

Calculations Policy: Multiplication and Division Methods



Inspiring a love of learning through
the bonds of family, faith and friendship.

Year 1

Multiplication and Division

Objectives

- 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.

Key Skills

Multiplication

- Count in multiples of 2, 5 and 10.
- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

Division

- 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.
- Through grouping and sharing small quantities, pupils begin to understand division, and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

Vocabulary

Multiplication

groups of, lots of, times, array, altogether, multiply, count

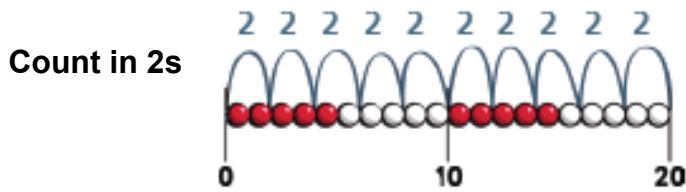
Division

share, share equally, one each, two each..., group, groups of, lots of, array

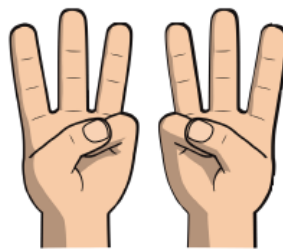
Year 1 Multiplication

Immerse children in practical opportunities to develop understanding of multiplication and division.

Counting in steps ('clever' counting)



Count in 10s and 5s



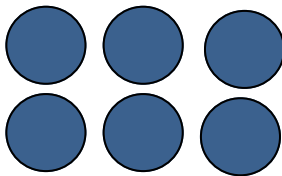
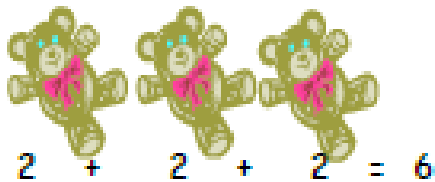
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Doubling and halving

Find doubles to double 5 using fingers

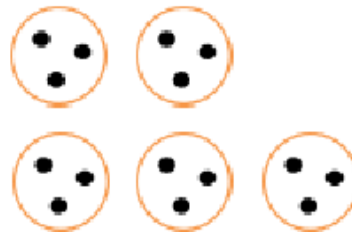
Multiply with concrete objects, arrays and pictorial representations.

How many legs will 3 teddies have?



There are 3 sweets in one bag. How many sweets are in 5 bags altogether?

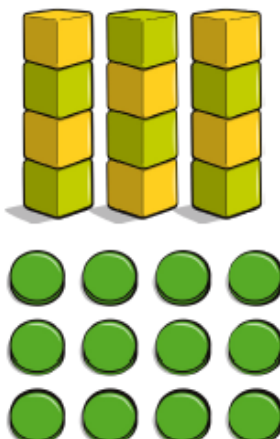
$$3+3+3+3+3=15$$



Grouping

Begin to use visual and concrete arrays and sets of objects to find the answer to 'three lots of four' or 'two lots of five' etc

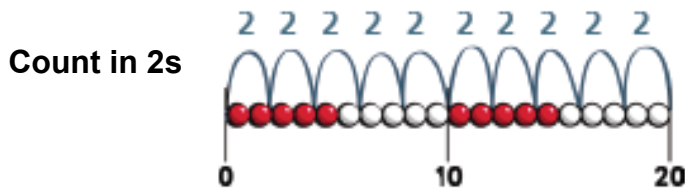
Three lots of four



Year 1 Division

Immerse children in practical opportunities to develop understanding of multiplication and division.

Counting in steps ('clever' counting)



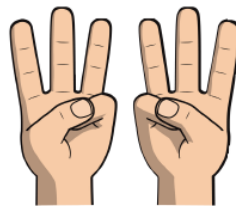
Count in 10s and 5s

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Doubling and halving

Find doubles to double 5 using fingers



Group and share small quantities

Using objects, diagrams and pictorial representations to solve problems involving both **grouping** and **sharing**.

