pattern (this is important).
- Minimise the number of sound bites
- Little and often - A two minute times table test, at least 3 times a week.
- 40 questions in each test. The children have two minutes to complete the test. An average of 3 seconds per question.

# Sound pattern

Stanislas Dehaene: verbal memory

*Exact arithmetic facts are stored in our verbal memory; saying (and hearing) the sound pattern of the phrase (e.g. seven threes are twenty one) is important.*

# In practice

- End of Key Stage 1: Children should have an understanding of multiplying as repeated addition.

e.g.  $7 \times 5$  using arrays to represent repeated groups. Understanding the commutativity of the fact.

Children should have a knowledge of the  $\times 2 - \times 5 - \times 10$  times table.

The Reality - No actual times table recall, until Summer term, when Maths Challenge is introduced. Children learn the 10 times tables.

- Year 3: Children become fluent in  $\times 2 - \times 5 - \times 3$  (Learn 21 facts)
- Year 4: Revising Year 3 content (inevitable summer holiday dip)

Children learn  $\times 4 - \times 6 - \times 7 - \times 8 - \times 9$  (Learn 15 facts)

$\times 11 - \times 12$  (Learn 21 facts)

# How we introduce a new times table

- It is important to highlight what the children already know as known facts (KF). Through the knowledge of commutative law they can really see even at this stage how much they already know.
- Write up the associated division facts alongside the times table facts so that the children can see the clear relationship between multiplication and division.
- Learn a fact at a time.
- Introduce times tables alongside another activity

Jill Mansergh – Tables with a number stick <https://www.youtube.com/watch?v=yXdHGBfoqfw>

Times table gym

TT Rockstars

# Key principles

1) Learn each number sentence as a memorised phrase by repeating the sound pattern out loud.

2) Learn each fact one way round only.

$4 \times 6 =$  becomes six fours are twenty four.

We always state the larger number first. The children very quickly become attuned to this and it just helps in the learning process.

3) Learn one new fact at a time. We will look at  $6 \times 6 = 36$  one day.

Then  $7 \times 6 =$  the following day.

4) Don't think. We want them to become known facts.

Leave the answers on display.

# How we write out the times table

$6 \times 1$

$6 \times 2$

$6 \times 3$

$6 \times 4$

$6 \times 5$

$6 \times 6$

$7 \times 6$

$8 \times 6$

$9 \times 6$

$10 \times 6$

$11 \times 6$

$12 \times 6$

The larger number always comes first

# The tests

# Reading out the answers

.The children mark their own booklets so that they can fill in any gaps if necessary.

- The full times table fact is read out. We always say the larger number first so that they are only learning one sound pattern for each fact. For example, if the number fact is  $6 \times 7 = 42$ , we say seven sixes are forty two.
- The children then repeat that fact back to you. It's important that every child does this.
- For division facts say the following. For 18 divided 3 say MMM threes are eighteen. The children then say the learnt times table fact. Six threes are eighteen.
- Once marked the children then share their results with the class and identify a number fact they need to learn.

# Key principles

1. Learn as a memorised phrase by repeating sound pattern out loud. Don't try to derive. If you don't know – copy down then learn later.
2. Learn each fact one way round only, then get confident at switching factors.
3. Don't think! (about the only time in maths when thinking is unhelpful!) When trying to recall a fact, say the WHOLE number sentence out loud and see if the answer trips off your tongue. If not, try the commutative and see if it comes then.
4. Learn one new fact at a time. Don't try to learn the whole times table at once.

# What if children are falling behind?

- ▶ Intervention
- ▶ Focus on specific facts they don't know
- ▶ Precision teaching
- ▶ Use of TTRockstars
- ▶ Support from home

# How you can help at home

- ▶ Chanting the tables
- ▶ Using the tests to see which tables your child finds difficult
- ▶ Positive affirmation that they can learn the facts
- ▶ Helping them see the benefit- this is not to 'pass' the MTC, but to help them in all areas of the maths curriculum

# How it will fit in with we already do

- ▶ This approach will start this academic year
- ▶ Year 3 & 4 will pilot the project, starting at the beginning of the sequence of learning
- ▶ Year 2 will start with the challenge in the summer term
- ▶ Children in Years 5 & 6 will be assessed on their times tables knowledge
- ▶ Some children will need to start the maths challenge at the level they are at
- ▶ Children who are confident in their times table recall, will sit weekly practice tests with up to 60 questions