Collins

10 teaching tips for times tables

Get ready for the Multiplication Tables Check

By Sam Townsend

1. Explore and investigate number facts

Spending time exploring number facts will allow pupils to look at factors and associated patterns. Exploring one number fact in a lesson will encourage pupils to work at a higher order level reasoning and communicating about their findings. Pupils should be actively engaged with physical manipulatives (counters, cubes or straws) to represent the number fact in multiple representations, as well as pictures and symbols.

$16 = 4 \times 4$

$16 = 1 + 3 + 5 + 7$

Communicating mathematically is essential to developing conceptual knowledge. Investigating patterns like this will initiate reasoning and promote a relational understanding.

Ask a range of open questions to encourage investigation and reasoning.

Q: What other numbers can you see here? (1, 4, 9)

Q: What happens to the pattern if we add another row?

Q: Can you make other numbers into a square shape?

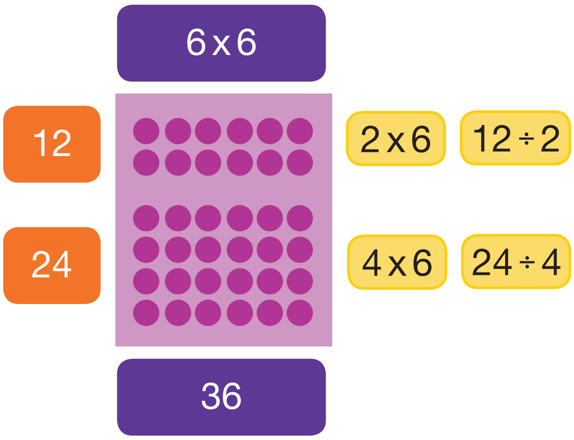
Making a poster of a number fact and adding this to an interactive display is a great way to support all pupils' understanding.

2. Arrays

The use of arrays appears in the National Curriculum from Year One. The commutative law can be effectively represented through the use of arrays as well as the relationship between multiplication and division. Arrays can be added together to show facts within facts; exposing pupils to a range of arrays can help make connections between different facts.

For example, when looking at 36 and the associated facts it is useful to develop understanding through partitioning the array. Exploring arrays and facts this way will demonstrate the structures of multiplication and division.

$6 \times 6 = 2 \times 6$ and 4×6
(demonstrated in the array below)

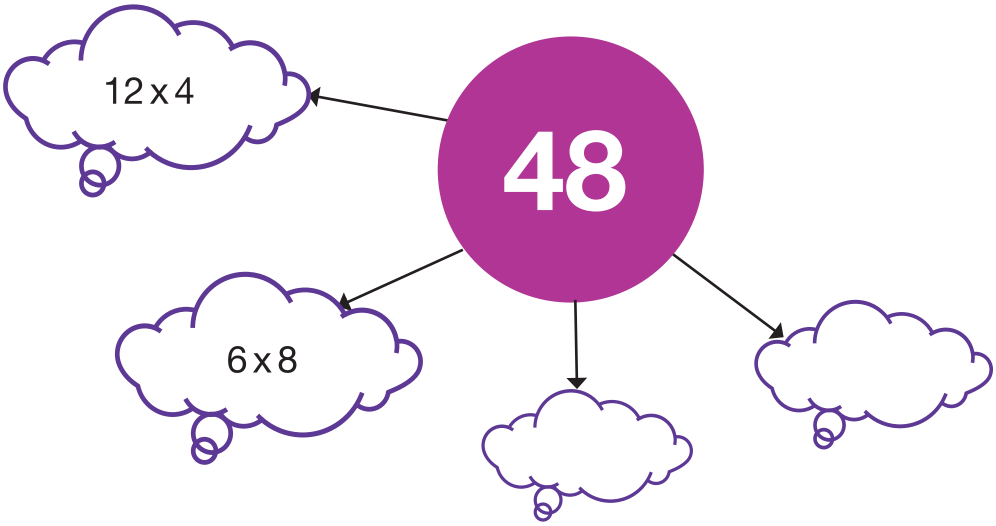


Q: Can you partition 36 into any other different arrays? (1x6) + (5x6) or (3x6) + (3x6)

Q: Can you make them with counters? What patterns do you see?

