Welcome to St. Paul's Maths Workshop Thursday 14th March

ORDER OF EVENTS:

1. Introduction
2. Multiplication and Division in EYFS
3. Mathematical Facts (Times-tables)
4. Strategies for teaching multiplication through the school.
5. Strategies for teaching division through the school.
6. Questions

Introduction

Multiplication and Division in EYFS

Mathematical Facts

Think of fluency as the PHONICS of maths!

- having a good sense of number
- understanding how numbers relate
- understanding how numbers are composed
- understanding the meaning of operations
- making links and understanding differences
- being **flexible, efficient** and **accurate**

Memorising Vs. Understanding

You have 5 seconds to memorise the following words…

house	smart	his	a	
brown	inside	bear	red	the
large	hat	wore		

Write down as many words as you can remember on your own… No talking!

Memorising Vs. Understanding

You have another 5 seconds to memorise these words…

The large brown bear wore a smart red hat inside his house.

How many can you remember this time?

How children learn fluency is the same …

house	smart	his	a
brown	inside	bear	red
the	large	hat	wore

The large brown bear wore a smart red hat inside his house.

memorisation

understanding

Efficiency, Flexibility, Accuracy

So what do we want/need our children to be fluent in?

Children are hampered if they are not 'fluent' in:

- Adding or subtracting a single digit to/from any number
- Adding a multiple of 10 or 100 to any number
- Counting on or back in 1s from any starting number
- Counting on or back in 2s, 10s, or 5s from any starting number
- Recalling rapidly the multiplication facts up to 10 x 10
- Multiplying any number by 2 or 10

Skills that children should be 'semi-fluent' in:

- Knowing what to add to a number to make it up to a multiple of 10 or 100
- Halving any number
- Multiplying any number by 5 (by multiplying by 10 and then halving)
- Knowing the division facts associated with the multiplication facts

Askew, M. (2012) *Transforming primary mathematics*. London: Routledge.

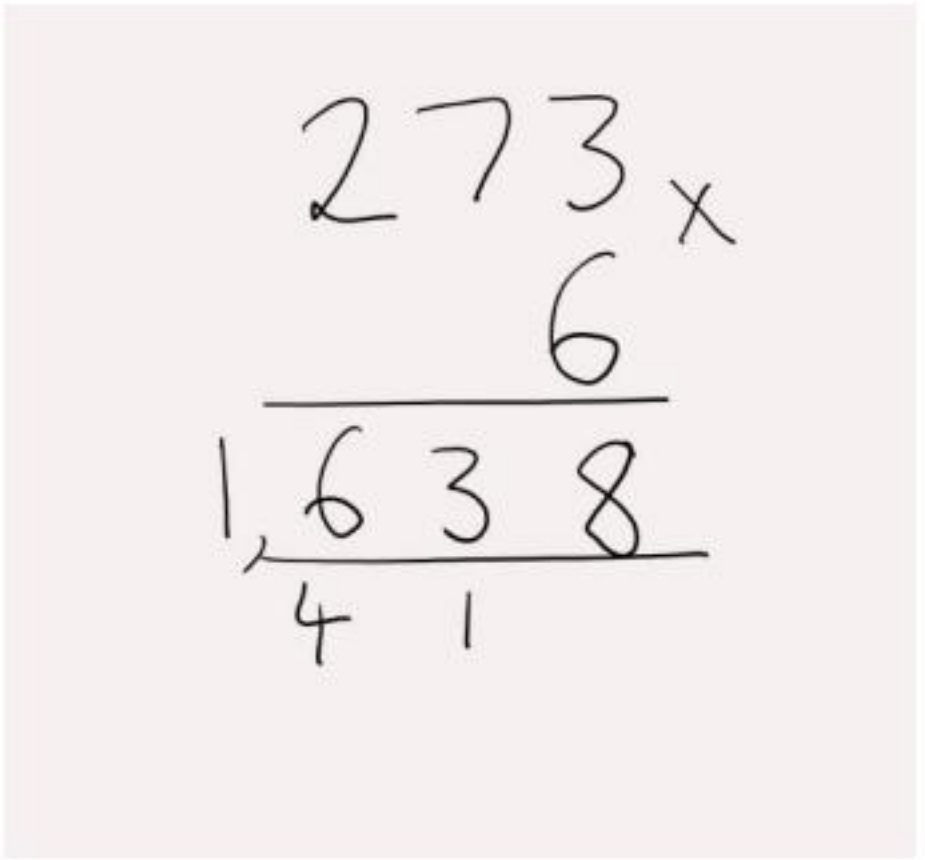
So thinking about fluency in the context of times tables … why do children need to learn them?

