



“Building stronger foundations, together for everyone”.



Mrs Taplin
Assistant Headteacher
Mastery Specialist

Maths Fluency Workshop

(Number Bonds, Maths Minutes , times tables)

Thursday 5th October 2023

8:30 -10:30 am

$$18 \times 35$$

Easy or tricky calculation? Explain your reasoning.

“The answer is only the beginning.”

(Chinese Proverb)



Aims

- Explain what a mastery approach to teaching mathematics is
- Share how fluency is taught at Binfield
- Develop our understanding of 'number sense'
- Identify ways to develop and support fluency at home





National Curriculum

Aims

The national curriculum for mathematics aims to ensure that all pupils:

- become fluent **in the** fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using **mathematical language**
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

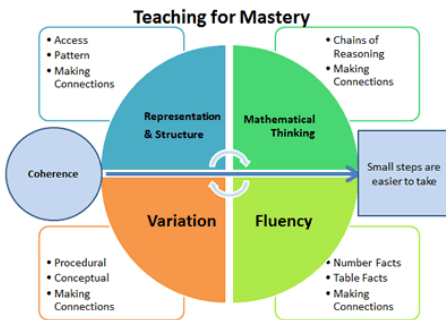


‘Every child a Mathematician’

During their time at Binfield C.E. Primary School (V.A.) we aim for all pupils to develop the characteristics needed to be Mathematician.

We believe that the ‘Essential Characteristics’ of a Mathematician are:

- A commitment to and passion for the subject.
- An understanding of the important concepts and an ability to make connections within mathematics.
- A broad range of skills in using and applying mathematics.
- Fluent knowledge and recall of number facts and the number system.
- The ability to show initiative in solving problems in a wide range of contexts, including the new or unusual.
- The ability to reason, generalise and make sense of solutions.
- The ability to think independently and to persevere when faced with challenges, showing confidence in their potential for success.
- The ability to embrace the value of learning from mistakes and false starts.
- Fluency in performing written and mental calculations and mathematical techniques.
- A wide range of mathematical vocabulary





Mastery Timeline

2013 New Curriculum

- Three aims: fluency, reasoning and problem solving
- Integration of conceptual and procedural knowledge

2017-18

- Mastery specialist training
- Shanghai exchange

2014 Maths Hubs and first visits to Shanghai

- Confirmed the importance of procedural and conceptual knowledge
- Small steps to build concepts, leading to generalisations

2020

- Lockdown videos
- Primary Guidance published
- Development of CP materials

2016 Mastery Specialists and PD materials

- First Mastery Specialists graduate
- Development of PD materials. Published 2017

2021

- Mastering Number
- New EYFS Framework



What does it mean to have mastered something in maths?

A mathematical concept or skill has been mastered when, through **exploration**, **clarification**, **practice** and **application** over time, a person can **represent** it in multiple ways, has the **mathematical language** to be able to communicate related ideas, and can **think mathematically** with the concept so that they can independently apply it to a totally new problem in an unfamiliar situation.



Drury, 2018, p.1

<https://www.ncetm.org.uk/teaching-for-mastery/mastery-explained/>



Think of three levels of learning:

Shallow learning: surface, temporary, often lost

Deep learning: it sticks and can be recalled and used

Deepest learning: it can be transferred and applied in different contexts

The deep and deepest levels are what we are aiming for by teaching maths using the Mastery approach.

A mathematical concept or skill has been *mastered* when a child can show it in different ways, use mathematical language to explain their ideas and independently apply the concept to new problems in unfamiliar situations.

Challenge is provided by going deeper not accelerating

For those children that have mastered the skill, concept or procedure they will be presented with higher order thinking activities, rather than accelerating through the curriculum.



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Fluency

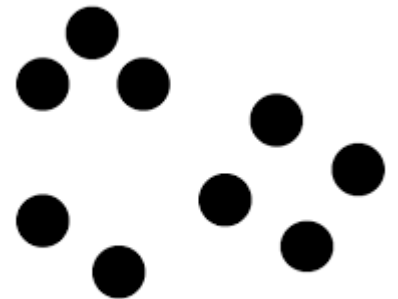
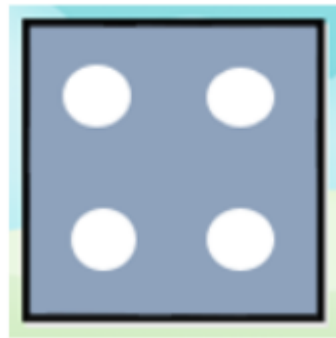
‘Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics’.



Super subitizers!

Subitizing is the ability to 'see' a small amount of objects and know how many there are without counting.

Don't count, say the amount!



<https://toytheater.com/subitizing-seeds/>

Research shows that if children cannot subitize 7 objects by the time they are 7 years old they will struggle with calculations.



Composition

Find the **Five** in me!