3. Teach division and multiplication facts together

Seeing the number as a whole and how it can be represented in different structures allows pupils to make connections. Ask pupils higher order questions to get them reasoning about the number.



Q: What do we know about this number and its facts?

Q: Can you discuss all the factors of 48 and draw them as a factor flower by putting the factors in the petals?

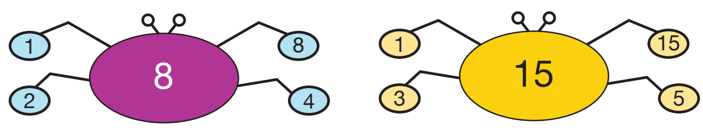
Q: Can you draw different shape rectangles to represent 48?

Q: Which of the factors of 48 do you see in the multiplication tables?

Q: Why can this number not be represented as a square?

Q: Why do some flowers only have 2 petals/or an odd number of petals?

Make factor flowers or factor bugs with numbers on their legs or on the flower petals.



4. Use doubles to your advantage

The 2, 4 and 8 times table are all doubles.

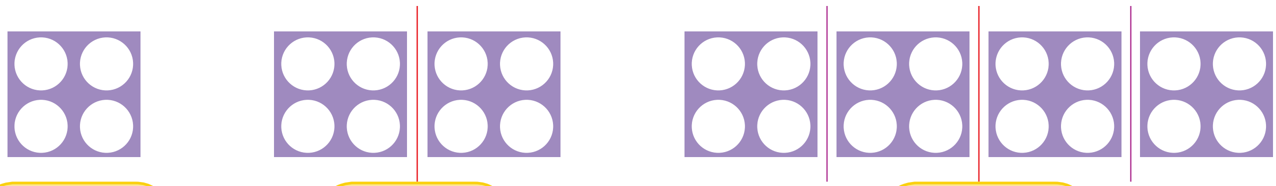
The 3, 6 and 12 times table are all doubles.

The 5 and 10 times table are doubles.

Knowing **2 x 2 = 4** and doubling this calculation to **4 x 2 = 8,** then doubling this to understand that **8 x 2 = 16** is a very flexible way of using numbers.

In the same way, knowing that dividing by 2 is halving, dividing by 4 is half and half again and dividing by 8 is half, half and half again.

This can be seen in the structures below using Numicon. Making these patterns as concrete representations supports the development of mental imagery and conceptual understanding.



4 = 2 x 2

4 ÷ 2 = 2

8 = 2 x 4

8 ÷ 2 = ?

16 = 2 x 8

16 ÷ 8 = 2

16 ÷ 4 = 4

Q: How else can you arrange the 16? Can you show the number as a square?

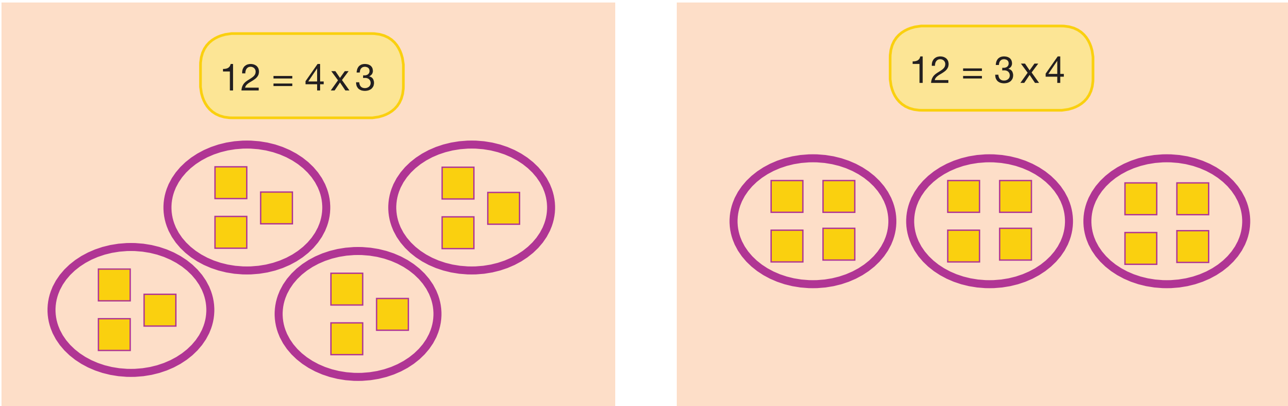
Q: Can you continue the pattern of doubling?

