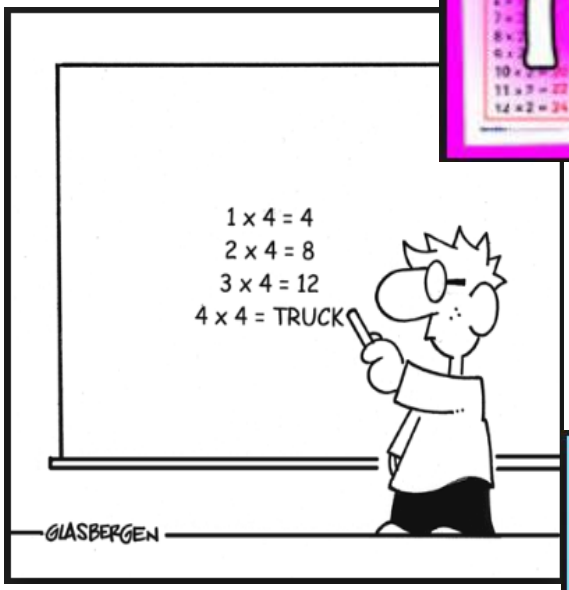
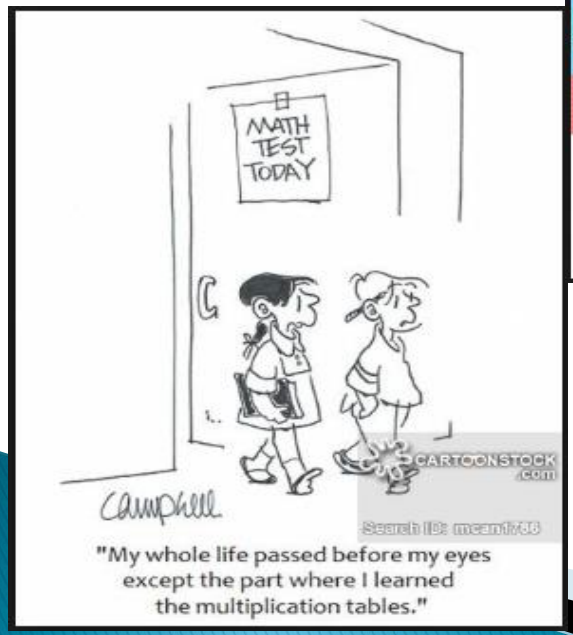
Times Tables





Aims for today:

- Why learn the times tables (what's in it for me?)
- What the children learn in each year.
- Using objects and pictures to explain what it is / is not.
- Vocabulary
- Which ones are the easy / hard ones?
- Why learning the easy ones helps with the hard ones.
- Handy tips and tricks for learning specific times tables facts.
- Looking at patterns and relationships – deeper understanding.
- A good method for learning.
- Good websites

Why memorise times tables? - Can't we just work them out?

Jo Boaler, professor of maths education at Stanford University, told a conference in London this morning that the increased focus on memorising times tables was "*terrible*".

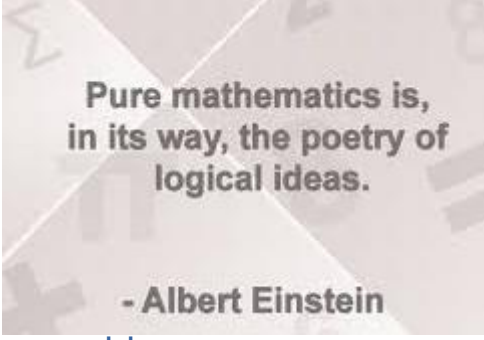
Professor Boaler said: "*I have never memorised my times tables. I still have not memorised my times tables. It has never held me back, even though I work with maths every day.* " (2015)

"The new UK curriculum requirement for children to learn times tables off by heart will lead to children being scared of and then turn away from maths."

Knowing your times tables supports mathematical learning and understanding, and my experience is that young children find learning them fun. They enjoy chanting their times tables and learning the relationships between them (such as the six times table being twice the three times table and why that is). Knowing the times tables fluently helps them to develop their learning in maths because they can take that knowledge for granted, which frees up cognitive space for them to learn new mathematical ideas and apply maths to solve problems.

I have also experienced primary classrooms where all children do know their times tables. The confidence this gives them in tackling other areas of mathematics and in solving mathematical problems empowers them and enables them to really enjoy maths.