Grouping

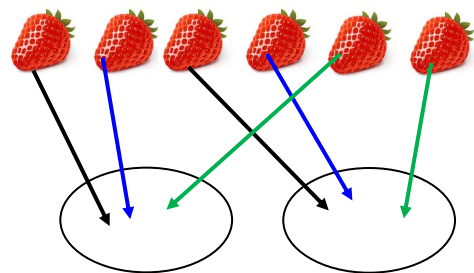
There are 6 strawberries, how many people can have 2 strawberries each?



3 people
3 strawberries

Sharing

There are 6 strawberries shared between 2 people, how many do they each get?



Children should :

- Use lots of practical apparatus, arrays and picture representations.
- Be taught to understand the difference between '**grouping**' objects (How many groups of 2 can you make?) and '**sharing**'. (Share these sweets between 2 people)
- Be able to count in multiples of 2s, 5s and 10s.
- Find **half** of a group of objects by sharing into 2 equal groups.

Example division problem in a familiar context:

There are 5 children on this table and there are 15 pieces of fruit to share between them. If we share them equally, how many will we each get?

Can they work it out and give a division statement... ?

"15 shared between 5 people gives you 3 each."

Year 2

Multiplication and Division

Objectives

- 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 (\times), division (\div) 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.

Key Skills

Multiplication

- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the **2, 5 and 10** multiplication tables, including recognising odds and evens.
- Write and calculate number statements **using the \times and $=$ signs**.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.

Division

- Count in steps of 2, 3, and 5 from 0.
- 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 \times , \div and $=$ 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.

Vocabulary

Multiplication

groups of, lots of, times, array, altogether, multiply, count, **multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times...**

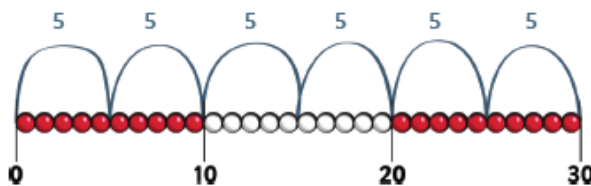
Division

share, share equally, one each, two each..., group, groups of, lots of, array, **divide, divided by, divided into, division, grouping, number line, left, left over**

Year 2 Multiplication

Counting in steps ('clever' counting)

Count in 2s, 5s, 10s



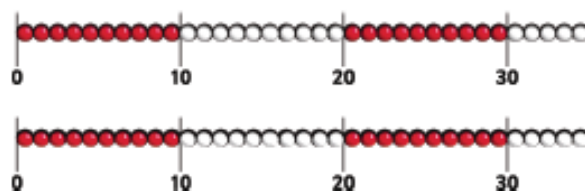
Doubling

Know doubles to double 20



Begin to know doubles of multiples of 5 to 100 e.g. double 35 is 70.

Begin to double 2-digit numbers less than 50 with 1s digits of 1, 2, 3, 4, or 5



Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

Use arrays:



$$5 \times 3 = 15$$

$$5 \times 3 = 3 + 3 + 3 + 3 + 3 = 15$$

Relate to



$$3 \times 5 = 5 + 5 + 5 = 15$$

'clever' counting



$$3 \times 5 = 15$$

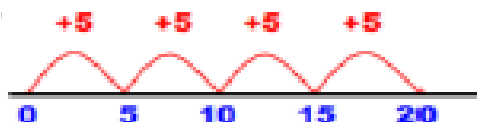
Use arrays to help teach children to understand the commutative law of multiplication and give examples such as $3 \times _ = 6$

Use repeated addition on a number line:

Starting from zero, make equal jumps on a number line to work out multiplication facts and write multiplication statements using \times and $=$ signs

4 lots of 5

$$4 \times 5 = 20$$



Move on to the grid method if children are secure, (see Year 3).

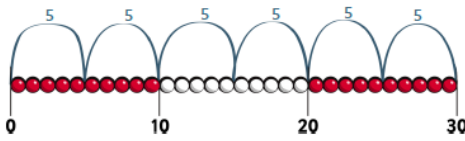
Children must be able to recall multiplication facts for 2, 10 and 5 x tables. Through regular practice in school and at home. Children will be introduced to Times Tables Rock Stars (TTRS) to support their development of times tables knowledge through the use of games and practise sheets. Begin to know 3 x tables.