Q: Can you find any other multiplication facts within these representations?

5: Investigate the commutative law

If children can understand the commutative nature of multiplication it will halve the number of facts they are required to know. No reverse facts will be tested in the MTC, so if a pupil is tested on 4x3 they will not be tested on 3x4.

Physically representing numbers and their multiplication and division facts will support a deeper understanding of the structures. Using counters and concrete resources to demonstrate this will engage pupils at the enactive phase of learning, leading to conceptual understanding.



Vary you Language:

4 lots of 3, 4 groups of 3, four multiplied by three. 12 = 4 groups of 3. The product of….

3 lots of 4, 3 groups of 4, three multiplied by four. 12 = 3 groups of 4. The third multiple of four is 12

6. Focus on investigating the most challenging multiplication facts:

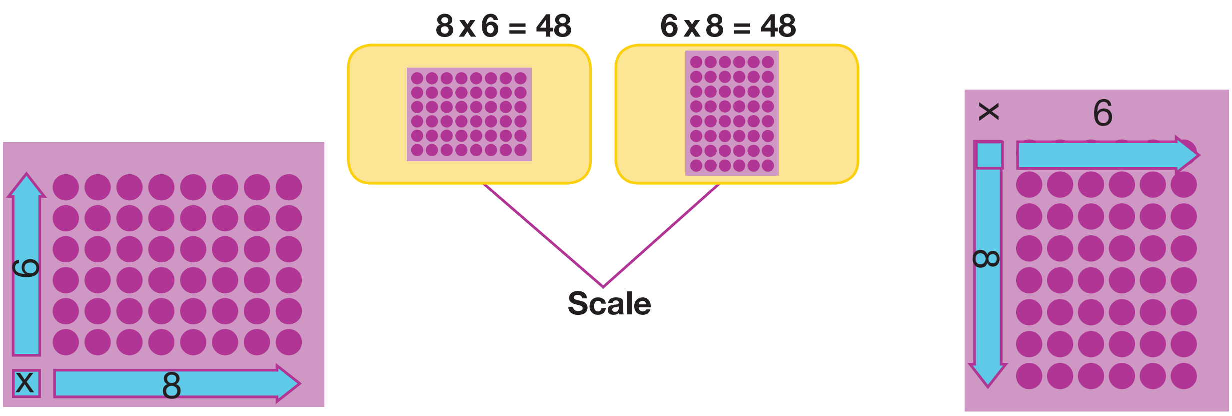
The 6, 7, 8, 9 and 12 times tables are more likely to be tested than the others. There will certainly be questions from all tables but these are the most challenging and will be a focus.

The 11 facts most likely to appear are:

- **6 x 6, 6 x 7, 6 x 8, 6 x 9, 6 x 12**
- **7 x 8, 7 x 9, 7 x 12**
- **8 x 9, 8 x 12**
- **12 x 12**

These facts must be explored in depth through physical representations, number tracks or lines and memorable ideas, such as: the answer to 7 x 8 is the two numbers in the sequence before: **56 = 7 x 8.**

Their commutative properties also need to be learned. An example of this can be through balance scales and multilink cubes. Pupils can make a calculation such as 6 x 8 using cubes or weights of an equal mass and then make 8 x 6. Placing them in the balance scale will prove that they have the same value. They can explore this with a range of numbers and their associated facts.

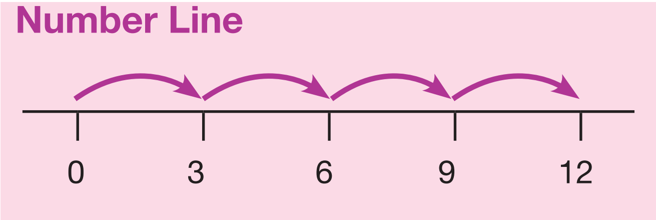


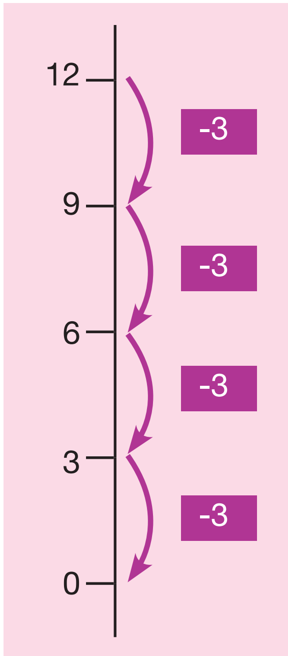
7. Number lines and number tracks

The number line can be represented vertically or horizontally. In this example the vertical representation demonstrates the repeated subtraction nature of division while the horizontal orientation represents the repeated addition nature of multiplication. This leads into strategies for formal written methods.

