Year 1

Statutory requirements

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.

Notes and guidance (non-statutory)

Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

They make connections between arrays, number patterns, and counting in twos, fives and tens.

Year 1

• 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



10 20 30 40 50



How many groups of 2 are there in 8?

If 5 children have 2 jelly babies each, how many are needed altogether?

There are 8 socks on the washing line, how many pairs are there?

Can you build me a tower with 8 blocks? If you snap it in half, how many blocks are in each tower?



How many wheels are there on three bikes?



If there were 10 wheels, how many bikes will there be?

<u>Sharing</u>

Provide opportunities to share out objects within the group, for example fruit, 'small world' toys or small equipment in the outdoor area.



Year 2

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) 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 and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Notes and guidance (non-statutory)

Pupils use a variety of language to describe multiplication and division.

Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.

Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, $40 \div 2 = 20$, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, $4 \times 5 = 20$ and $20 \div 5 = 4$).

<u>Year 2</u>

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs





• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.



There are 12 wheels altogether. How many bikes are there?



Dad baked 35 buns for Sally's birthday party and they were all eaten. If each child ate 5 buns, how many children went to the party?

There were 7 children at the party and they each ate 5 buns. How many buns were eaten altogether?

MAN MAN MAN

How many fingers are there on 6 gloves? 5+5+5+5+5+5 6×5 (6 lots of 5 are...)



10 ÷ 5 = 2 5 ÷ 10 = ???

"I can't make groups of 10 from 5!!!"

There are 25 crayons in the tub. How many boxes of 5 can we make?



Additionally trio cards can be used to help children recognise trios of numbers for multiplication and division.



Provide opportunities for pupils to find the value of unknown numbers within number sentences.

Year 3

Statutory requirements

Pupils should be taught to:

recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables

 write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

solve problems, including missing number problems, involving multiplication and division, including
positive integer scaling problems and correspondence problems in which n objects are connected to m
objects.

Notes and guidance (non-statutory)

Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (for example, using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (for example, $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).

Pupils develop reliable written methods for multiplication and division, starting with calculations of twodigit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.

Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

Year 3

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables

3 x 13 (3 lots of 13)

30 + 9 = 39

 $(3 \times 3) = 9$ (3 lots of 3)

"Three lots of ten plus three lots of three."

Use the models and images demonstrated in Y2 to enable children to learn and recall these additional multiplication tables.

Additionally, children can use their knowledge of the 2 times tables to help calculate the 4 times tables (i.e. double the 2s to calculate the 4s) and their knowledge of the 4s to calculate the 8s.

See Y2 for making links with division facts through inverse operations.

Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two -digit numbers times one-digit numbers, using mental and progressing to formal written methods





Multiplication Array ITP - see shared drive



How many groups of 3 can I make from 39?

10 groups of 3 make 30 and I have 9 left. I can make another 3 groups of 3.

Altogether I have 13 groups of 3.

Children can go on to record their working on a number line for the purpose mental multiplication and division. + 30 +9 10 x 3 3 x 3 30 39 0

Before children attempt to multiply two-digit numbers by a one-digit number they must be confident at multiplying multiples of 10 by one-digit numbers e.g. 5 x 30

Using PV counters enables children to see this as '5 lots of 3, lots of 10'

This will help children use known facts to derive related facts

E.g. If 5 x 3 = 15, 5 x 30 must equal 150

Similarly, regarding division; if $15 \div 5 = 3$, $150 \div 5 = 30$



Multiplying/Dividing by 10

Additionally, they need to be taught the effect of multiplying by 10 prior to multiplying a two-digit number by a one-digit number .

In light of work to follow in Year 4, pupils should also be taught the effect of dividing by ten.

Teach the children to move the digits to the left and fill any gaps left with 0 (place holder) for multiplication and to the right for division.

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Moving Digits ITP - see shared drive







• Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Use correspondence problems in which objects are connected to objects (for example

Round remainders up or down depending on the context.

E.g. Twenty two children are going to a birthday party by car. Each car can take four children. How many cars are **needed**? (round up)



The farmer has collected twenty seven eggs from his chickens. He packs them in boxes of six. How many boxes can he **fill**? (round down)



Jane built a tower 13cm high. Her brother built one 8 times as high. How tall was her brother's tower? (Integer scaling)



Some sweets were shared between 4 children. Each child got 7 sweets. How many sweets were shared?

÷ 4 = 7

4 cakes are shared equally between 8 children. How much will each child get?



• Pupils should also be given opportunities to develop efficient mental methods, for example, reordering when multiplying three numbers to make the calculation more manageable mentally e.g.

```
4 \times 6 \times 5 =
```

4 × 5 × 6 =

20 × 6 = 120 (6 x 2 x 10 '6 lots of 2, lots of 10')

• Pupils should be taught systematic means of solving correspondence (how many ways?) type problems in which m objects are connected to n objects (for example, 2 hats and 3 coats, how many different outfits?







<u>Year 4</u>

Pupils should be taught to:

recall multiplication and division facts for multiplication tables up to 12 × 12

 use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 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.

Notes and guidance (non-statutory)

Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency.

Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 \div 3 = 200 can be derived from 2 x 3 = 6).

Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers (see <u>Mathematics Appendix 1</u>).

Pupils write statements about the equality of expressions (for example, use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, $2 \times 6 \times 5 = 10 \times 6 = 60$.

Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.

• Recall multiplication and division facts for multiplication tables up to 12 × 12

The following may help children derive the multiplication/division tables as they work towards rapid recall

- \Rightarrow For the 6s pupils can double the 3s or recall 5 lots of and add 1 more lot
- \Rightarrow For the 7s pupils can recall the 5s and add 2 lots of
- \Rightarrow For the 9s pupils can subtract 1 lot from 10 lots of
- \Rightarrow For the 11s and 12s pupils can do 10 lots plus 1 or 2 lots

Continue to use the models and images previously demonstrated to consolidate children's understanding of the multiplication/division facts they are beginning to recall.

 Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers

6 x 40 = 6 x 4 x 10 = 240 8 x 700 = 8 x 7 x 100 = 5600 600 ÷ 3 = (There are 2, 3s in 6 so there must be 200 in 600) 630 ÷ 7 (There are 9, 7s in 63 so there must be 90 in 630)

Emphasise the language of 'lots of' and 'groups of' throughout teaching of multiplication and division to aid understanding. As well as assisting the understanding of the inverse nature of multiplication and division, this helps pupils understand multiplying by 0 and 1 and dividing by 1.

When teaching pupils to multiply three numbers e.g. $2 \times 6 \times 5$, encourage them to look at the numbers first to see if rearranging the numbers makes the multiplication more manageable. i.e. $(2 \times 5) \times 6$



Recognise and use factor pairs and commutativity in mental calculations

Use counters and squared paper or cubes to allow children to find all the factors of a given number e.g.12

Continue to build up the pairs of factors until they meet in the middle to ensure you have all the factors.

Ensure children have a thorough understanding that multiplication can be done in any order e.g.8 x 15 = 15×8

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

No Exchanges

Exchange 10 ones







Once children are comfortable recording in the above manner, move them on to visualising the multiplication of each digit, as below:



• 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. (See Y3)

<u>Year 5</u>

Pupils should be taught to:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- 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 and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- 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.

Notes and guidance (non-statutory)

Pupils practise and extend their use of the formal written methods of short multiplication and short division (see <u>Mathematics Appendix 1</u>). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.

They use and understand the terms factor, multiple and prime, square and cube numbers.

Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, $98 \div 4 = 98/4 = 24$ r $2 = 24\frac{1}{2} = 24.5 \approx 25$).

Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.

Distributivity can be expressed as a(b + c) = ab + ac.

They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$).

Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, 13 + 24 = 12 + 25; 33 = 5 x).

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19

Multilple : A whole number multiplied by another whole number gives us a multiple of both numbers

E.g. a x b = multiples of a and b, where a and b are whole numbers!!

Factor: A whole number that divides exactly into another number (see Y4)

e.g. factors of 24...

1, 2, 3, 4, 6, 8, 12, 24

Prime number:

- A number that has exactly two distinct factors (remember that 1 is not a prime number it has only one factor!) but 2 is!!
- A number that can only be divided evenly by itself and one

Composite number:

• A number that has more than two factors (not a prime number)

Prime factor:

• A factor that is also a prime number e.g. a the prime factors of 24 are 2 and 3

• 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



When first introducing two by two digit multiplication teach pupils to multiply the number by the ones number then the tens.