Year 2 Division

Group and share using the \div and $=$ sign.

Counting in steps ('clever' counting)

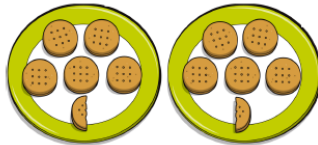
Count in 2s, 10s and 5s. Begin to count in 3s.



Halving

Find half of numbers up to 40, including realising that half of an odd number gives a remainder of 1 or answer containing a $\frac{1}{2}$ e.g. $\frac{1}{2}$ of 11 = $5\frac{1}{2}$

Begin to know half of multiples of 10 to 100



Sharing

Begin to find half or a quarter of a quantity using sharing e.g. find a quarter of 16 cubes by sharing the cubes into four piles.



Find $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ of small quantities.

Grouping

Relate division to multiplication by using arrays or towers of cubes to find answers to division e.g. How many towers of 5 cubes can I make from twenty cubes? As $_ \times 5 = 20$ and also as $20 \div 5 = _$. Relate to 'clever counting'.



Written methods

Group and share

Using objects, diagrams and pictorial representations and grouping on a number line.

How many groups of 4 can be made with 12 stars?

Grouping

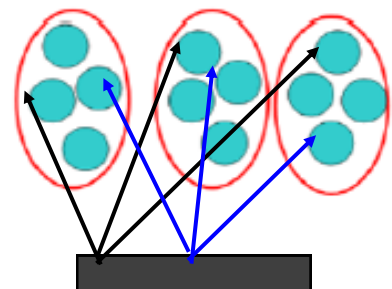
4 4 4



12 sweets shared between 3 people

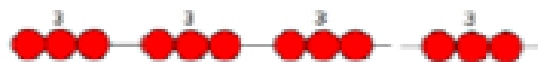
Sharing

4 4 4

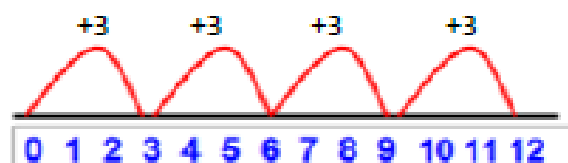


Grouping using a number line

Children to use a beadstring or practical apparatus to work out problems like 'A CD cost £3. How many CDs can I buy with £12?' This develops understanding of grouping.



Move towards recording this on a number line. Group from zero in equal jumps of the divisor find out 'how many groups of $_$ in $_$?'



If children are secure counting in equal jumps move on to the Year 3 method using groups of the divisor. See Y3 method.

Year 3

Multiplication and Division

Objectives

- 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

Key Skills

Multiplication

- Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including **2-digit x single-digit**, drawing upon mental methods, and progressing to reliable written methods.
- Solve multiplication problems, including missing number problems.
- Develop mental strategies using commutativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$)
- Solve simple problems in contexts, deciding which operations and methods to use.
- Develop efficient mental methods to solve a range of problems e.g using commutativity ($4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and for missing number problems $x \times 5 = 20$, $3 \times x = 18$, $x = 32$

Division

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- 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, in contexts, and including missing number problems, involving multiplication and division.
- Pupils develop efficient mental methods, for example, using multiplication and division facts e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$ to derive related facts $30 \times 2 = 60$, so $60 \div 3 = 20$ and $20 = 60 \div 3$.

Vocabulary

Multiplication

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., **partition, grid method, carry, exchange, multiple, product, tens, units, value**

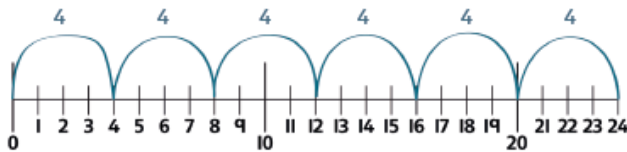
Division

share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, **carry, exchange, inverse, short division, remainder, multiple**

Mental Strategies **Year 3 Multiplication**

Counting in steps ('clever' counting)

Count in 2s, 3s, 4s, 5s, 8s, and 10s.



