

MULTIPLICATION CALCULATION GUIDANCE

Year 1

Pupils should be taught to:

- solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Year 2

Pupils should be taught to:

- recall and use multiplication ... facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication ... within the multiplication tables and write them using the multiplication (\times), ... and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication ... using materials, arrays, repeated addition, mental methods, and multiplication ... including problems in contexts.

Year 3

Pupils should be taught to:

- recall and use multiplication ... facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication ... using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written method
- solve problems, including missing number problems, involving multiplication ... including integer scaling problems and correspondence problems in which n objects are connected to m objects.

Year 4

Pupils should be taught to:

- recall multiplication ... facts for multiplication tables up to 12×12
- use place value, known and derived facts to multiply ... mentally, including: multiplying by 0 and 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Year 5

Pupils should be taught to:

- solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply ... numbers mentally drawing upon known facts
- multiply ... whole numbers and those involving decimals by 10, 100 and 1000
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

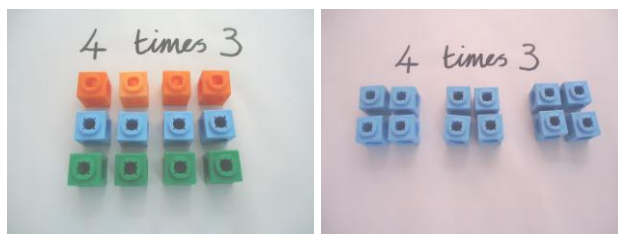
Year 6

Pupils should be taught to:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- perform mental calculations, including with mixed operations and large numbers.
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

STAGE 1

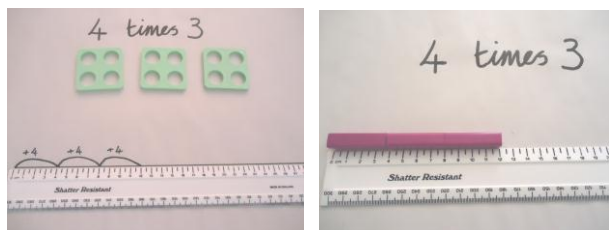
Develop multiplication as repeated grouping (repeated addition of sets of the same size) using practical apparatus and diagrams.



STAGE 2

Develop an understanding of multiplication using arrays and number lines showing repeated groups.

Use number lines to show repeated grouping (repeated addition of sets of the same size).



STAGE 3

Develop the use of x and = symbols to record calculations horizontally.

Use arrays and other practical apparatus to illustrate commutativity (that multiplication calculations can be carried out in any order) e.g. 2×5 arrives at the same product as 5×2 .

Begin to derive new facts from known facts

e.g. $3 \times 2 = 6$ (known fact)

$30 \times 2 = 60$

$300 \times 2 = 600$ etc.

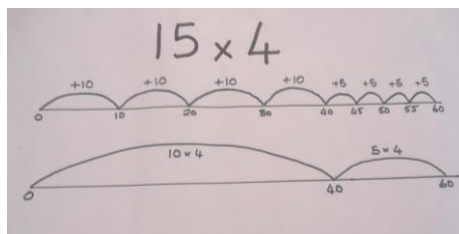
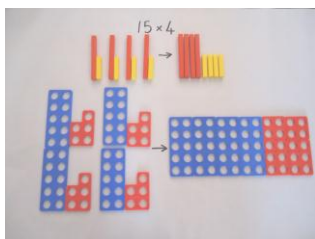


STAGE 4

Begin to use understanding of place value and partitioning to carry out multiplication of two-digit by one-digit numbers

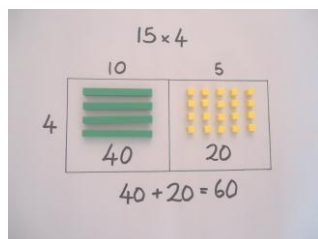
$$\begin{array}{c} 15 \times 4 \\ \swarrow \searrow \\ 10 \quad 5 \end{array}$$

$$\begin{aligned} 10 \times 4 &= 40 \\ 5 \times 4 &= 20 \\ 40 + 20 &= 60 \end{aligned}$$