$12 - 3 - 3 - 3 - 3 = 0$ $(12 \div 4 = 3)$

$3 + 3 + 3 + 3 = 12$ $(3 \times 4 = 12)$





These structures work well when adding concrete objects to the number. The physical representation will support understanding of the groups in involved in the multiplication fact.

A useful activity would be to ask pupils to demonstrate the opposite number fact. In this case representing **12 = 3 x 4** or **12 ÷ 3 = 4** and adding concrete objects to reason about the difference in group number and group size.

8. Area

Area is an excellent way of demonstrating multiplication and division facts conceptually. Pupils often learn short division in a rote fashion with little understanding of the relationship with multiplication and finding a missing length.
The bus stop method, as it is commonly known, originates from finding a missing length in an area calculation.

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      1  2
7 | 7 8 1 4
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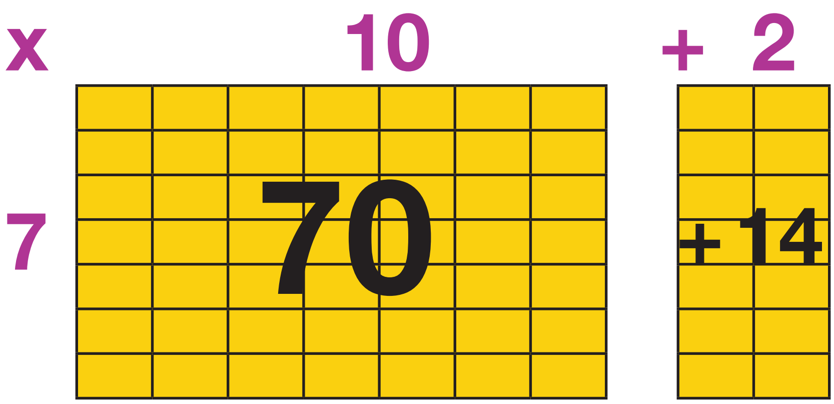
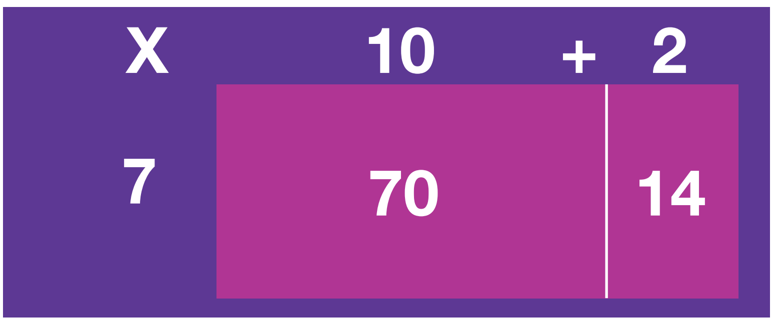
Pupils will make connections to this symbolic representation if they can see the workings of the calculation as follows:

This method can also be represented as an array use counters or Base 10 equipment and partitioned into two less challenging calculations.





A pictorial representation of this calculation will support an understanding of the grid method while demonstrating the concept of re-grouping. It is important to develop mental imagery so that children can return to these mental images when working in an abstract mode.

9. Mathematical language and processes

Engaging pupils in mathematical language and thinking is key to their understanding. How children interpret symbolic representations is crucial to their application of skills.

When faced with a symbolic division equation such as **96 ÷ 8** children may struggle to decode this to effectively approach the calculation. Changing the language or rewording the calculation makes it less abstract and more manageable.

How many 8s are in 96?

How many times do you have to add 8 to get to 96?

