DIVISION: Y1

Understanding the operation and related vocabulary.

Understanding the operation

Begin to understand division as both sharing and grouping using concrete objects, pictorial representations and arrays to solve problems.

Children should begin to explore finding simple fractions of objects, numbers and quantities.

Vocabulary

Begin to use the vocabulary involved in dividing:

share, share equally, one each, two each…, group, groups of, lots of, array, row, column, equal groups of

Generalisations

- True or false? I can only halve even numbers.
- Grouping and sharing are different types of problems. Some problems need solving by grouping and some by sharing. Encourage children to practically work out which they are doing.

Some Key Questions

How many groups of…?
How many in each group?
Share… equally into…
What can do you notice?

Mental Calculations

Number facts

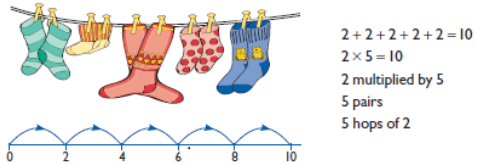
Experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10.

Count a set of objects by grouping in 2s, 5s or 10s
Count these pennies (2 at a time)

Know corresponding halves of doubles of all numbers to 10:
Half of 6 is ☐
Half of 10 is ☐

Begin to recognise odd and even numbers.
Use cubes to make 9 and recognise it is odd (as the cubes cannot be paired)

They should begin to recognise the number of groups counted to support understanding of relationship between multiplication and division.



Mental methods and jottings

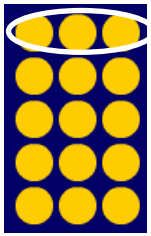
Solve problems involving sharing, grouping and

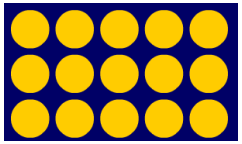
Written Calculations

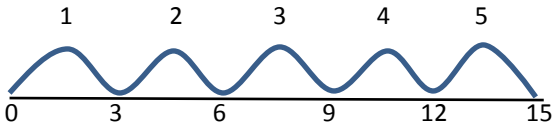
No formal written layout. Children record their maths using pictorial representations, arrays, number lines and mathematical statements.

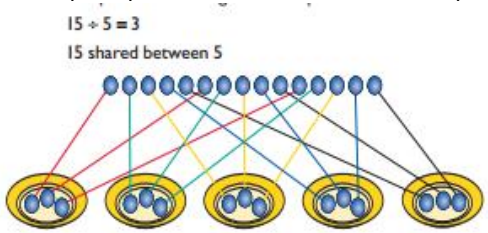
10 ÷ 5 = 2

Use of arrays as a pictorial representation for division.
15 ÷ 3 = 5 There are 5 groups of 3.
15 ÷ 5 = 3 There are 3 groups of 5.







	halving; make equal groups **Counting on** There are 10 seeds and some flower pots. Each pot needs 2 seeds in it. How many pots can be planted? **Sharing** Develops importance of one-to-one correspondence.  **Grouping** Children should apply their counting skills to develop some understanding of grouping.  How many groups of 2 are in 6?  Jo has 12 Lego wheels. How many cars can she make? **Using doubling and halving** Know corresponding halves of doubles to 10. Half of 10 is 5. A ladybird has 12 spots altogether. How many spots on each side of its body?	

DIVISION: Y2

Understanding the operation and related vocabulary.

Understanding the operation

Continue to understand division as both sharing and grouping using concrete objects, pictorial representations and arrays to solve problems.

Begin to relate division to fractions.

Continue to work on arrays and begin to understand the inverse relationship between x and ÷.

15 ÷ 3 = 5 There are 5 groups of 3.

5 x 3 = 15

15 ÷ 5 = 3 There are 3 groups of 5.

3 x 5 = 15

Show that division of one number by another cannot be done in any order.

15 ÷ 5 = 3

5 ÷ 15 ≠ 3

Write mathematical statements using the division and equals sign.

6 ÷ 2 = □ □ = 6 ÷ 2

6 ÷ □ = 3 3 = 6 ÷ □

□ ÷ 2 = 3 3 = □ ÷ 2

□ ÷ ∇ = 3 3 = □ ÷ ∇

Vocabulary

Understand and use the vocabulary related to division:

Group in pairs, 3s … 10s etc

equal groups of, divide, ÷, divided by, divided into, remainder, left over.

Generalisations

Noticing how counting in multiples if 2, 5 and 10 relates to the number of groups you have counted (introducing times tables)

Mental Calculations

Number facts

Count regularly, on and back, in steps of 2, 3, 5 and 10 from 0.

0 3 6 9 12 15 18 ……30

50 45 40 35 30 …….. 0

Recall and use division facts for the 2, 5 and 10 times table:

How many groups of 10 in 30?

Divide 14 by 2.

25 divided by 5.