Learning some material so that it can be recalled automatically (in other words, memorising) assists, rather than detracts from, the process of developing conceptual understanding in maths. Educational research shows that memorising supports understanding and understanding supports learning. ***Charlie Stripp*** *director of the National Centre for Excellence in the Teaching of Mathematics (**NCETM**) (*2015*)*



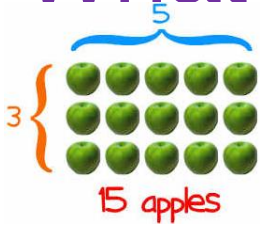
Why memorise times tables? – Summary

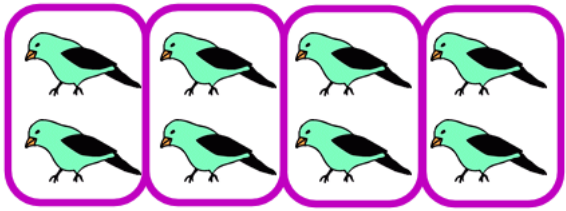
- Some leading mathematicians argue they haven't needed to memorise times tables.
- Testing can cause anxiety which can lead to poor performance and general maths anxiety.
- All Y4 children will be tested on times tables knowledge up to 12 x 12 from next year.
- Part of our job therefore is to present the tests in non threatening ways (e.g. fun quizzes).
- Knowing times tables supports maths learning.
- Knowing times tables is helpful in life.
- Knowing times tables frees up brain power for more complex tasks and creativity. Not knowing them can slow and hinder this.
- Knowing times tables can lead to increased confidence in maths, general self esteem and therefore the willingness to try more difficult tasks, which will lead to further development.
- Learning times tables can be fun!
- Maths can be viewed as beautiful and pattern spotting can be inspiring!
- Using memory in itself, is a valuable exercise for the brain, making it more agile.

What the children learn each year

- Y1 - Count in multiples of 2,5 and 10.
- Y2 - Recall and use facts for 2,5, and 10.
- Y3 - Recall and use facts for 3, 4, 8.
- Y4 - Recall and use facts for all up to 12x12
- Y5 - Revision of all up to 12x12
- Y6 - Revision of all up to 12x12

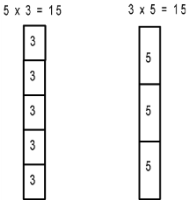
What is multiplication?

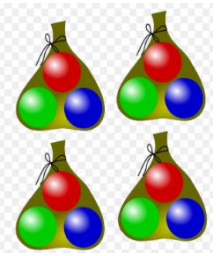


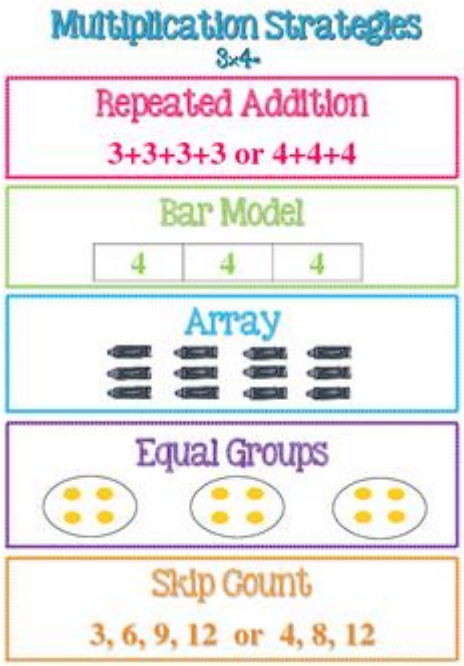


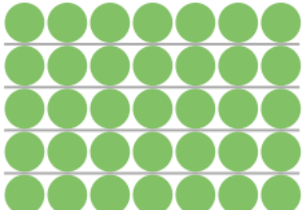
Use the visual to complete the equation.