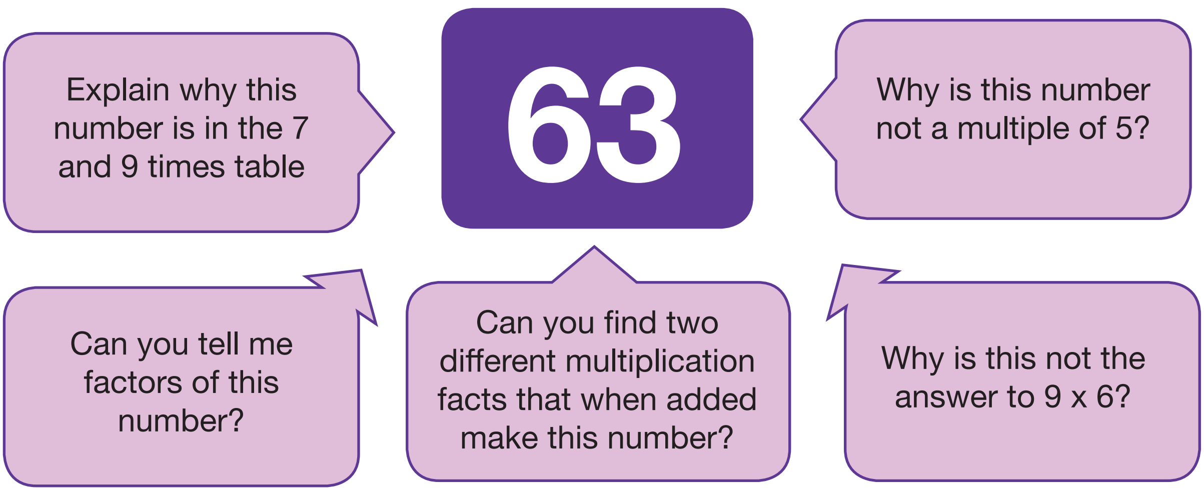
How many groups of 8 make 96?

How many jumps of 8 on the number line will get to 96?

Changing the language allows pupils to gain a visual image of the structure. In multiplication, knowing that **12 x 8** means there are 12 groups of 8, or 12 lots of 8 gives pupils a mental image of the calculation. Using varying language in lessons will support these strong visual images.

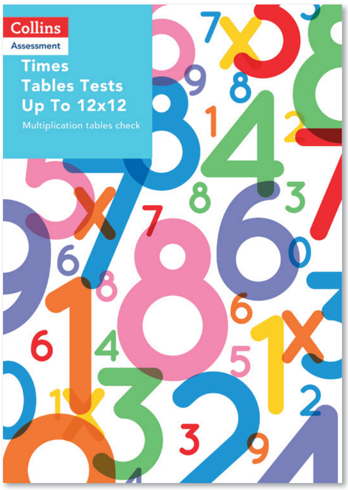
10. Mathematical reasoning about number facts

Reasoning mathematically allows children to look at the properties of numbers and calculations. Asking open questions about numbers can engage pupils at a higher cognitive level.
Choose a number and engage pupils in questions involving proof, reasoning, justification and logic.



Being flexible with numbers and having 'number sense' allows pupils to make connections and progress more effectively and efficiently. Through exposure and engagement in some of the above ideas and strategies, pupils will be exploring number, making connections and becoming flexible and fluent. When they see clear structures and representations they can form mental images that will scaffold them when calculating symbolically.

Other resources from Collins



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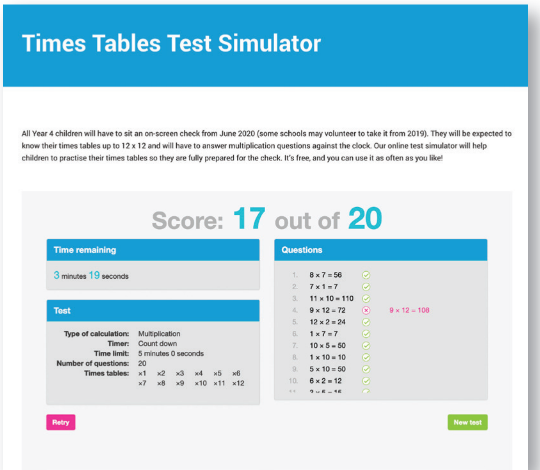

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