●	●	●	●	●
●				

6

5

1

*6 is made of 5
and 1*



Number bonds

'five'ness of 10



<https://www.ncetm.org.uk/classroom-resources/lv-number-facts/>



Number bonds

Adding 1 and 2
Bonds to 10
Adding 10
Bridging/compensating
Y1 facts
Doubles
Adding 0
Near doubles
Y2 facts

6 can be made of 5 and 1, 1 and 5

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

<https://numbersensemaths.com/media/1841/achieving-fluency-in-addition-and-subtraction-facts-article.pdf>



Developing Automaticity

*'Automaticity is the ability to produce answers in a few seconds by relying on thinking of the **relationships among the operations.***

Fosnot and Dolk (2001)



NumBots



NumBots is all about every child achieving the “triple win” of understanding, recall and fluency in mental addition and subtraction, so that they move from counting to calculating.

Q: How many cogs are there?



Q: Practising number bonds to 10



Q: Add 10 and subtract 1

									0
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Representations

A core set of representations have been selected to **expose** important **mathematical structures** and ideas, and make them accessible to pupils. Consistent use of the same representations across year groups help to connect prior learning to new learning.

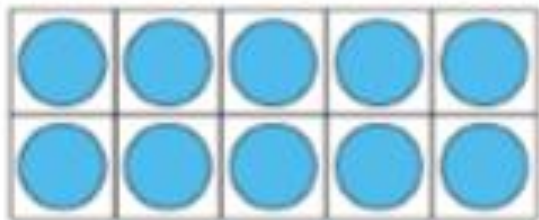


Figure 1: using a tens frame and counters

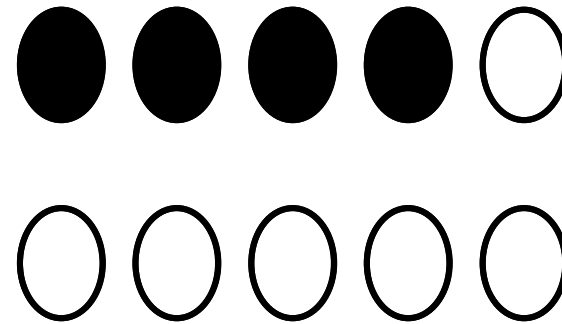
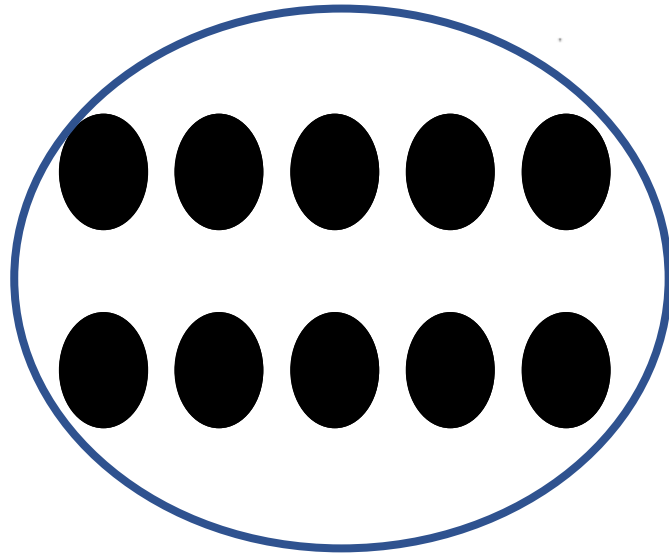


Figure 2: using a tens frame and counters



Ten frames

$$14 - 5$$

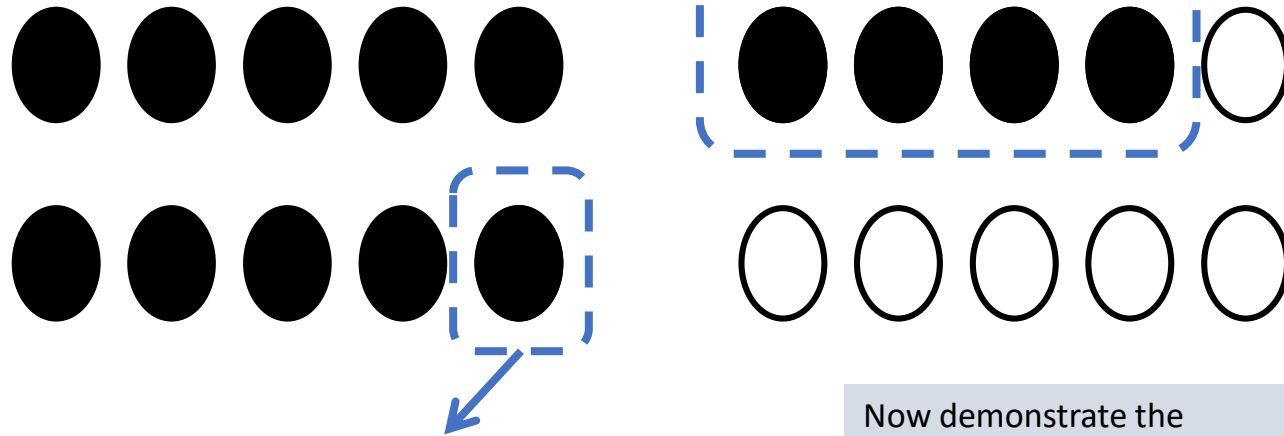




Ten frames

$$14-5$$

4 1



14 is 10 and 4.