 Multiply and divide numbers mentally drawing upon known facts (See work in previous years on mental multiplication and division) Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context

42 ÷ 3 = 14











	164	
3	4 ¹ 9 ¹ 2	
I		

н т о

How many groups of 3 hundreds can I make out of 4 hundreds? I can make 1 group of 3 hundred and I have 1 hundred left.

How many groups of 3 tens can I make out of 19 tens I can make 6 groups of 3 tens and I have 1 ten left.

How many groups of 3 ones can I make out of 12 ones? I can make 4 groups of 3 ones.



Make sure to include examples that involve zero, both within the question and the answer and calculations that involve remainders.

Move children on to 4 digit numbers as appropriate.

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.





347 x 100 = 34700

3.04 × 100 = 47







156 ÷ 100 = 1.56





Multiplication Board ITP - see shared drive



- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- 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.

<u>Year 6</u>

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
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Notes and guidance (non-statutory)

Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division (see <u>Mathematics Appendix 1</u>).

They undertake mental calculations with increasingly large numbers and more complex calculations.

Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.

Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.

Pupils explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$.

Common factors can be related to finding equivalent fractions.

<u>Year 6</u>

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



divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context



 divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context



Remind children, when using division to solve problems, to look carefully at what the question is asking before carrying out the calculation. If the problem is asking **how many** each will get or **how many are left**, a method resulting in a **remainder** is best; if asking **how much** each person will get, a method resulting in a **fractional or decimal answer** is more appropriate.

- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers

(See Year 5)

• use their knowledge of the order of operations to carry out calculations involving the four operations

BODMA	S		
Bracket	S		
1	6 × <mark>(5 + 3)</mark>	= 6 × <mark>8</mark>	= 48
x	6 × (5 + 3)	= 30 + 3	= 33 (wrong)
<mark>O</mark> rder (j	oower)		
1	5 × <mark>2²</mark> =	5 × <mark>4</mark> =	20
×	5×2^2 =	10 ² =	100 (wrong)
Divisior	n/ <mark>M</mark> ultiplicati	on	
1	<mark>30 ÷ 5</mark> × 3	= <mark>6</mark> × 3	= 18
×	30 ÷ 5 × 3	= 30 ÷ 15	= 2 (wrong)
Additio	n/ <mark>S</mark> ubtractic	n	

1

- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division

 $2 + \frac{5 \times 3}{5} = 2 + \frac{15}{5} = 17$

 $2 + 5 \times 3 = 7 \times 3 = 21$ (wrong)

• use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Multiplication - Calculation

Year 6

• Calculate mentally with integers and decimals TU × U, U.t × U

Teach children to use the 'grid method' strategy demonstrated in Y4 to mentally carry out the above multiplication calculations.

Children need to be aware of and determine appropriate mental calculation strategies dependent on the numbers within the calculation. See Y5 for special case multiplication strategies.

• Use efficient written methods to multiply integers and decimals by a one-digit integer, and to multiply two-digit and three-digit integers by a two-digit integer.

26.3 x 4 =	372 x 24 =		372	
		X	24	
		1	4 8 8	
		7	4 4 0	
		8	928	
			1	

• Use a calculator to solve problems involving multi-step calculations.

Multiplication - Calculation

<u>Year 5</u>

• Refine and use effective written methods to multiply HTU \times U, TU \times TU and U.t \times U

Once children have a sound understanding of the below expanded method, they can be introduced to the formal compact method.

Reduce the recording showing the links to the grid method - long multiplication.



Before children begin to multiply U.t \times U, they should have a firm understanding of multiplying tenths by a whole-number e.g. 0.6 \times 3



See Mult-e-Maths - 'Numbers' resource bank to create a variety of number lines.

 Use a calculator to solve problems, including those involving decimals, which require multiplication.

Year 5

Extend mental methods for whole-number calculations to multiply a two-digit by a one -digit number.

Teach children to use the 'grid method' strategy demonstrated in Y4 to mentally multiply twodigit numbers by one-digit.

Children need to be aware of and determine appropriate mental calculation strategies dependent on the numbers within the calculation.

Doubling and Halving (mult by 2,4,8, 25,50 etc)



Rounding and adjusting (mult by 9,19,49, 0.90 etc)



Use understanding of place value to multiply whole-numbers and decimals by 10, 100 and 1000

н т U т н U U Th 10 It is vital that children understand that the decimal point never moves.

 $\frac{1}{10}$

100

Moving Digits ITP - see shared drive