

Unit overview: Multiplication & Division – Year 1

National Curriculum requirements

By the end of the year, the children will be able 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.

Vocabulary

- number / digit
- multiplication / multiply / times
- division / divide
- equally
- group / groups of
- share
- array
- equal to

Manipulatives

- counters
- dienes
- interlocking cubes
- toys

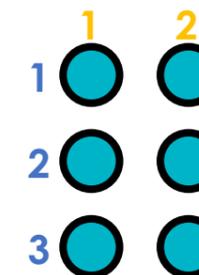
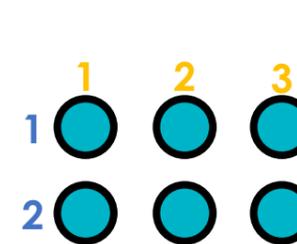
Visual representations

$$\boxed{2} \times \boxed{3} = \boxed{6}$$

multiplicand multiplier product

$$\boxed{6} \div \boxed{2} = \boxed{3}$$

dividend divisor quotient



Sentence stems

The multiplicand is ____.

The multiplier is ____.

The product is ____.

The dividend is ____.

The divisor is ____.

The quotient is ____.

There are ____ groups of ____

____ times ____ is equal to ____.

____ multiplied by ____ is equal to ____.

When I share ____ equally into ____ groups, each group has ____

____ divided by ____ is equal to ____.

Learning sequence

- understand the words multiplication and multiply
- understand that multiplication is the same as repeatedly adding the same number
- use concrete objects to demonstrate and describe the multiplication process and its results
- use pictures to show how to multiply (linked to concrete materials)
- understand the words division / divide
- use concrete objects to demonstrate and describe the division process and its results
- use pictures to show how to divide (linked to concrete materials)
- understand and interpret an array
- use arrays to solve multiplication and division problems
- explore the ways in which multiplication and division are connected

Unit overview: Multiplication & Division – Year 2

National Curriculum requirements

By the end of the year, the children will be able 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 (\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.

Vocabulary

- number / digit
- multiplication / multiply / times
- multiplicand / multiplier / product
- division / divide
- dividend / divisor / quotient
- equally
- group / groups of
- share
- array
- equal to

Manipulatives

- counters
- dienes
- place value counters
- interlocking cubes
- place value slider white boards
- number lines

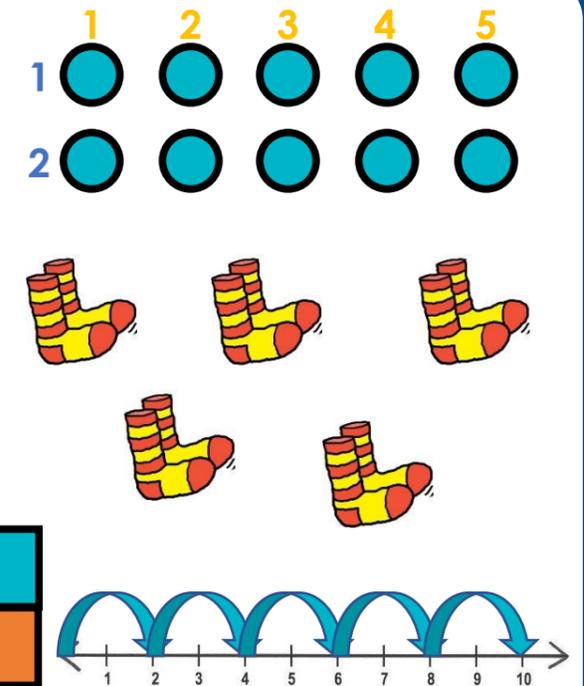
Visual representations

$$\boxed{2} \times \boxed{5} = \boxed{10}$$

multiplicand multiplier product

$$\boxed{10} \div \boxed{5} = \boxed{2}$$

dividend divisor quotient



Sentence stems

The multiplicand is ____.

The dividend is ____.

The multiplier is ____.

The divisor is ____.

The product is ____.

The quotient is ____.

There are ____ groups of ____

____ times ____ is equal to ____.

____ multiplied by ____ is equal to ____.

When I share ____ equally into ____ groups, each group has ____

____ divided by ____ is equal to ____.

Learning sequence

- identify and use the multiplication, division and equals signs
- complete calculations by inserting missing signs
- identify and describe patterns in the 1, 2, 5, and 10 times tables
- recognise if a two digit number is multiple of 2, 5, or 10
- recognise and give examples of odd and even numbers
- express a multiplication problem as repeated addition, e.g. on a number line, and use this information to solve a problem
- use arrays to solve multiplication problems
- demonstrate that multiplication is commutative (the multiplicand and multiplier are interchangeable)
- demonstrate that multiplication and division are inverse operations and give corresponding multiplication/division facts
- use arrays to solve division problems (sharing and grouping)
- perform divisions using the same numbers to show that different results are obtained (demonstrating that division is not commutative)
- solve multiplication and division problems in context

Unit overview: Multiplication & Division – Year 3

National Curriculum requirements

By the end of the year, the children will be able 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.

Vocabulary

- number / digit
- multiplication / multiply / times
- multiplicand / multiplier / product
- multiple
- inverse operation
- division / divide
- dividend / divisor / quotient
- equally
- group / groups of
- share
- array
- equal to

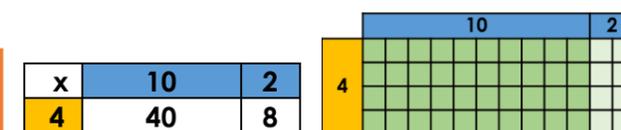
Manipulatives

- dienes
- place value counters
- place value charts
- place value slider white boards
- number lines

Visual representations

$$\boxed{12} \times \boxed{4} = \boxed{48}$$

multiplicand multiplier product

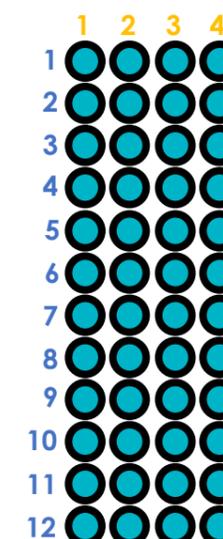


$$40 + 8 = 48$$

$$\boxed{48} \div \boxed{4} = \boxed{12}$$

dividend divisor quotient

$$4 \overline{) 48}$$



Sentence stems

The multiplicand is ____.

The dividend is ____.

The multiplier is ____.

The divisor is ____.

The product is ____.

The quotient is ____.

____ is commutative; ____ is not commutative.

There are ____ groups of ____

____ times ____ is equal to ____.

____ multiplied by ____ is equal to ____.

When I share ____ equally into ____ groups, each group has ____

____ divided by ____ is equal to ____.

Learning sequence

- times tables practise (Term 1: 2, 3, 4, 5, 10; Term 2: 6, 8, 11; Term 3: 7, 9, 12)
 - through doubling, they connect the 2, 4 and 8 multiplication tables; the 5 and 10 multiplication tables; the 6 and 12 multiplication tables
- describe the link between multiplication and division; using times tables facts for division
- make the link between multiplication as repeated addition and scaling, e.g. 4×3 as four groups of three children, giving a total of 12 children and/or one boat is 4m long and another boat is three times the length, meaning it is 12m long.
- using times table facts, e.g. $12 \times 4 = 48$, therefore $12 \times 40 = 480$ and $48 \div 4 = 12$ therefore $480 \div 4 = 120$
- combine multiplication facts, e.g. $18 \times 6 = (10 \times 6) + (8 \times 6) = 60 + 48 = 108$
- make the link between arrays and grid multiplication
- use the expanded column method of multiplication; progressing to the formal written method if appropriate
 - two-digit multiplicand and a one digit multiplier
- make the link between arrays and chunking
- progress to the formal written method of division if appropriate

Unit overview: Multiplication & Division – Year 4

National Curriculum requirements

By the end of the year, the children will be able 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.

Vocabulary

- number / digit
- multiplication / multiply / times
- multiplicand / multiplier / product
- multiple
- inverse operation
- division / divide
- dividend / divisor / quotient
- equally
- group / groups of
- share
- array
- equal to

Manipulatives

- dienes
- place value counters
- place value charts
- place value slider white boards
- number lines

Visual representations

	400	70	3	
6	$6 \times 400 = 2400$ <small>(using knowledge of $6 \times 4 = 24$)</small>	$6 \times 70 = 420$ <small>(using knowledge of $6 \times 7 = 42$)</small>	$6 \times 3 = 18$	

	2400	
+	420	
+	18	
	<u>2838</u>	

6	0	4	7	3
	<hr/>			
6	2	8	3	18

	Th	H	T	O
	4	7	3	
x				6
	<hr/>			
	2	8	3	8
		4	1	

Sentence stems

The multiplicand is _____. The dividend is _____.
 The multiplier is _____. The divisor is _____.
 The product is _____. The quotient is _____.

_____ is commutative; _____ is not commutative.

There are _____ groups of _____
 _____ times _____ is equal to _____.
 _____ multiplied by _____ is equal to _____.

When I share _____ equally into _____ groups, each group has _____
 _____ divided by _____ is equal to _____.

Learning sequence

- times tables practice (all times tables up to 12×12), including corresponding division facts
- identify factors and use to solve mental multiplication and division problems
- practise mental methods and extend this to three-digit numbers to derive facts, for example $600 \div 3 = 200$ can be derived from $2 \times 3 = 6$
- use times tables knowledge to solve number problems, including multiplying together three numbers
- explore the relationship between multiplication and division
 - use multiplication facts to solve a division problem
 - use division facts to solve a multiplication problem
- prove that multiplication is commutative, but division is not
- practise to become fluent in the formal written method of short multiplication and short division with exact answers
 - two-digit multiplicand and a one digit multiplier
 - three-digit multiplicand and a one digit multiplier
- 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 $(2 \times 3) \times 4 = 2 \times (3 \times 4)$
- combine knowledge of number facts and rules of arithmetic to solve mental and written calculations, for example: $2 \times 6 \times 5 = 10 \times 6 = 60$
- 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.

Unit overview: Multiplication & Division – Year 5

National Curriculum requirements

By the end of the year, the children will be able 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.

Visual representations

Square numbers:
 $4^2 = 4 \times 4 = 16$

Cube numbers:
 $4^3 = 4 \times 4 \times 4 = 64$

Prime numbers:

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

Factor pairs:

1 x	6				
2 x	3		3		
3 x	2	2		2	
6 x	1	1	1	1	1

Visual representations:

0 4 7 9 r4

$6 \overline{) 2^2 8^4 7^5 8}$

$4^2 = 4 \times 4 = 16$

$4^3 = 4 \times 4 \times 4 = 64$

Place value chart:

Th	H	T	O
7	4	1	6

Formal written multiplication:

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      2 2 2 4 8
    x   1   1
    -----
      2 2 2 4 8
     1 4 8 3 2 0
    -----
    1 7 0 5 6 8
  
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Sentence stems

The multiplicand is _____. The dividend is _____.

The multiplier is _____. The divisor is _____.

The product is _____. The quotient is _____.

_____ is commutative; _____ is not commutative.

I know that _____ is a prime number because _____

I know that _____ is a composite number because _____

_____ squared is equal to _____

The square root of _____ is _____

Vocabulary

- multiplication / multiply / times
- multiplicand / multiplier / product
- multiple / factor
- inverse operation
- division / divide
- dividend / divisor / quotient
- equal to
- prime number
- square / cubed number

Manipulatives

- dienes
- place value counters
- place value charts
- place value slider white boards
- number lines

Learning sequence

- times tables practice (all times tables up to 12 x 12), including corresponding division facts
- multiply and divide by 10, 100 and 1000, including decimal numbers
- identify multiples of a given number
- find all factors of given number, including all factor pairs
- find common multiples of two numbers
- understand and use the vocabulary of prime numbers
- understand and use the vocabulary of composite numbers
- establish if a number up to 100 is prime; recall prime numbers up to 19
- investigate and recognise square numbers; use this knowledge to solve problems
- investigate and recognise cube numbers; use this knowledge to solve problems
- grid / area method of multiplication (see Year 4 visual representation)
 - two digits x one digit; three digits x one digit; four digits x one digit
 - two digits x two digits; three digits x two digits; four digits x two digits
- long multiplication (expanded column method)
 - two digits x one digit; three digits x one digit; four digits x one digit
 - two digits x two digits; three digits x two digits; four digits x two digits
- formal written method of multiplication (column method)
- formal written method of short division, including remainders

Unit overview: Multiplication & Division – Year 6

National Curriculum requirements

By the end of the year, the children will be able 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 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.

Sentence stems

The multiplicand is _____. The dividend is _____.

The multiplier is _____. The divisor is _____.

The product is _____. The quotient is _____.

The remainder is _____.

_____ is commutative; _____ is not commutative.

If I know that _____ then I know that _____

I know that _____ is a prime number because _____

I know that _____ is a composite number because _____

The common factors are _____

_____ squared is equal to _____

The square root of _____ is _____

Manipulatives

- dienes
- place value counters
- place value charts
- place value slider white boards
- number lines

Vocabulary

- multiplication / multiply / times
- multiplicand / multiplier / product
- multiple / factor
- inverse operation
- division / divide
- dividend / divisor / quotient
- remainder
- known facts
- equal to
- prime number
- square / cubed number
- estimate

Visual representations

In a supermarket, a bag of five apples costs £1.80; a bag of four oranges also costs £1.80. What is the difference in price between one apple and one orange?

£1.80				
?				

£1.80				
?				

$$£1.80 = 180p$$

$$180p \div 5 = 36p$$

$$180p \div 4 = 45p$$

$$45p - 36p = 9p$$

One orange is 9p more expensive than one apple.

17	$\begin{array}{r} 0169r5 \\ \hline 2878 \\ -17 \\ \hline 117 \\ -102 \\ \hline 158 \\ -153 \\ \hline 5 \end{array}$	$1 \times 17 = 17$ $2 \times 17 = 34$ $3 \times 17 = 51$ $4 \times 17 = 68$ $5 \times 17 = 85$ $6 \times 17 = 102$ $7 \times 17 = 119$ $8 \times 17 = 136$ $9 \times 17 = 153$
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Learning sequence

- multiply large numbers mentally using known facts, e.g. 6000×800 using the knowledge of 6×8
- divide large numbers mentally using known facts, e.g. $56000 \div 700$ using the knowledge of $56 \div 7$
- use estimation for the solution to a calculation, based on known facts
- identify common factors, common multiples and prime numbers
- use the formal written method to multiply a four-digit number by a two-digit number (including decimal numbers)
- revise short division using a single digit divisor
- short division with a two-digit divisor (no remainders)
- short division with remainders
- interpreting remainders as fractions and/or decimals (rounding where necessary)
- long division with a single-digit divisor
 - no remainder
 - with a remainder: interpret the remainder as fractions and/or decimals
- long division with a two-digit divisor
 - no remainder
 - with a remainder: interpret the remainder as fractions and/or decimals
- use their knowledge of the order of operations to carry out calculations involving the four operations