Partition 5 into 4 and 1.

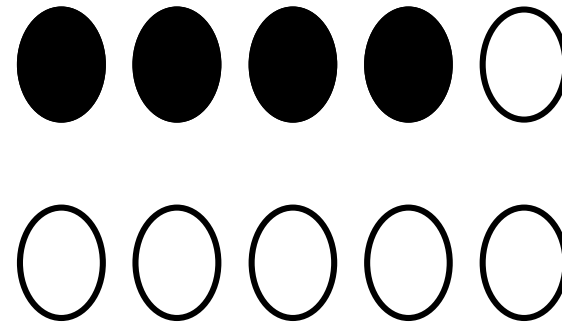
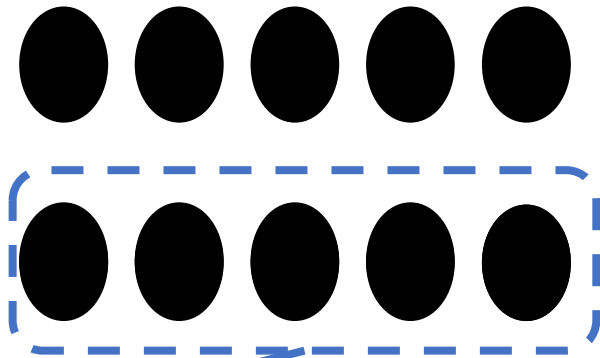
Take away 4 and then take away 1.

Now demonstrate the method to your partner using the counters and tens frames



Ten frames

$$\begin{array}{r} 14-5 \\ \wedge \\ 10 \quad 4 \end{array}$$



14 is 10 and 4.

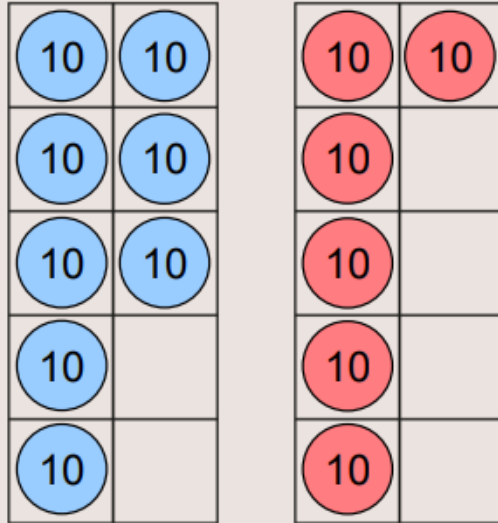
Take away 5 from 10,

then put 5 and 4 together.

Now demonstrate the method to your partner using the counters and tens frames



Ten frames



$$8 + 6$$

8 tens + 6 tens

$$80 + 60 = 140$$

“10 tens are equivalent to 100”



