Multiplication bonds teaching policy

Multiplication is distributive: multiplication facts can be derived from related known facts by portioning one of the factors, this can be interpreted as portioning the number of groups; two part problems that involve addition/subtraction of products with a common factor can be efficiently solved by applying the distributive law.

Multiplication Bonds key vocabulary Highlighted words are adult words to use and children are not expected to know them
Multiplier Factor multiples Product Multiplicand Array row column inverse Groups of Horizontal Vertical Partition Double halve share equal Repeated addition Something four times, five times etc Multiplied by multiply repeated addition additive multiplicative

Multiplication bonds must be written out correctly: 3x4 must be read as three items four times. The 3 is the group size and is the multiplicand. The 4 is the number of times the group is multiplied.

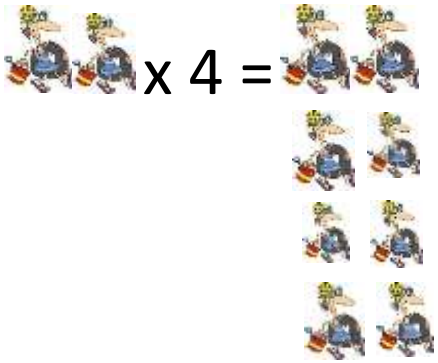
 read as:

One clock three times produces three clocks

The product of one clock three times is three clocks.

One clock is the multiplicand, three is the multiplier and the product is what is produced when we have replicated the one clock three times.

2	x	4	8
Multiplicand	Operation	Multiplier	Product



Read as:

Two swimmers four times produces eight swimmers.

The product of two swimmers four times is eight swimmers.

Teaching multiplication facts

We recognise the importance of children being able to efficiently calculate their multiplication facts. We believe that children need regular and frequent practice at calculating with their multiplication facts.

Year 4 children are required to sit a National Multiplication on line check.

Progression of teaching

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5 and 6
Autumn 1	**Doubling/halving within 5**	**Retrieval practise (counting in 2s, 5s and 10s)** **0x 1x**	**Retrieval practise (previously learned times tables)** **3x**	**Retrieval practise (previously learned times tables)** **6x**	**Conduct a baseline assessment.** **Retrieval practise for identified weaknesses**
Autumn 2	**Doubling/halving within 10**	**2x**	**3x**	**9x**	**Retrieval practise for identified weaknesses**
Spring 1	**Counting in 2s**	**2x**	**4x**	**7x**	**Square numbers**
Spring 2	**Counting in 2s**	**5x**	**4x**	**11x**	**Cube numbers**
Summer 1	**Counting in 5s**	**10x**	**8x**	**12x**	**Prime numbers**
Summer 2	**Counting in 10s**	**Counting in 3s**	**8x**	**Consolidation**	**Consolidation**

At the start of each half term allocate the first two lessons of the half term on direct teaching of the multiplication table.

Visit the multiplication facts daily through counting and games in subsequent games.

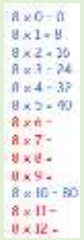
	Yr 1 and 2	Yr 3 and 4	Yr 5 and 6
Autumn 1	**Doubling/halving within 10** **Counting in 2s**	**Retrieval practise (previously learned times tables (2s, 5s and 10s)** **3x**	**Conduct a baseline assessment.** **Retrieval practise for identified weaknesses**
Autumn 2	**2x**	**4x** **8x**	**Retrieval practise for identified weaknesses**
Spring 1	**Counting in 5s**	**6x** **9x**	**Square numbers**
Spring 2	**5x**	**7x** **11x**	**Cube numbers**
Summer 1	**Counting in 10s**	**12x**	**Prime numbers**
Summer 2	**10x** **Counting in 3s**	**Consolidation**	**Consolidation**

Success Criteria:
Children will be able to;

Count fluently in groups of …….
Children will know how to use doubling and halving to efficiently calculate unknown facts.
Children will visualise the array associated with the multiplication facts and will recognise the link with division.
Children will be able to complete fact families for the different factors and multiples.
Children will use the vocabulary: FACTOR MULTIPLE PRODUCT COMMUTATIVE ARRAY DIVISION.
Children will not use the word answer, they will use the word PRODUCT.
Multiplication facts will be represented as :
6x0=0
6x1=6
6x2=12 etc the first digit is the multiplicand and tells you the group size. The algorithm is read as 6 nought times, 6 one time, six two times etc.

The algorithm is read this way as it links onto algebra when the algorithms are expressed as 6n , where 6 is the constant and the n is the variable.

The table below sets out the content of each lesson, as well as ideas for regular practice.

