



# Year 5 multiplication and division

## Prior Knowledge

- Recall multiplication and division facts for multiplication tables up to  $12 \times 12$
- Show that multiplication of 2 numbers can be done in any order (commutative) and division of 1 number by another cannot (Y2)
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers (Y4)
- Recognise and use factor pairs and commutativity in mental calculations (Y4)
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout (Y4)
- Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as  $n$  objects are connected to  $m$  objects (Y3&4)

multiplication and division		Working Towards	Within	Expected	Above
$\times \div$	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 1,000				
	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 knowledge of factors and multiples, squares and cubes				
	Solve problems involving 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				
Highlights: _____					
_____					



# Glossary

vocabulary	word class	definition
multiplication	noun	the process of combining matrices, vectors, or other quantities to obtain their product
division	noun	the process of dividing a matrix, vector, or other quantity to obtain a quotient
calculating	verb	determine (the amount or number of something) mathematically
arrays	noun	an arrangement of quantities or symbols in rows and columns; a matrix
integer	noun	a number which is not a fraction; a whole number
factor pairs		a set of two integers that give a particular product when multiplied together
product		the answer when two or more values are multiplied together
distributive law		multiplying a number by a group of numbers added together is the same as doing each multiplication separately
common factor	noun	when the factors of two or more numbers are found, the factors that are the same are the common factors
prime number	noun	a number that is divisible only by itself and 1 (e.g. 2, 3, 5, 7, 11)
prime factor		the prime factors of a positive integer are the prime numbers that divide that integer exactly
composite number	noun	a whole number that can be made by multiplying other whole numbers. Example: 6 can be made by $2 \times 3$ .
remainder	noun	the number which is left over in a division in which one quantity does not exactly divide another. Example: 23 divided by 3 is 7, remainder 2"
decimal	adjective	relating to or denoting a system of numbers and arithmetic based on the number ten, tenth parts, and powers of ten.
square number	noun	the product of a number multiplied by itself, e.g. 1, 4, 9, 16
cube number	noun	the result when a number has been multiplied by itself twice. The symbol for cubed is $^3$ . Example: 8 is a cube number because it's $2 \times 2 \times 2$

## Factors and Multiples

A multiple is a number that can be divided evenly by a given number.

For example,  $12 \times 1 = 12$ ,  
 $12 \times 2 = 24$ ,  $12 \times 3 = 36$

The multiples of 12 include: 12, 24, 36, 48...

A factor is a number that is multiplied by another number to get a product.

For example,  $12 \div 1 = 12$ ,  
 $12 \div 2 = 6$ ,  $12 \div 3 = 4$

The factors of 12 are: 1, 2, 3, 4, 6 and 12.

## Common Factors

A common factor is a number which is a factor of two or more other numbers. For example, 3 is a common factor of 6 and 9.

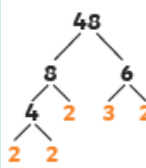
## Prime Numbers

A natural number greater than 1 with no divisors other than 1 and itself.

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

## Prime Factors

Prime factors are the factors of a number that are prime. They can be found using a diagram like this:



## Square and Cube Numbers

$$1^2 \quad 1 \times 1 = 1$$

$$2^2 \quad 2 \times 2 = 4$$

$$3^2 \quad 3 \times 3 = 9$$

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

$$5^2 \quad 5 \times 5 = 25$$

$$6^2 \quad 6 \times 6 = 36$$

$$7^2 \quad 7 \times 7 = 49$$

$$8^2 \quad 8 \times 8 = 64$$

$$9^2 \quad 9 \times 9 = 81$$

$$10^2 \quad 10 \times 10 = 100$$

$$11^2 \quad 11 \times 11 = 121$$

$$12^2 \quad 12 \times 12 = 144$$

$$1^3 \quad 1 \times 1 \times 1 = 1$$

$$2^3 \quad 2 \times 2 \times 2 = 8$$

$$3^3 \quad 3 \times 3 \times 3 = 27$$

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

$$5^3 \quad 5 \times 5 \times 5 = 125$$

$$6^3 \quad 6 \times 6 \times 6 = 216$$

$$7^3 \quad 7 \times 7 \times 7 = 343$$

$$8^3 \quad 8 \times 8 \times 8 = 512$$

$$9^3 \quad 9 \times 9 \times 9 = 729$$

$$10^3 \quad 10 \times 10 \times 10 = 1000$$

$$11^3 \quad 11 \times 11 \times 11 = 1331$$

$$12^3 \quad 12 \times 12 \times 12 = 1728$$

## 4-digit $\times$ 2-digit carrying not shown

5368	Write the numbers above each other in columns.
$\times 24$	
5368	
$\times 24$	Multiply $5368 \times 4$
21472	
5368	
$\times 24$	Multiply $5368 \times 20$
21472	
107360	
21472	
+ 107360	Add the products
128832	

		3	8
4	1	5	2

$$15 \div 4 = 3 \text{ remainder } 3$$

Remember to regroup any remainders and move them into the next column.

		4	5	5	r	3
5	2	2	7	8		

$$28 \div 5 = 5 \text{ remainder } 3$$

If your calculation has a remainder, remember to record it in the answer using the letter r.

## Short Multiplication

$$2543 \times 7 = 17801$$

	2	5	4	3
x				7
1	7	8	0	1
1	3	3	2	

Remember to move any regrouped digits into the next column. After the next multiplication, add the regrouped number to the answer.

## Long Multiplication

$$2543 \times 67 = 170381$$



		2	5	4	3
	x		6	7	
	1	7	8	0	1
1	5	2	5	8	0
1	3	2	1		
1	7	0	3	8	1
1	1				

Before multiplying by the number in the tens column, remember to use zero as a placeholder because the 6 in 67 is 6 tens (60).







## Resources

x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths	Ten Thousandths	Hundred Thousandths	Millionths
M	Hth	TTh	Th	H	T	O	t	h	th	nth	hth	m


## Future Learning

### Year 6

- 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 4 operations
- Solve problems involving multiplication and division
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy