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 (×), … 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.

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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.

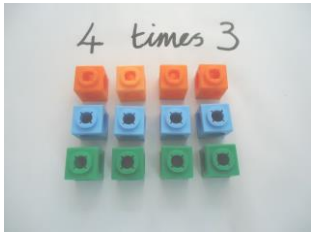
Year 6

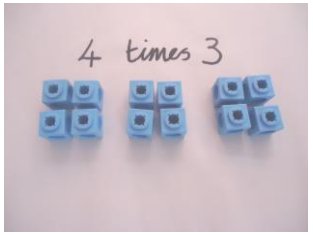
Pupils should be taught to:

- 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.





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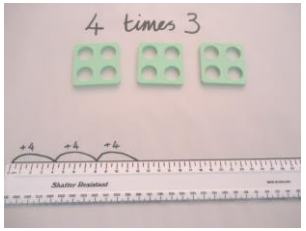
STAGE 2

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

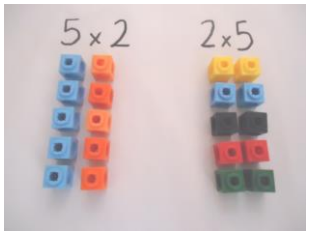
Use number lines to show repeated grouping (repeated addition of sets of the same size).

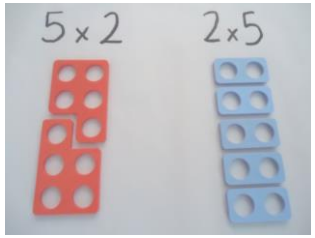


STAGE 3

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 x 5 arrives at the same product as 5 x 2.
Begin to derive new facts from known facts
e.g. 3 x 2 = 6 (known fact)
30 x 2 = 60
300 x 2 = 600 etc.





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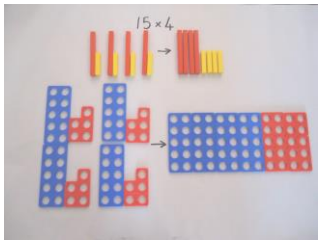
STAGE 4

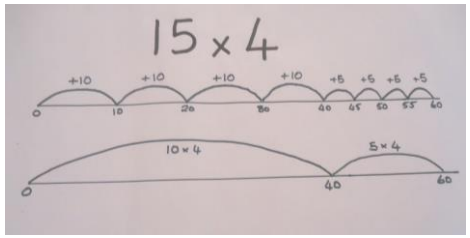
Begin to use understanding of place value and partitioning to carry out multiplication of two- digit by one -digit numbers

15 x 4

10 5

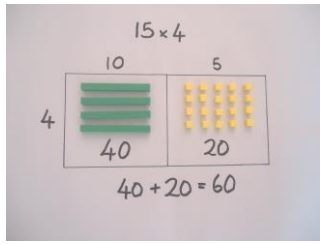
10 x 4 = 40
5 x 4 = 20
40 + 20 = 60





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

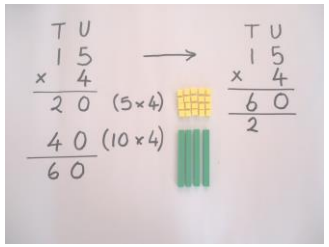
	10	5
4	40	20



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

	T	U	
	1	5	
x		4	
	2	0	(5 x 4)
	4	0	(10 x 4)
	6	0	

	T	U
	1	5
x		4
	6	0
	2	



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STAGE 5

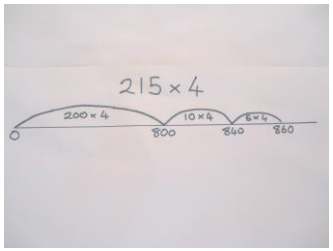
Extend written approaches to HTU x U, then to ThHTU x U

Illustrate using partitioning approaches as required

215 x 4

200 10 5

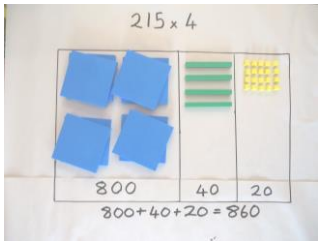
200 x 4 = 800
10 x 4 = 40
5 x 4 = 20
800 + 40 + 20 = 860



Illustrate using grid approaches as required

x	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	
	1	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	

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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                      x       1   3
       1   8   (  6 x  3)             7   8
       6   0   ( 20 x  3)               1
       6   0   (  6 x 10)         2   6   0
   2   0   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

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

	H	T	U	
	2	2	6	
x		1	3	
		1	8	(6 x 3)
		6	0	(20 x 3)
	6	0	0	(200 x 3)
		6	0	(6 x 10)
	2	0	0	(20 x 10)
2	0	0	0	(200 x 10)
2	9	3	8	
	1			

→

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

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