36 times table facts that 'unlock' all other

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

Why is it imperative that the children are secure in times tables up to 9 x 9 ?

When using short multiplication or division, children are always working within a column (single digit x or ÷ by a single digit) so the biggest times table fact they need to know is 9x9.



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They don't need to learn the 1x table if they remember that the other factor will also equal their product!

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

2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10	2 × 11	2 × 12
3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10	3 × 11	3 × 12
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The 11 & 12 x tables still need to be covered for the Y4 MTC, even though they never occur within short multiplication or division.

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The 10x table is learnt very early on in a child's education when then discover the base 10 number system and is often memorised fairly easily.

2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9	2 × 10
3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9	3 × 10
4 × 2	4 × 3	4 × 4	4 × 5	4 × 6	4 × 7	4 × 8	4 × 9	4 × 10
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9 × 2	9 × 3	9 × 4	9 × 5	9 × 6	9 × 7	9 × 8	9 × 9	9 × 10
10 × 2	10 × 3	10 × 4	10 × 5	10 × 6	10 × 7	10 × 8	10 × 9	10 × 10

So as long as children remember multiplication is commutative (like addition) then you are left with just 36 essential facts to learn and become fluent with!

2 × 2	2 × 3	2 × 4	2 × 5	2 × 6	2 × 7	2 × 8	2 × 9
3 × 2	3 × 3	3 × 4	3 × 5	3 × 6	3 × 7	3 × 8	3 × 9
4 × 2	4 × 3	4 × 4	4 × 5	4 × 6	4 × 7	4 × 8	4 × 9
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8 × 2	8 × 3	8 × 4	8 × 5	8 × 6	8 × 7	8 × 8	8 × 9
9 × 2	9 × 3	9 × 4	9 × 5	9 × 6	9 × 7	9 × 8	9 × 9

Multiplicative and additive facts

Learning additive facts is different from learning multiplicative facts and happens in a different part of the brain.

- Multiplicative 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.

- Additive facts are built up in a different part of the brain and rely initially on thinking about relationships.

(Piazza and Dehaene)

Key Messages:

- Children must use concrete resources to explore concepts.
- Talk and language
- Practise counting (2s, 3s, 5s, 10s)
- Children to learn their doubles (dominoes or two dice are great for this)
- Place value is key before moving to formal methods.
- Don’t rush to formal methods (End of Year 3).

Helping at home

- Practise counting and grouping objects.

(Add to, subtract from, sharing, combining groups)

- Work on estimating.
- Compare quantities (less and more)
- Practise multiplication facts (Year 2+)
- Real life: time, money and measures.
- Pattern spotting.
- Play games – dominoes, cards and board games.
- TALK about maths.
- Watch Numberblocks!