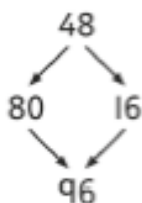
1	2	3	4	5	6	7	8	9	10
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31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Doubling

Know doubles to double 20.

Know doubles of multiples of 5 to 100

Find doubles of numbers to 50
using partitioning e.g. double 48



Grouping

Recognise that multiplication is commutative e.g. $4 \times 8 = 8 \times 4$.

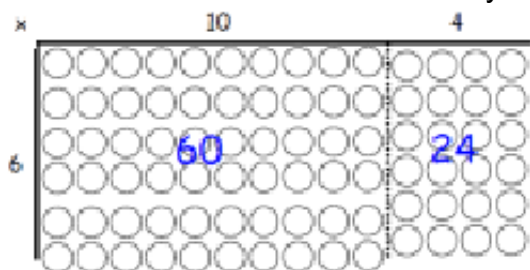
Multiply multiples of 10 by 1-digit numbers using known number facts e.g. $3 \times 8 = 24$ so I know $30 \times 8 = 240$ as 30 is 10 times bigger.

Written methods

Multiply 2-digits by a single digit number

Introduce the grid method for multiplying 2 digit by single-digits with children physically making an array to represent the calculation then translate this to the grid method.

Make the link between an array and the grid method



$$\begin{array}{r}
 \times \quad 20 \quad \quad 3 \\
 8 \quad \boxed{160} \quad \boxed{24}
 \end{array}$$

$$160 + 24 = 184$$

In order to carry out this method, children must be able to:

- Partition numbers into tens and units
- Multiply multiples of ten by a single digit (e.g. 20×4) using their knowledge of multiplication facts and place value
- Recall and work out multiplication facts in the **2, 3, 4, 5, 8 and 10** times tables.
- Work out multiplication facts not known by repeated addition or other taught mental strategies (e.g. by commutative law, working out near multiples and adjusting, using doubling etc.) Strategies to support this are repeated addition using a number line, bea bars and arrays.

Children must be able to recall multiplication facts for 2, 3, 4, 5, 8 and 10 times tables. Through regular practice in school and at home. Children will be tested on each times table, achieving bronze (times table facts in order), silver (times tables fact in a random order) and gold (related division facts).

Year 3 Division

Group and share using the \div and $=$ sign.

Counting in steps (‘clever’ counting)

Count in
2s, 10s, 5s, 3s, 4s, 8s

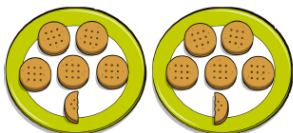
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61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Halving

Find half of even numbers to 100 using partitioning e.g. find half of 48

Using halving as a strategy in dividing by 2 e.g. $36 \div 2$ is half of 36 = 18

Find half of odd numbers



Using number facts

Know half of even numbers to 40

Know half of multiples of 10 to 200

e.g. *half of 170 is 85*

Know $\times 2$, $\times 3$, $\times 4$, $\times 5$, $\times 8$, $\times 10$ division facts

Grouping

Recognise that division is not commutative

e.g. $16 \div 8$ does not equal $8 \div 16$

Relate division to multiplications ‘with holes in’

e.g. $_ \times 5 = 30$ is the same calculation as $30 \div 5 = _$ thus we can count in 5s to find the answer

Divide multiples of 10 by 1-digit numbers e.g. $240 \div 8 = 30$

Begin to use subtraction of multiples of 10 of the divisor to divide numbers above the 10th multiple e.g. $52 \div 4$ is 10×4 (40) and 3×4 (12) = 13



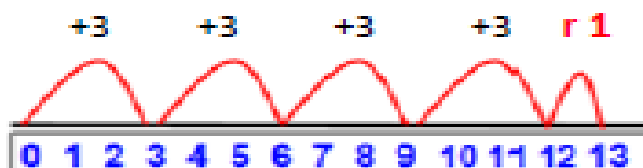
Written methods

Divide 2-digit numbers by a single digit

Step 1: Grouping on a number line

Children continue to work out unknown division facts by grouping on a number line from zero. They are also now taught the

concept of **remainders**, as in the example. This should be introduced practically and with arrays, as well as being translated to a number line. Children should work towards calculating some basic division facts with remainders mentally for the 2s, 3s, 4s, 5s, 8s and 10s.