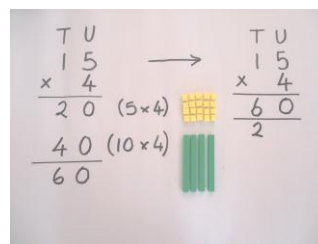
Use grid approaches to illustrate as appropriate using practical apparatus to support.

$$4 \begin{array}{|c|c|} \hline 10 & 5 \\ \hline 40 & 20 \\ \hline \end{array}$$



Develop expanded recording in columns and then move to formal written method, using practical apparatus to support as required.

$$\begin{array}{r} \text{T} \quad \text{U} \\ 1 \quad 5 \\ \times \quad 4 \\ \hline 2 \quad 0 \quad (5 \times 4) \\ 4 \quad 0 \quad (10 \times 4) \\ \hline 6 \quad 0 \end{array} \longrightarrow \begin{array}{r} \text{T} \quad \text{U} \\ 1 \quad 5 \\ \times \quad 4 \\ \hline 6 \quad 0 \\ 2 \end{array}$$



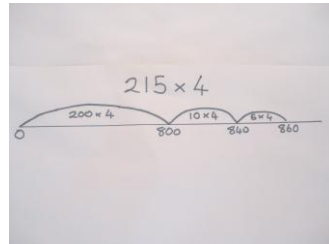
STAGE 5

Extend written approaches to HTU x U, then to ThHTU x U

Illustrate using partitioning approaches as required

$$\begin{array}{c} 215 \times 4 \\ \swarrow \quad \downarrow \quad \searrow \\ 200 \quad 10 \quad 5 \end{array}$$

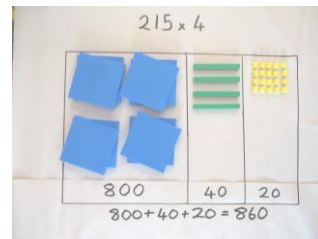
$$\begin{aligned} 200 \times 4 &= 800 \\ 10 \times 4 &= 40 \\ 5 \times 4 &= 20 \\ 800 + 40 + 20 &= 860 \end{aligned}$$



Illustrate using grid approaches as required

	200	10	5
4	800	40	20

$$800 + 40 + 20 = 860$$



Develop expanded recording in columns and then move to formal written method, using practical apparatus to support as required.

	H	T	U	
	2	1	5	→
x			4	
		2	0	(5 x 4)
		4	0	(10 x 4)
	8	0	0	(200 x 4)
	8	6		

	H	T	U
	2	1	5
x			4
	8	6	0
		2	

STAGE 6

Extend written approaches to HTU x TU and ThHTU x TU

Illustrate using grid approaches as required

26 x 13

	20	6
10	200	60
3	60	18

$$200 + 60 + 60 + 18 = 338$$

Develop expanded recording in columns and then move to formal written method of long multiplication, using practical apparatus to support as required.

	H	T	U		H	T	U
		2	6			2	6
x		1	3	→		1	3
		1	8			7	8
			(6 x 3)			1	
		6	0			2	6
			(20 x 3)			3	8
		6	0			3	3
			(6 x 10)			1	0
	2	0	0		2	6	0
			(10 x 20)		3	3	8
	3	3	8		1		
	1						

226 x 13

	200	20	6
10	2000	200	60
3	600	60	18

$$2000 + 600 + 200 + 60 + 60 + 18 = 2938$$

Develop expanded recording in columns and then move to formal method of long multiplication, using practical apparatus to support as required.

	H	T	U	→	H	T	U	
x	2	2	6		x	2	2	6
		1	3			1	3	
		1	8		6	7	8	
		6	0			1		
6	0	0			2	2	6	0
		6	0		2	9	3	8
	2	0	0		1			
2	0	0	0					
2	9	3	8					
	1							