<table>
<tr>
<td>Success Criteria:
Children will be able to;
• Count fluently in groups of …
• Use doubling/halving to efficiently calculate unknown facts.
• Visualise the array associated with the multiplication facts and will recognise the link with division.
• Use the vocabulary: factor, multiple, product, commutative, array, division
• Use the word PRODUCT rather than answer.</td>
<td>Vocabulary:
multiplicand, multiplier, product, factors, multiple, equals, double, halve, share, multiplied by, multiply, equal groups, repeated addition, quantity, commutative, groups of, square, cube, array, row, column</td>
<td>Key Points to remember: e.g. using 6x
Multiplication facts will be presented as:
6 x 0 = 0
6 x 1 = 6 etc.
The first digit is the multiplicand (quantity).
Multiplication facts are read as:
The product of 6, … times is …
or 6, … time produces …</td>
</tr>
<tr>
<td colspan="2">Lesson 1: WALT: count in …
Introduce the new multiplication. Link it to the real world. Think, Pair, Share: What comes in groups of …? Create a class poster of their ideas and place on Maths Working Wall. (This can be added to throughout the half term)
Display the multiplication bonds without the products. Begin to fill them in using facts children already know, using colour to highlight those known/unknown:
We have learned the 2, 3, 4, 5 and 10 times multiplication bonds. We already have some of the facts for the 8 times tables. What are they?
Which facts are left to learn? Which facts might help us to work them out?
Double/Halve/Add/Subtract
 
Chant the whole multiplication table: … times 0 produces …, … times 1 produces …, … times 2 produces … etc. Use the word ‘produces’ to reinforce and cement the vocab.
Adding groups of your multiplicand slowly build arrays to show each product – concrete (counters/multi-link) or pictorial (IWB). For each say the multiplication fact in full.
Count up and down as a class. Make sure to always include 0.
For rest of lesson allow children to play games or carry out activities to further explore.</td>
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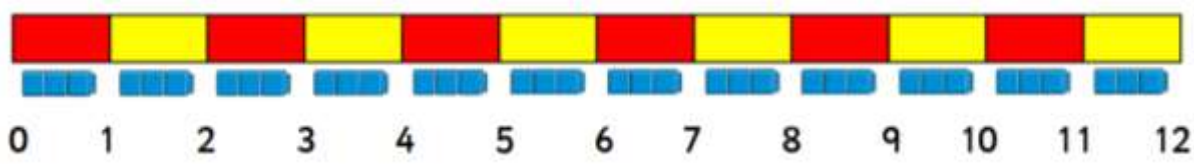
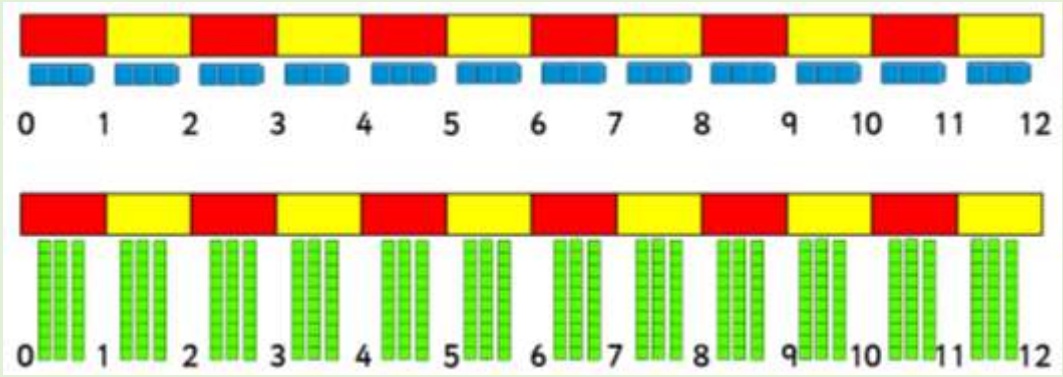
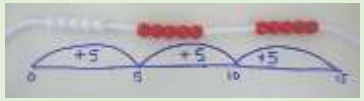
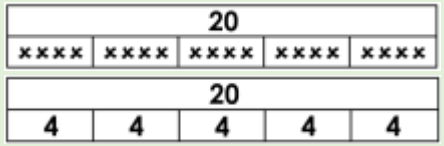
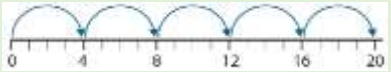
Lesson 2: WALT: count in … Produce an empty number track with the factors written underneath (IWB) or a counting stick. Have sticks of multi-link prebuilt to the required multiplicand.  Build up the products using doubling and halving, as well as adding or subtracting. Use the multi-link towers for conceptual understanding, *If we know …, one times, we can double this to find the product of …, two times. (repeat for x4, x8)* *If we know …, ten times, we can halve this to find the product of …, five times.* *If we know …, eight times, how could we work out the ones either side? (+ or – for x3, x7, x9)* Fill in the products on the empty number track or using post-it notes on the counting stick. Chant the whole multiplication table: … times 0 produces …, … times 1 produces …, … times 2 produces … etc. Count in the multiplication bonds up and down a number of times, and slowly remove different products from the number track or counting stick until they are chanting on their own. For rest of lesson allow children to play games or carry out activities to further explore.	Counting Stick: Use similar process as shown in video https://www.youtube.com/watch?v=yXdHGBfoqfw