Step 2: Grouping on a number line

Divide on a number line using multiple groups of the divisor.

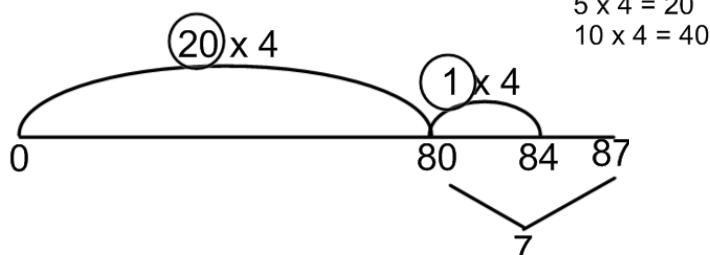
Model jotting down useful multiplication facts e.g. 5×10 .

Children to make the first jump the largest possible using known facts e.g. ‘I know there are two 4’s in 8 so there are twenty 4’s in 80.’

Then calculate what is left to make the final jump. e.g. how many 4’s are in 7? I know there is one 4 in 7 and 3 left over.

Children to circle the ‘lots of’ and total.

$$87 \div 4 = 21 \text{ r}3$$



Year 4

Multiplication and Division

Objectives

- 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.

Key Skills

Multiplication

- Count in multiples of 6, 7, 9, 25 and 1000.
- Recall multiplication facts for **all multiplication tables up to 12×12** .
- Recognise place value of digits in up to 4-digit numbers.
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.
- Use commutativity and other strategies mentally $3 \times 6 = 6 \times 3$, $2 \times 6 \times 5 = 10 \times 6$, $39 \times 7 = 30 \times 7 + 9 \times 7$.
- Solve problems with increasingly complex multiplication in a range of contexts.
- Count in multiples of 6, 7, 9, 25 and 1000.
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones).

Division

- Recall multiplication and division facts for all numbers up to 12×12 .
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number.
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example $200 \times 3 = 600$ so $600 \div 3 = 200$.
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

Vocabulary

Multiplication

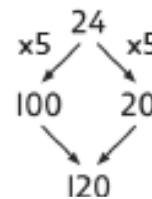
groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times..., partition, grid method, carry, exchange, multiple, product, tens, units, value, **total, product, sets of, inverse**

Division

share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, carry, exchange, inverse, short division, remainder, multiple, **divisible by, factor**

Grouping

Use partitioning to multiply 2-digit numbers by 1-digit numbers e.g. 24×5



Multiply multiples of 100 and 100 by 1-digit numbers using tables facts

e.g. $4 \times 8 = 32$ so make it 100 times bigger,
 $400 \times 8 = 3200$

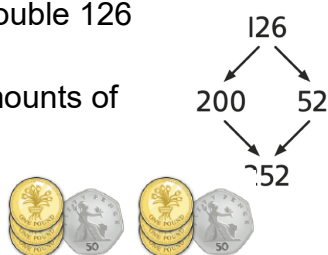
Th	H	T	U
3	2	0	0

Doubling and halving

Find doubles to 100 and beyond using partitioning e.g. double 126

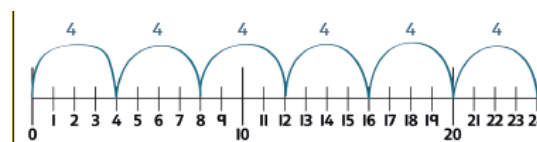
Begin to double amounts of money

e.g. £3.50 doubled
 is £7



Counting in steps (sequences)

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12, 25s, 50s, 100s and 1000s



Written methods

Multiply 2 and 3 digits by a single digit number, using all multiplication tables up to 12x12

Developing the grid method, encouraging column addition to add accurately:

$$136 \times 5 = 680$$

X	100	30	6	500
5	500	150	30	150
				+30
				<u>680</u>

Move onto **short multiplication** (see Y5) if and when children are confident and accurate multiplying 2 and 3-digit numbers by a single digit this way, **and** are already confident in "carrying" for written addition.