Recall corresponding halve of doubles of all numbers to 15 and doubles of multiples of 5 to 50.

Half of 14 is □

Half of 30 is □

Recall and use division facts for the 2, 5 and 10 times table.

How many groups of ten in 30 divide14 by 2 25 divided by 5

Recognize odd and even numbers.

Explain why 15 is an odd number

Mental methods and jottings

Counting on

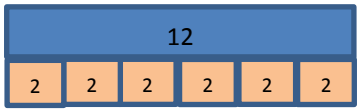
70 ÷ 7 = 10 (by counting on in tens using fingers to keep track).

With jottings:

24 ÷ 3 = 8 (counting on in threes using a number line to keep track).

Sharing

Share 12 pencils **equally** between 6 pots (using objects/pictures)



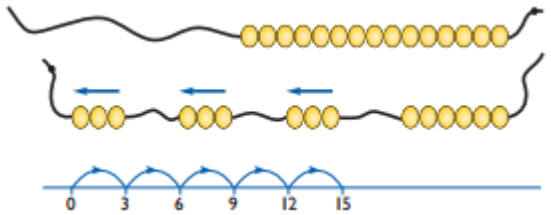
Written Calculations

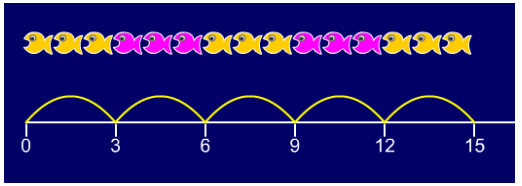
No formal written layout. Children record their maths using pictorial representations, arrays, number lines and mathematical statements.

Grouping using a number line

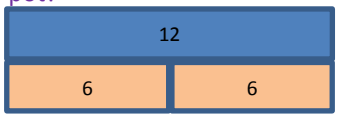
Group from zero in jumps of the divisor to find our 'how many groups of 3 are there in 15?

15 ÷ 3 = 5





See Year 1 for other images.

An understanding of the more you share between, the less each person will get (e.g. would you prefer to share these grapes between 2 people or 3 people? Why?) Secure understanding of grouping means you count the number of groups you have made. Whereas sharing means you count the number of objects in each group. **Some Key Questions** How many 10s can you subtract from 60? I think of a number and double it. My answer is 8. What was my number? If 12 x 2 = 24, what is 24 ÷ 2? Questions in the context of money and measures (e.g. how many 10p coins do I need to have 60p? How many 100ml cups will I need to reach 600ml?)	12 pencils shared between 2 pots, how many in each pot?  **Using doubling and halving** Know corresponding halves of doubles of all numbers to 15 and doubles of all numbers of multiples of 5 to 50. 14 ÷ 2 = 7 (by recalling the doubles first) With Jottings 24÷2 (by halving 20, halving 4 and recombining) **Using known facts and place value** If 4 ÷ 2 = 2 then 40 ÷ 2 = 20 **Fractions** Find a half, a quarter and a third of shapes, objects, numbers and quantities. Finding a fraction of a number of objects to be related to sharing. Explore visually and understand how some fractions are equivalent – e.g. two quarters is the same as one half. 3 apples shared between 4 people = $\frac{3}{4}$ 	

DIVISION: Y3

Understanding the operation and related vocabulary.

Understanding the operation

Understand the operation of division as sharing and grouping.

Understand the principles of commutative and associative laws **do not** apply to division.

Recognise that 24÷4 is not equal to 4÷24

Understand the inverse relationship between multiplication and division.

6 x 3 = 18 3 x 6 = 18 18 = 3 x 6 18 = 6 x 3

18 ÷ 3 = 6 18 ÷ 6 = 3 6 = 18 ÷ 3 3 = 18 ÷ 6

Continue using a range of missing number equations as in year 2 but with appropriate numbers.

15 ÷ □ = 5 □ = 14 ÷ 2 20 = □ x □

5 + 10 = 35 ÷ □ 7 < □ ÷ 2 □ ÷ □ > 8

Continue to relate fractions to division.

¼ of 16 = 16 ÷ 4

Vocabulary

Understand, read and spell vocabulary related to division correctly:

See Y1 and Y2

Inverse, in every

Generalisations

Inverses and related facts – develop fluency in finding related multiplication and division facts.

Develop the knowledge that the inverse relationship can be used as a checking method.

Some Key Questions

Questions in the context of money and measures that involve remainders (e.g. How many lengths of 10cm

Mental Calculations

Number facts

Count regularly, on and back, in steps of 3, 4 and 8.

Count from 0 in multiples of 4, 8, 50 and 100.

0 8 16 24 32 ….

500 450 400 350 ….

Recall and use division facts for the 3, 4 and 8 times table.

How many threes in 27?

Divide 24 by 4

48 divided by 8

Divide 80 in to fours

Recall corresponding halves and doubles of all numbers to 20, doubles of multiples of 5 to 100 and doubles of multiples of 100 to 500.