Times-tables – web resources

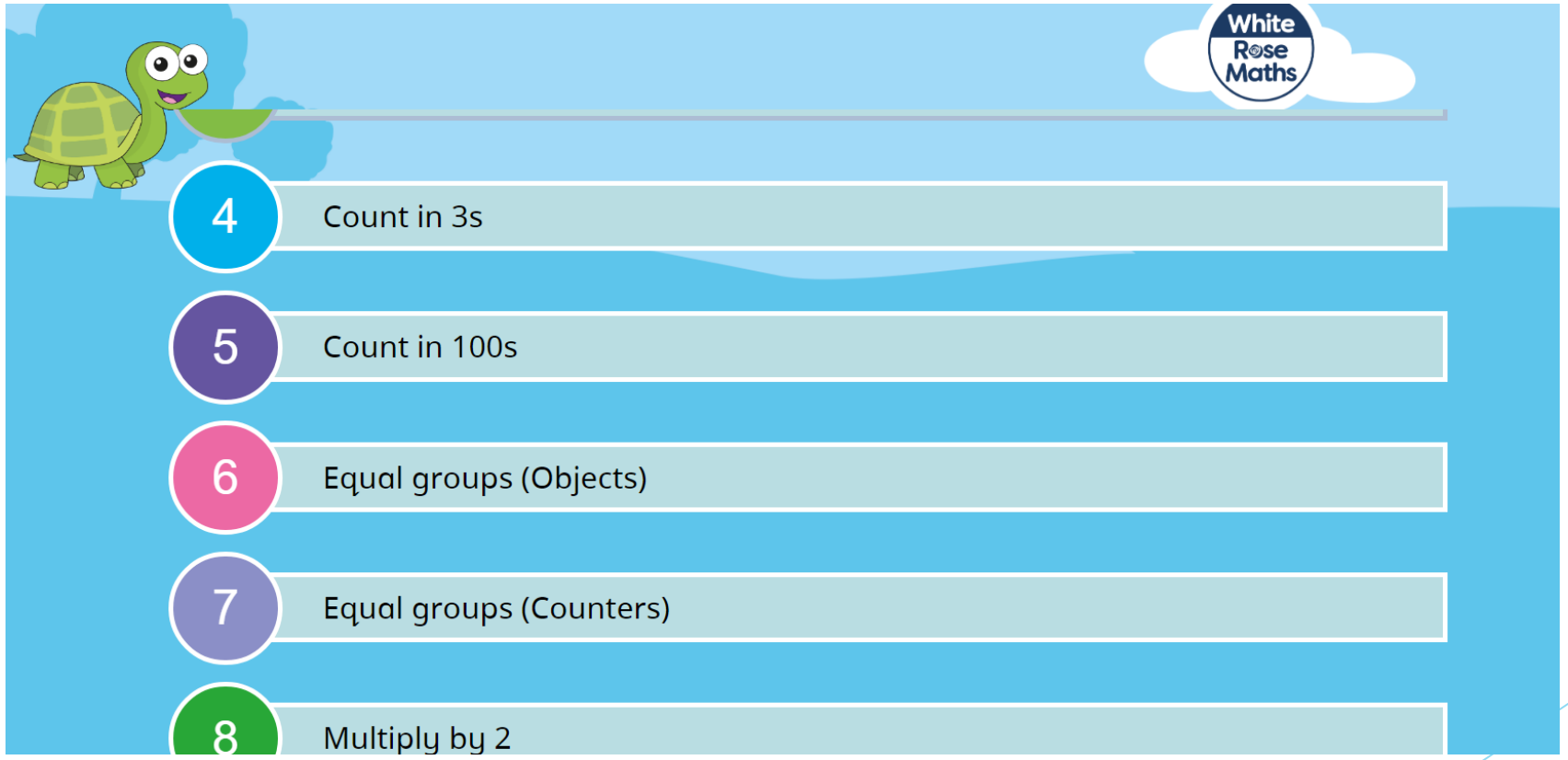
- Hit the button
- MyMaths
- White Rose Minute Maths

Hit the Button

- https://www.topmarks.co.uk/maths-games/hit-the-button

TT Rockstars

Minute Maths



Songs

- https://www.bbc.co.uk/teach/supermovers/times-table-collection/z4vv6v4

Every times table video for both KS1 and KS2, featuring all your favourite football mascots.

The 2 Times Table with Bridget the Lioness

Chelsea mascot Bridget the Lioness, has a song and movement routine to help students learn their 2 times table.

The 3 Times Table

Get your class on their feet and learning the 3 times table using Professor Pipette's fun song and movement routine.

The 4 Times Table with Cyril the Swan

Let Cyril the Swan get your class moving and learning the 4 times table with this fun song and movement routine.

Non Computer activities

- Times Table tennis
- Ping Pong
- Counting on the way to school

So why focus on fluency?

Mathematical factual fluency leads to higher order mathematics.

Through automaticity, students free up their working memory and can devote it to problem solving and learning new concepts and skills.

(Geary 1994)