In order to carry out this method, children must be able to:

- Approximate before they calculate, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer. e.g. 346×9 is approximately $350 \times 10 = 3500$.
- Record an approximation to check the final answer against.
- Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.
- Recall all times tables up to 12×12 .

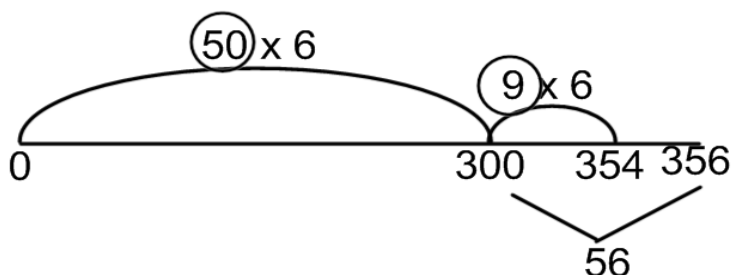
Children must be able to recall multiplication facts for 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 times tables. Through regular practice in school and at home. Children will be tested on each times table, achieving bronze (times table facts in order), silver (times tables fact in a random order) and gold (related division facts).

Group and share using the \div and $=$ sign.

x	1	2	3	4	5	6	7	8	9	10	11
1	1	2	3	4	5	6	7	8	9	10	11
2	1	2	4	6	8	10	12	14	16	18	20
3	5	6	9	12	15	18	21	24	27	30	32
4	5	8	12	16	20	24	28	32	36	40	44
5	5	10	15	20	25	30	35	40	45	50	54
6	6	12	18	24	30	36	42	48	54	60	65
7	7	14	21	28	35	42	49	56	63	70	76
8	8	16	24	32	40	48	56	64	72	80	87
9	9	18	27	36	45	54	63	72	81	90	99
10	10	20	30	40	50	60	70	80	90	100	110
11	11	22	33	44	55	66	77	88	99	110	121
12	12	24	36	48	60	72	84	96	108	120	132

```

    graph TD
      258 --> 100
      258 --> 29
      100 --> 129
      29 --> 129
  
```


$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Year 5

Multiplication and Division

Objectives

- 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.

Key Skills

Multiplication

- Identify multiples and factors, using knowledge of **multiplication tables to 12x12**.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 1000.
- Recognise and use square and cube numbers and their notation.
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

Division

- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- 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.
- Use multiplication and division as inverses.
- 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 (e.g. $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$).
- Solving problems involving combinations of all four operations.

Year 5

Multiplication and Division

Vocabulary

Multiplication

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, carry, exchange, multiple, product, tens, units, value, total, product, sets of, inverse, **square, factor, integer, decimal, short/long multiplication**

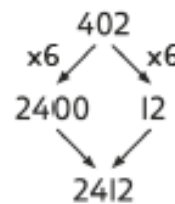
Division

share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, carry, exchange, inverse, short division, remainder, multiple, divisible by, factor, **quotient, prime number, prime factors, composite number (non-prime)**

Mental Strategies **Year 5 Multiplication**

Grouping

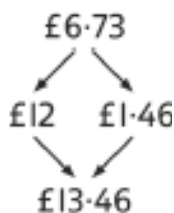
Multiply whole numbers and decimals by 10, 100, 1000 e.g. $3.4 \times 100 = 340$.
 Use partitioning to multiply 'friendly' 2 and 3-digit numbers by 1-digit numbers.
 Use partitioning to multiply decimal numbers by 1-digit numbers
 e.g. 4.5×3 as $4 \times 3 = 12$ and $0.5 \times 3 = 1.5$ $12 + 1.5 = 13.5$



Children must be able to recall and apply multiplication facts up to 12

Doubling and halving

Double amounts of money using partitioning.
 Use doubling and halving as a strategy in multiplying by 2, 4, 8, 5 and 20



Using number facts

Use times-tables facts up to 12×12 to multiply multiples of 10/100 of the multiplier
 e.g. $4 \times 6 = 24$ so $40 \times 6 = 240$ and $400 \times 6 = 2400$
 Use knowledge of factors and multiples in multiplication
 e.g. 43×6 is double 43×3
 e.g. 28×50 is half of 28×100 (2800) = 1400
 Know square numbers and cube numbers.