Ten frames

- 18 hundred
- 18 tenths

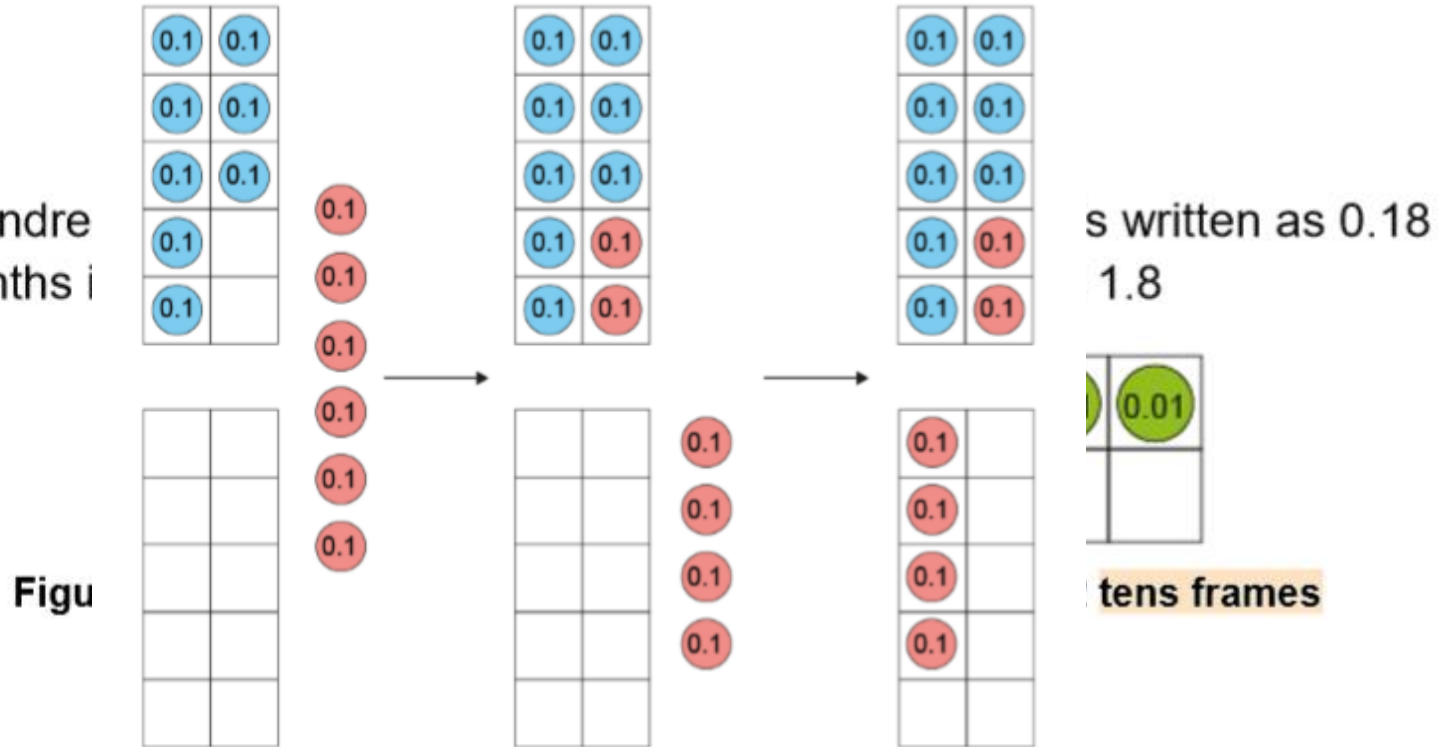


Figure 172: **tens frames** with 0.1-value counters showing $0.8 + 0.6 = 1.4$

$$8 + 6 = 14$$

$$0.8 + 0.6 = 1.4$$

$$14 - 6 = 8$$

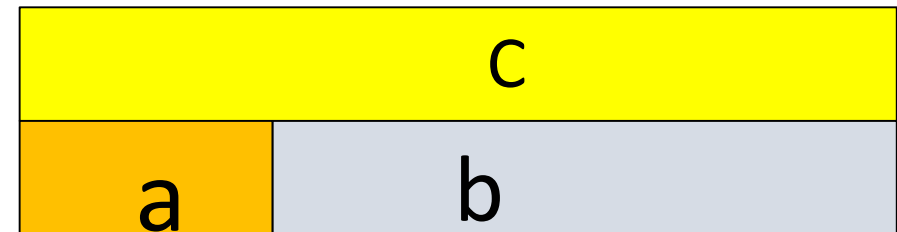
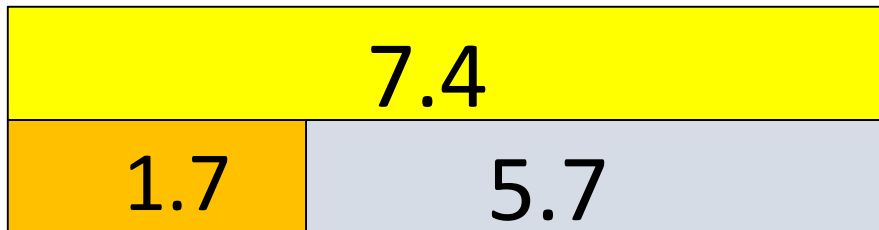
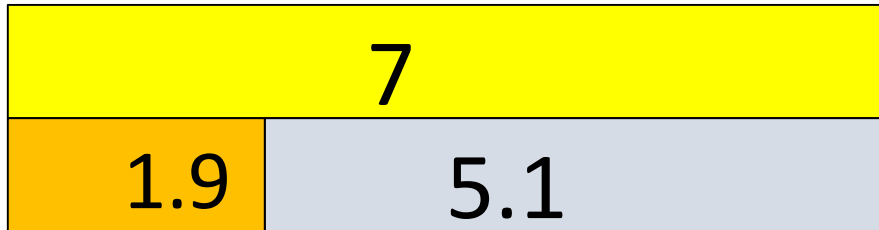
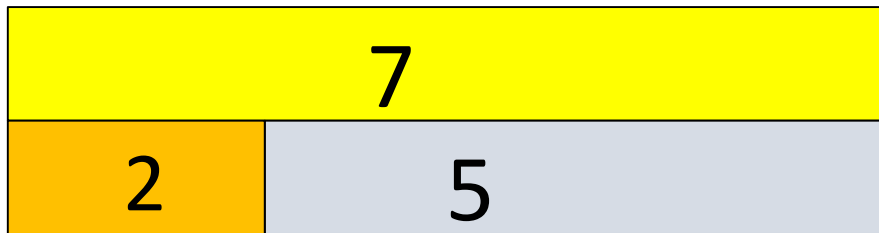
$$1.4 - 0.6 = 0.8$$