Lesson 3: WALT: count in … and link it to … Repeat the start of Lesson 2. Ask questions to allow children to link facts and understand the structure of multiplication. Next show an empty number track underneath the original, but replace the unit multiplicand with it multiplied by ten, e.g. instead of 3 cubes, put 3 ten sticks. Ask children: What is the same? What is different?  Build up the products using what they know – linking facts – as well as doubling and halving, adding or subtracting when required. Keep referring back to the original: What do you notice? When complete, count in the new multiplicand, e.g. 30. Depending on appropriateness for class, repeat for hundreds, thousands, etc. For rest of lesson allow children to play games or carry out activities to further explore.	How can I use 7x3 to work out 7x6? Can you find a number that is a factor of both 64 and 40? Why is 17 not a multiple of 3? True or false? 83 cannot be in the 6x table? If I know 3x4 is 12, what else do I know?
Keeping Skills Shape Games, songs (BBC Supermovers), counting-stick work, step counting using manipulatives, chanting, technology-based, quick-reaction exercises, Times Tables Rock Stars, tests should only occur periodically (start and end of a half term) and not as the sole activity in the session – the other games and activities should enable you to formatively assess your children.	

As Year 4 children are required to sit a National Multiplication Check on-line, provide them with opportunities to familiarise them with how the check occurs. Time should be given to them being able to practice using a similar check (TTRS).

CPA Approach

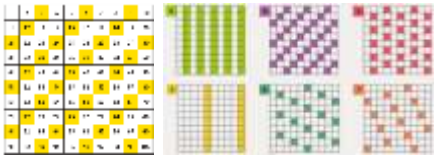
The CPA approach helps children learn new ideas and build on their existing knowledge by introducing abstract concepts in a more familiar and tangible way. They are able to achieve a much deeper understanding if they do not have to resort to rote learning and are able to solve problems without having to memorise. Although presented as three distinct stages, we understand the need to move back and forth between stages to reinforce concepts, and that all children, however young, can see the connection between each representation.

Purpose	**Concrete:** ***'doing' stage***	**Pictorial:** ***'seeing' stage***	**Abstract:** ***'symbolic' stage***
Expose structure *There is strength in using these alongside one another - for example concrete/pictorial alongside abstract.*   	Real-life objects in natural groups (pairs of socks, hands, cars, dice, coins, dominoes, cards)  Multi-link or Unifix Cubes Counters Bead strings Numicon pegs Numicon shapes Dienes (Base 10) Counting stick Cuisenaire Rods   	Bar Model  Number track  Number line  Arrays: most versatile model for showing the properties of multiplication (repeated addition, commutative, distributive, associative and inverse of division) 	Written equations: 2+2+2+2+2=10 (repeated addition) 2 x 5 = 10

Explore pattern

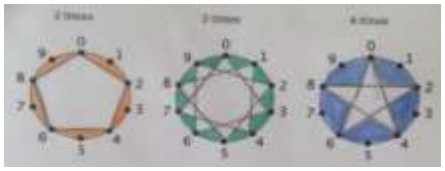
Ensure children engage with 'rich' tasks and investigations which encourage deeper knowledge and understanding, and require children to use greater levels of reasoning, conjecturing, predicting and explaining.

Hundred Square



Multiplication Circles:

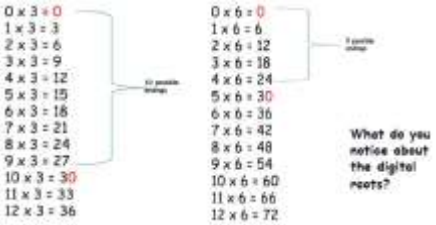
Start with a 10 point circle and connect the dots around the circle using the last digit of each product.



Multiplication Grid

×	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

Explore the last digits of the products – investigate how many different possible endings there are.



Intelligent Practice (lesson 3)

2 × 3 =	6 × 7 =	9 × 8 =
2 × 30 =	6 × 70 =	9 × 80 =
2 × 300 =	6 × 700 =	9 × 800 =
20 × 3 =	60 × 7 =	90 × 8 =
200 × 3 =	600 × 7 =	900 × 8 =

Misconception

A common misconception stems from reading the equations incorrectly. Take for example this image. It does not show 4x2, 3x4 and 2x6. The multiplicand, the first number is telling us the group size and the second is telling us how many times. It demonstrates the need for the correct language in order for the concrete and pictorial representations to be true reflections of the multiplication taking place.