Written methods

Multiply up to 4-digits by 1 or 2-digits

• Step 1 - short multiplication for multiplying by 1 digit

X	300	20	7
4	1200	80	28

H T U

	3	2	7
x			4
	1	3	0
			8

Children should be asked to complete a calculation using the grid method and then the teacher models short multiplication. What are the similarities and differences? Unpick the steps and show how it reduces them.

• Step 2 - long multiplication for multiplying by 2-digits

X	10	8
10	100	80
3	30	24

H T U

	1	8
x	1	3
	2	4
	3	0
	8	0
	1	0
	2	3

If needed use this partitioned method before long multiplication

H T U

	1	8
x	1	3
	5	4
	1	8
	2	3

• Step 3 - moving towards more complex numbers

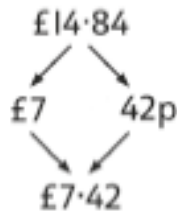
	3	6	5	2
x				8
	2	9	2	1
				6

	1	2	3	4
x				6
	7	4	0	4
	1	2	3	4
				0

Year 5 Division

Halving

Half amounts of money using partitioning
e.g. half of £14.84 is half of £14 (£7) plus half of 84p (42p)

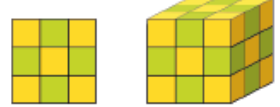


Using halving as a strategy for dividing by 2, 4, 8.

Using number facts

Use division facts from the times tables up to 12 x 12 to divide multiples of powers of 10 of the divisor e.g. $3600 \div 9$ using $36 \div 9$

Know square numbers and cube numbers.



Grouping

Divide numbers by 10, 100, 1000, to obtain decimal answers with up to 3 decimal places

e.g. $340 \div 100 = 3.4$

Written methods

Divide up to 4-digits by a single digit, including those with remainders.

Step 1: Introduce short division when children are secure with division on a number line. Start with carefully selected examples requiring no calculating of remainders at all.

Remind children of correct place value, that 96 is equal to 90 and 6, but in short division, pose:

- How many 3's in 9? = 3, and record it above the **9 tens**.
- How many 3's in 6? = 2, and record it above the **6 units**.

Step 2: Short division (2-digits) with remainders within the calculation

Move on to using this method when remainders occur within the calculation (e.g. $96 \div 4$), and be taught to 'carry' the remainder onto the next digit.

Step 3: Short division (3-digits) with remainders within the calculation

Pupils move onto dividing numbers with up to 3-digits by a single digit.

Step 4: Short division (4-digits) with remainders within the calculation

Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life problem solving context, where **pupils consider the meaning of the remainder and how to express it**, i.e. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.

Long Division

When children are secure with short division, progress long division to dividing any number by a 2-digit number e.g. $4356 \div 17$. This is a Y6 expectation. See Y6 for method.

Year 6

Multiplication and Division

Objectives

- 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 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.

Key Skills

Multiplication

- Recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5)**.
- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.
- Perform mental calculations with mixed operations and large numbers.
- Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.
- Estimate answers using round and approximation and determine levels of accuracy.

Division

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations.
- 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. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.