$$14 - 8 = 6$$

$$1.4 - 0.8 = 0.6$$



Developing depth, simplicity and clarity



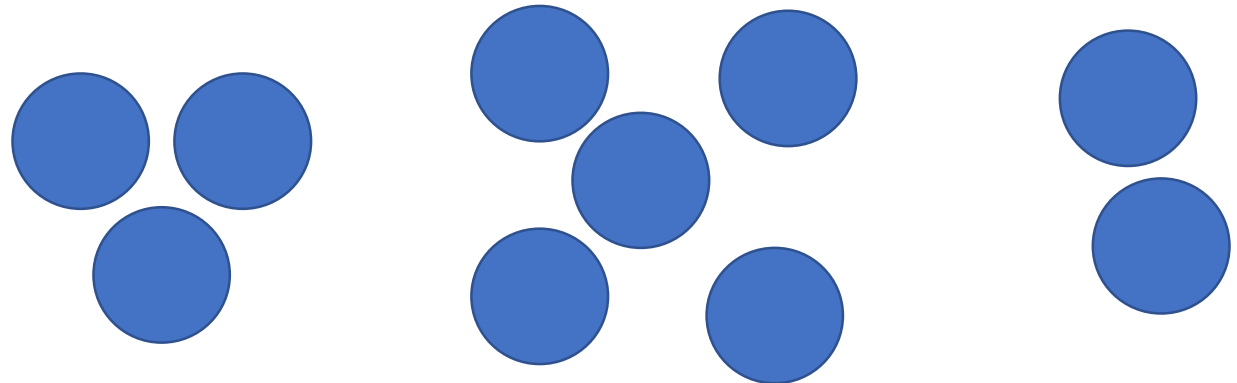


Fluency and Understanding

Does she have fluency and understanding?

- Sally knows all her tables up to 12×12
- When asked what is 12×13 she looks blank.

$$3 \times 2$$





Making Connections

$$\square + 17 = 15 + 24$$

Jimmy has £5.00 to spend at Creams. He buys an ice cream for £2.99. How much change does he get?



Times Tables

Why do children need
to learn their times
tables?



The National Curriculum says...

Year 1	
Year 2	
Year 3	
Year 4	
Year 5	
Year 6	



The National Curriculum says...

Year 1	<i>count in multiples of twos, fives and tens</i>
Year 2	<i>count in steps of 2, 3, and 5 from 0, and in tens from any number</i> recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
Year 3	<i>count from 0 in multiples of 4, 8, 50 and 100</i> recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
Year 4	<i>count in multiples of 6, 7, 9, 25 and 1 000</i> recall multiplication and division facts for multiplication tables up to 12×12
Year 5	<i>count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000</i>
Year 6	



Multiplication strategies

What strategies do we have for teaching times tables?

Use a numberline



Draw equal groups



Makes 6 groups of 4

Draw a picture



Draw an array



Repeated addition

Keep adding the same number over and over

Add 4 together 6 times

$$4 + 4 + 4 + 4 + 4 + 4 = 24$$

Skip count

Count in 4's

4, 8, 12, 16, 20, 24



Times Tables



$$7 \times 8 = 56$$

- Seven eights are 56
- Seven eights make 56
- Seven times eight is 56
- Seven multiplied by 8 is 56
- Seven lots of eight are 56
- Seven groups of eight are 56
- Seven eight times is 56



"Building strong foundations, together, for everyone."

Times Tables

Times table sound bites grid

1 1 is 1	2 1s are 2	3 1s are 3	4 1s are 4	5 1s are 5	6 1s are 6	7 1s are 7	8 1s are 8	9 1s are 9	10 1s are 10
1 2 is 2	2 2s are 4	3 2s are 6	4 2s are 8	5 2s are 10	6 2s are 12	7 2s are 14	8 2s are 16	9 2s are 18	10 2s are 20
1 3 is 3	2 3s are 6	3 3s are 9	4 3s are 12	5 3s are 15	6 3s are 18	7 3s are 21	8 3s are 24	9 3s are 27	10 3s are 30
1 4 is 4	2 4s are 8	3 4s are 12	4 4s are 16	5 4s are 20	6 4s are 24	7 4s are 28	8 4s are 32	9 4s are 36	10 4s are 40
1 5 is 5	2 5s are 10	3 5s are 15	4 5s are 20	5 5s are 25	6 5s are 30	7 5s are 35	8 5s are 40	9 5s are 45	10 5s are 50
1 6 is 6	2 6s are 12	3 6s are 18	4 6s are 24	5 6s are 30	6 6s are 36	7 6s are 42	8 6s are 48	9 6s are 54	10 6s are 60
1 7 is 7	2 7s are 14	3 7s are 21	4 7s are 28	5 7s are 35	6 7s are 42	7 7s are 49	8 7s are 56	9 7s are 63	10 7s are 70
1 8 is 8	2 8s are 16	3 8s are 24	4 8s are 32	5 8s are 40	6 8s are 48	7 8s are 56	8 8s are 64	9 8s are 72	10 8s are 80
1 9 is 9	2 9s are 18	3 9s are 27	4 9s are 36	5 9s are 45	6 9s are 54	7 9s are 63	8 9s are 72	9 9s are 81	10 9s are 90
1 10 is 10	2 10s are 20	3 10s are 30	4 10s are 40	5 10s are 50	6 10s are 60	7 10s are 70	8 10s are 80	9 10s are 90	10 10s are 100