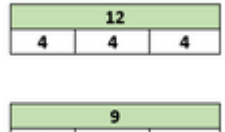
$\square \times 7 = 35$

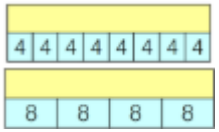


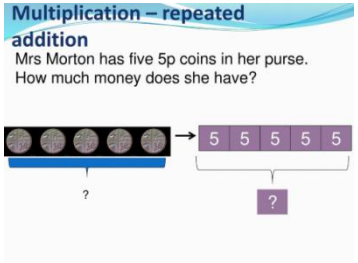




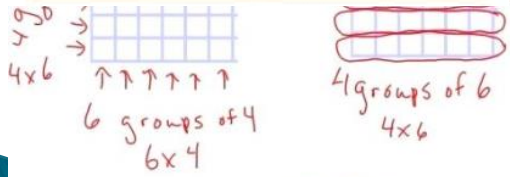


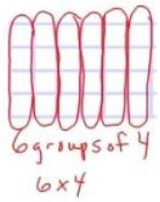


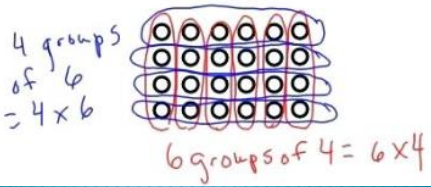


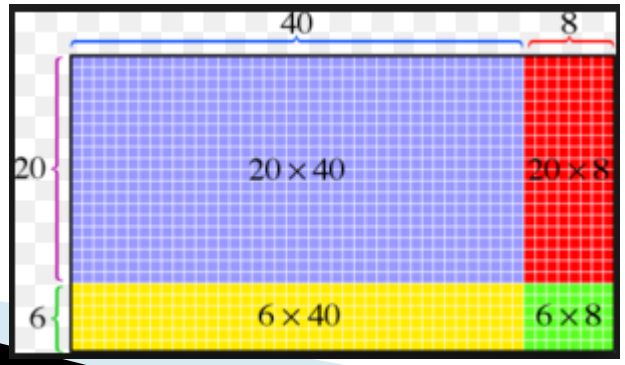


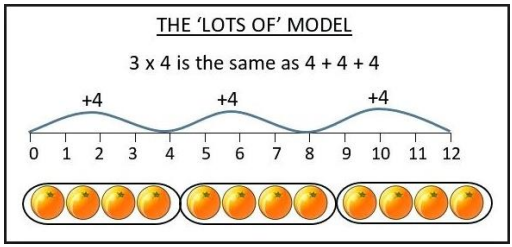
x	1	2	3	4	5
1	•	••	•••	••••	•••••
2	•	••	•••	••••	•••••
3	•	••	•••	••••	•••••
4	•	••	•••	••••	•••••
5	•	••	•••	••••	•••••











Vocabulary taught

- **Multiply** *(4 multiplied by 5 is 20)*
- **Lots of** *(4 lots of 5 is 20)*
- **Groups of** *(4 groups of 5 is 20)*
- **Of** *(4 of 5 is 20;*
  20 ***x*** *½ or ½* ***x*** *20*
  means same as half ***of*** *20 is 10)*
- **Product** *(the product of 4 and 5 is 20)*
- **Times** *(4 times 5 is 20)*
- **Multiple** *(20 is a multiple of 10)*
- **Common multiple** *(20 is a common multiple of 2, 4, 5 and 10)*
- **Factor** *(1,2,4,5,10 and 20 are factors of 20)*
- **Factor pairs** *(2 and 10 is a factor pair of 20; 4 and 5 is another one…)*
- **Common factor** *(5 is a common factor of 15 and 20)*

Which are the easiest?

- Rank 0 to 12 in order of easiest to most difficult.
- Of course, subjective, depends on knowing tricks, the order learned, but might be something like:
- 0, 1, 10, 5, 2, 11, 9, 3, 12, 4, 8, 6, 7.
- Easy = 0, 1, 2, 5, 10, 11 (up to 99)
- More difficult = 3, 4, 6, 7, 8, 9,12.
- Tricks and tips available = 4,8, 6, 7, 9, 11 (beyond 99), 12.

Why learning the easy ones helps with the hard ones – a look at the 99 club

You've basically leanred a lot of the content of the harder ones while learning the easy ones.

Multiplication table and the 99 club

Total number of facts to learn: 68

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

	1 x n = n (1 fact; easy)
	2x (11 new facts – **15 club**)
	5x and 10x (19 new but easy facts – **22 club**)
	3x and 4x (15 new facts – 2 easy - **33 club**)
	6x (6 new facts – 1 easy - **44 club**)
	7x 8x 9x (12 new facts – 3 easy ones -**55 club**)
	11x 12x (3 new facts – **66, 77, 99 clubs**)

Easy vs difficult ones

After removing duplicates...

Number of easy facts: 38 (0, 1, 2, 5, 10, 11 up to 9x11)

Number of more difficult facts: 30

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

Some general advice and 7 times tables trick

- https://www.oxfordowl.co.uk/for-home/advice-for-parents/help-with-times-tables/

9 times tables tricks

- is 10× the number minus the number.
  Example: 9×6 = 10×**6**−**6** = 60−6 = 54

- the ones digit goes 9, 8, 7, 6, ...: **9**, 1**8**, 2**7**, 3**6**, 4**5**, ...
  the tens digit goes 0, 1, 2, 3, ...: 9, **1**8, **2**7, **3**6, **4**5, ...