Vocabulary

Multiplication

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, carry, exchange, multiple, product, tens, units, value, total, product, sets of, inverse, square, factor, integer, decimal, short/long multiplication, **tenths, hundredths, decimals**

Division

share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, carry, exchange, inverse, short division, remainder, multiple, divisible by, factor, quotient, prime number, prime factors, composite number (non-prime), **common factor**

Year 6 Multiplication

Mental Strategies

Grouping

Use partitioning as a strategy in mental, as appropriate

e.g. 3060×4 as $3000 \times 4 = 12,000$ and $60 \times 4 = 240$, $12,000 + 240 = 12,240$

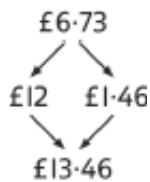
e.g. 8.4×8 as $8 \times 8 = 64$, and $0.4 \times 8 = 3.2$, $64 + 3.2 = 67.2$

Use factors in mental multiplication

e.g. 421×6 as $421 \times 3 = 1263$ doubled $= 2526$

Doubling and halving

Double decimal numbers with up to 2 places using partitioning



Using number facts

Use times tables facts up to 12×12 in mental multiplication of large numbers or with numbers with up to 2 decimal places

E.g. $6 \times 4 = 24$, $0.06 \times 4 = 0.24$

Written methods

Short and multiplication with up to 2 decimal places by a single digit

• Short multiplication for multiplying by 1 digit

Use **short multiplication** to multiply numbers with **more than 4-digits by a single digit**; to multiply money and measures, and to multiply decimals with up to 2d.p. by a single digit.

	Th	H	T	U
	3	6	5	2
\times				8
	2	9	2	16
	5	4	1	

• Long multiplication for multiplying by 2-digits

Use **long multiplication** to multiply numbers with **at least 4 digits by a 2-digit number**.

	Th	H	T	U	
	1	2	3	4	
\times			1	6	
	7	4	0	4	(1234 \times 6)
	1	2	3	4	0 (1234 \times 10)
	1	9	7	4	4

• Multiplication of numbers with up to 2 decimal places

Step 1 - Grid method

Step 2 - Short multiplication

		TU.th	
X	3	0.1	0.09
8	24	0.8	0.72
		0.80	
		0.72	
		25.52	



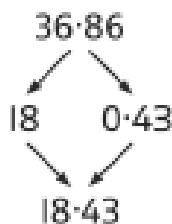
	U	.	t	h
	3	.	1	9
\times	8			
	2	5	.	52

Year 6 Division

Halving

Halve decimal numbers with up to 2 places using partitioning

e.g. *half of 36.86 is half of 36 (18) plus half of 0.86 (0.43)*



Using number facts

Use division facts from the times-tables up to 12×12 to divide decimal numbers by 1-digit numbers

e.g. $1.17 \div 3$ is $1/100$ of $117 \div 3$ (39)

Know tests of divisibility for numbers divisible by 2, 3, 4, 5, 9, 10 and 25

Grouping

Divide numbers by 10, 100, 1000, to obtain decimal answers with up to 3 decimal places

e.g. $340 \div 100 = 3.4$

Written methods

Divide at least 4-digits by both single digit and 2-digit numbers (including decimal numbers)

Short division for dividing by a single digit

$$6497 \div 8$$

Short division with remainders: Children should continue to use this method, but with numbers to at least 4 digits, and understand how to express remainders as fractions, decimals, whole number remainders, or rounded numbers. Real life problem solving contexts need to be the starting point, where children have to consider the most appropriate way to express the remainder.

Calculating a decimal remainder: In this example, rather than expressing the remainder as **r 1**, a decimal point is added after the units because there is still a remainder, and the one remainder is carried onto zeros after the decimal point (to show there was no decimal value in the original number). Keep dividing to an appropriate degree of accuracy for the problem being solved.

Long division for dividing by 2-digits

Find out 'How many 36s are in 972?' by subtracting 'chunks' of 36, until zero is reached (or until there is a remainder).

Teach children to write a **useful list** first at the side that will help them decide what chunks to use,

e.g. **Useful list:** 1x is 36

10x is 360

100x is 3600

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{-720} \\ 252 \\ \underline{-180} \\ 72 \\ \underline{-72} \\ 0 \end{array}$$

$= 36 \times (20)$
 $= 36 \times (5)$
 $= 36 \times (2)$

$$\begin{array}{r} 28 \text{ r } 12 \text{ or } \frac{12}{15} \text{ or } \frac{4}{5} \\ 15 \overline{) 432} \\ \underline{-300} \\ 132 \\ \underline{-120} \\ 12 \end{array}$$

$= 15 \times (20)$
 $= 15 \times (8)$