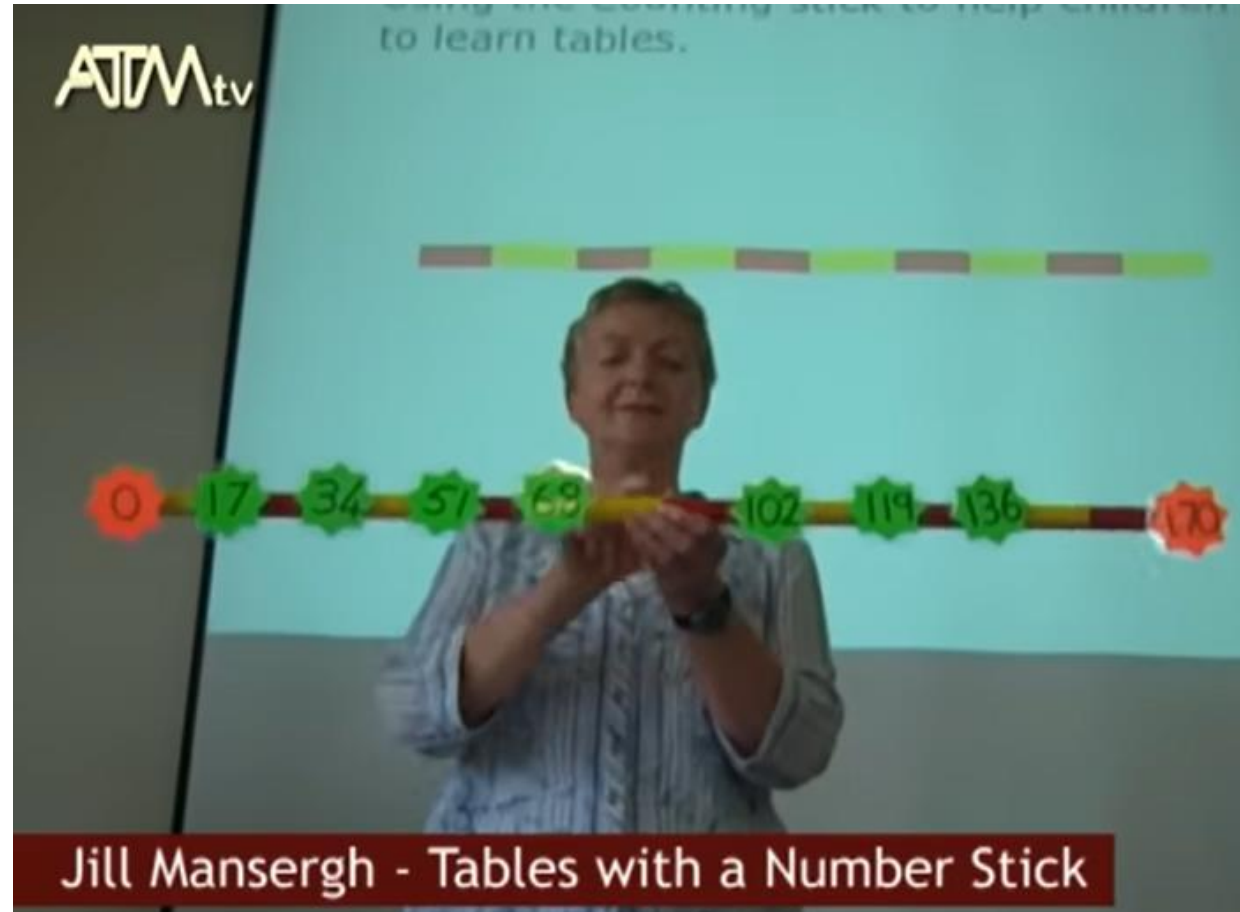
My target 45 facts

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



A good mathematician notices

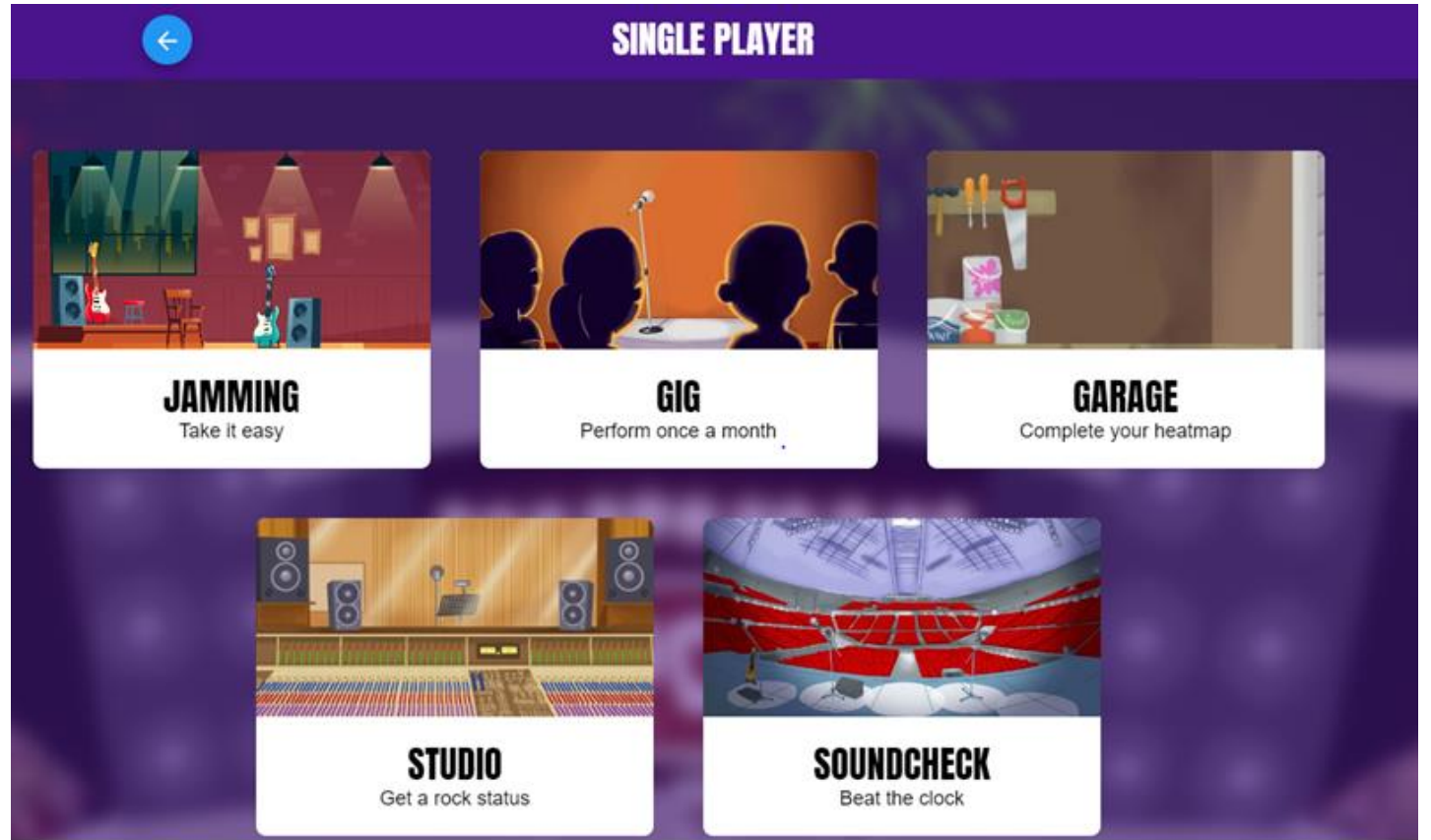
Do you
know your
17 times
table?





Times Tables

Jamming: game choice
Gig: baseline assessment
Garage: focussed
Studio: all tables
Soundcheck: 25 questions





Hit the Button



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



Daily 10



Level 5 ▾ Ordering ▾ Choose ▾ ✕

- Addition
- Subtraction
- Ordering
- Partitioning
- Digit Values
- Rounding
- Multiplication
- Division
- Doubles/Halves
- Fractions

Daily 10

Mental Maths Challenge

Topmarks

<https://www.topmarks.co.uk/maths-games/daily10>



Times Tables

Let's share some tips!

What do you do with your children to help with their times table knowledge?

What have you done in the past that has worked?

$1 \times 1 = 1$

$2 \times 2 = 4$

$3 \times 3 = 9$

$4 \times 4 = 16$

$5 \times 5 = 25$

$6 \times 6 = 36$

$7 \times 7 = 49$

$8 \times 8 = 64$

$9 \times 9 = 81$