- subtract one to get the tens digit, and the tens and ones digit together make 9

Example: 9×**5**: tens digit is **4**, 4 and **5** make 9, so **45**

Example: 9×**8**: tens digit is **7**, 7 and **2** make 9, so **72**

- your hands can help! Example: to multiply 9 by 8, hold your 8th finger down, and count "7" and "2", the answer is **72**

Mirror image layout:

09	90
18	81
27	72
36	63
45	54

Other times tables tricks…

11

- up to 11x9: just repeat the digit. Example: 11x**4** = **44**
- for 11×10 to 11×18: write the sum of the digits between the digits

Example: 11×15 = 1*(1+5)*5 = 165

6

- when you multiply 6 by an even number, they both end in the same digit.

Examples: 6×**2**=1**2**, 6×**4**=2**4**, 6×**6**=3**6**, etc

7×8

- Think "5,6,7,8": **56=7×8**

I ate and I ate till I was sick on the floor… 8x8 is 64!

12s… If you know your 11s, just add one more of the number you are multiplying by..
……..So 6x12 = 6x11+6 = 66+6 = 72

2s – double the number; 4s double then double again; 8s – Double! Double! Double!

5s – cut in half and x by 10 (especially easy for even numbers)

Draw attention to odd/even patterns to help spot if answer is correct.

Another look at easy vs difficult ones taking into account tips and tricks!

A look at the hard ones and easy ones taking into account the tricks looked at:

Now only 7 facts not covered by any of the tricks or tips.

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

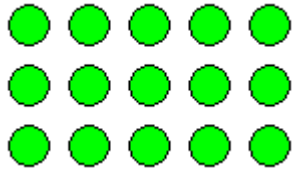
A Good Learning Method

- Once learned, consolidate with lots of fun practice.

https://www.youtube.com/watch?v=yXdHGBfoqfw

Looking at patterns and relationships – a deeper understanding

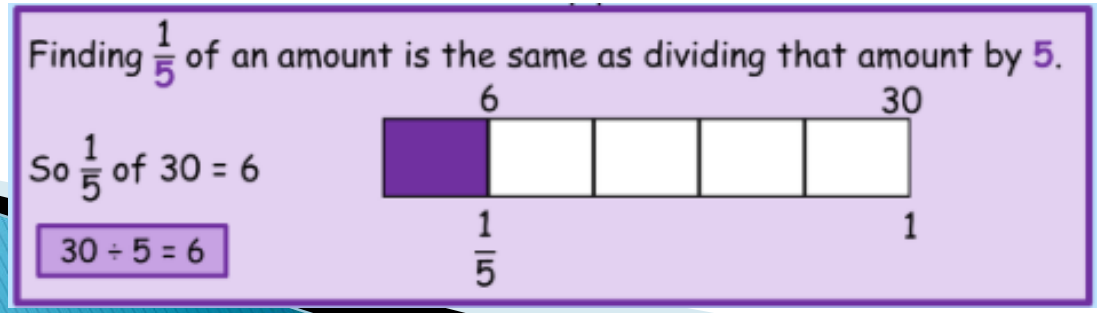
- Illustrate why 0xn = 0. For example, use 5 bowls for sweets, but no sweets in any of the bowls! 5 lots of nothing is nothing or 5x0=0. Use real objects to demonstrate!
- Use arrays to illustrate the 'engine' of multiplication / division:



- The array shows that 3x5=15; 5x3=15; 15=5x3; 15=3x5

  It also shows that 15÷3= 5; 15÷5=3; 3=15÷5; 5=15÷3 (8 facts!)

- Show the connections between e.g.4x3, 2x6, 1x12, using area models/arrays /objects.
- Show the connections between 5x6=30 and 1/5 of 30=6 using bar model.



Good websites

- www.timestables.co.uk
- https://www.topmarks.co.uk/maths-games/hit-the-button
- https://www.mathschase.com/
- www.mathletics.com
- https://www.khanacademy.org/math/arithmetic-home/multiply-divide/modal/e/multiplying-with-arrays

Summary

- Learning times tables supports mathematical learning.
- Knowing them off by heart frees up brain space for more complex / creative tasks.
- There are plenty of fun tricks and tips to help make learning easier and more fun.
- Alongside memorising the tables, understanding the mechanics of multiplication using visuals like arrays, bar models, area models (starting with easy numbers) aids deeper learning and the recognition of patterns and relationships.

Finally…

- Any questions?
- We appreciate any feedback and suggestions for further workshop ideas. (email or put a note into the office)
- Maths shop now open for relevant items (e.g. 12x12 sided dice for playing games, times tables grids – completed and empty, white boards and pens for bar modelling, creating arrays and area models).
- Thank you for coming. As ever, we value your support because we know what a positive difference it makes to your child's learning!