$10 \times 10 = 100$

$11 \times 11 = 121$

$12 \times 12 = 144$

Remembering Squares Can Help



Maths Minutes

As a school, we recognise the importance of fluency and mental skills in mathematics and our daily Maths Minutes support children in becoming more secure in their recall of the key facts for their year group, enabling them to approach more complex maths with confidence and flexibility.

100	÷	2	=	<input type="text"/>
100	÷	4	=	<input type="text"/>
100	÷	5	=	<input type="text"/>
100	÷	10	=	<input type="text"/>
100	÷	20	=	<input type="text"/>
100	÷	25	=	<input type="text"/>

72	+	<input type="text"/>	=	100
<input type="text"/>	+	51	=	100
<input type="text"/>	+	94	=	100
92	+	<input type="text"/>	=	100

2	x	8	=	<input type="text"/>
8	x	<input type="text"/>	=	88
9	x	8	=	<input type="text"/>
<input type="text"/>	x	3	=	24
11	x	8	=	<input type="text"/>



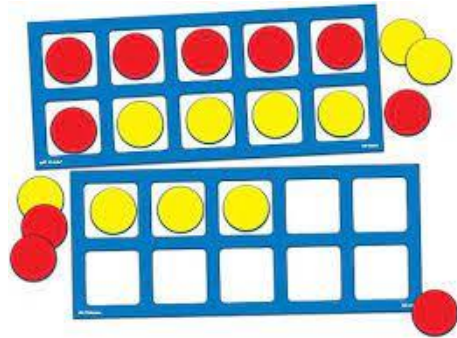
Things to have a go with now:



Hit the button



TTRS & NumBots



Maths Bot



Daily 10

How do you know?

Prove it



Century Tech

Follow their path!

Richard's Recommended Path ?

- English: Common Nouns and Proper Nouns [PSPG1.02] **Start**
- English: Adjectives [PSPG1.03]
- English: Possessive Pronouns [PSPG1.13]
- English: Adverbs of Possibility [PSPG1.16]
- Mathematics: Diagnostic: Place Value [PAR0.01]
- Science: Diagnostic: Animals Includ Humans [PS0.04]

Due Assignments ?

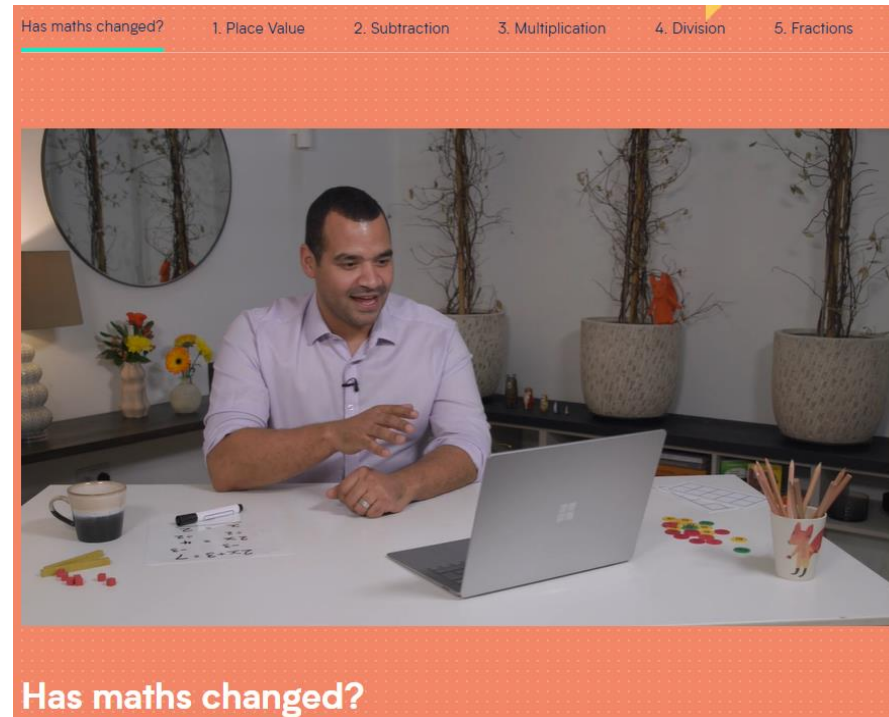
Subject	Material	Due
English	Nuggots	22 Oct
English w/b 17.10.22		
Life and Environmental Science	Nuggots	22 Oct
Maths w/b 17.10.22		

My Streak ?

0 / 5



Maths with Mike



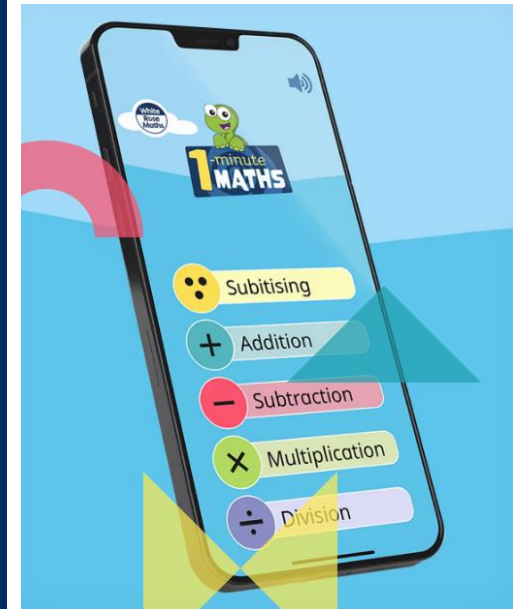
Videos, parent guides and printable resources.

<https://whiteroseeducation.com/parent-pupil-resources/maths/maths-with-michael#watch>



White Rose Resources

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					
Autumn Block 1 Place value	Autumn Block 2 Addition and subtraction	Autumn Block 3 Length and perimeter	Autumn Block 4 Multiplication and division	Spring Block 1a Multiplication and division (a)	





Funkey Times Tables



A multi-faceted resource which helps children develop conceptual understanding of multiplication and division and fluency in times table recall up to 12 x 12 through fun games and activities.

<https://www.funkeymaths.com/product/times-tables-maths-cards/>



How can I help my child?

- Talk
- Encourage them to draw pictures and representations such as the part whole and bar models.
- Question them to deepen understanding- how do you know? Can you prove that? Check your answer, show me.
- Be mindful of any negative word choices around mathematics.
- Look at the school website for curriculum and representations-if any questions arise, pop and see your child's class teacher.





Any questions?