Half of 16 is ☐ 18÷2=☐ Half of 70 is ☐

Mental methods and jottings

Calculate mathematical statements for division using the multiplication tables that they know, beginning to divide two-digit numbers by one-digit numbers (for known multiplication tables).

Counting on

70 ÷ 5 (by counting on in fives from 50)

With jottings:

52 ÷ 4 (by counting on in fours from 4 x 10 using a number line to keep track).

With remainders: 54 ÷ 4

Partitioning

Without crossing the tens boundary:

69 ÷ 3 = 23

(60 ÷ 3 = 20 ; 9 ÷ 3 = 3)

20 + 3 = 23

Written Calculations

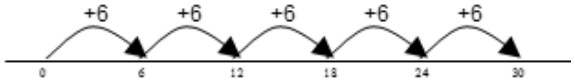
No formal written layout.

Begin to divide 2 digit numbers by one digit numbers (for known multiplication tables).

Grouping

How many 6's are in 30?

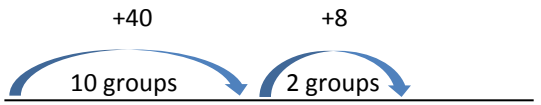
30 ÷ 6 can be modelled as:



Becoming more efficient using a number line

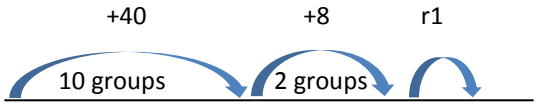
Children need to be able to partition the dividend in different ways.

48 ÷ 4 = 12



Remainders

49 ÷ 4 = 12 r1



Make sensible decisions about rounding up or down after division in the context of a problem.

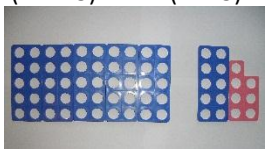
Sharing: 49 shared between 4. How many left over?

Grouping: How many 4s make 49. How many are left over?

Place value counters can be used to support children apply their knowledge of grouping.

60 ÷ 10 = How many groups of 10 in 60?

600 ÷ 100 = How many groups of 100 in 600?

can I cut from 81cm of string? You have £54. How many £10 teddies can you buy?) What is the missing number? 17 = 5 x 3 + __ __ = 2 x 8 + 1	Partition number in different ways: 52 = 50 + 2; 40 + 12; 30 + 12 etc With jottings Partitioning crossing the tens boundary. 65 ÷ 5 = 13 (12 x 5) (1 x 5)  *With remainders: 67 ÷ 5 = 13r2* **Doubling and halving** 84 ÷ 2 = 42 (*80 ÷ 2 = 40) (4 ÷ 2 = 2)* With jottings 100 ÷ 4 = 25 (halve and halve again) *Half of 100 is 50, half of 50 is 25.* **Known facts and place value** Use multiplication and division facts they know to make links with other facts. *If: 3 x 2 = 6, 6 ÷ 3 = 2, 2 = 6 ÷ 3* *Then: 30 x 2 = 60, 60 ÷ 3 = 20, 2 = 60 ÷ 30* **Estimating** Estimate the answer to a calculation: 52 ÷ 4 is between 10 fours and 20 fours. Use inverse operations and equivalent calculations to check answers: Check 65 ÷ 5 = 13 with 5 x 13 = 65.	**Remainders** Understand the idea of a remainder and make sensible decisions about rounding up or down after division in the context of a problem.

DIVISION: Y4

Understanding the operation and related vocabulary.

Understanding the operation

Continue to understand the operation of division as sharing and grouping.

Relate division and fractions.

1/3 = 1 ÷ 3 2/3 = 2 ÷ 3

Understand links to ratio problems (2 quantities in a fixed ratio.

Continue to understand the principles of commutative and associative laws **do not** apply to division.

Understand the distributive law and recognise that

65 ÷ 5 is the same as (50 ÷ 5) + (15 ÷ 5)

Continue to understand the inverse relationship between multiplication and division.

6 x 7 = 42 7 x 6 = 42 42 = 7 x 6 42 = 6 x 7

42 ÷ 7 = 6 42 ÷ 6 = 7 7 = 42 ÷ 6 6 = 42 ÷ 7

Continue using a range of equations as in year 3 but with appropriate numbers.

54÷☐= 6 ☐=80x8 48=☐x☐

36÷4 = 18÷☐ 5 < ☐ ÷9 ☐÷☐ > 11

Vocabulary

Understand, read and spell vocabulary related to division correctly.

see years 1-3

divide, divided by, divisible by, divided into

share between, groups of, factor, factor pair, multiple

times as (big, long, wide …etc), for every, quotient

equals, remainder, quotient, divisor

Mental Calculations

Number facts

Count on and back in multiples of 6, 7, 9, 25 and 1000.

0 7 14 21 28 …

300 275 250 225 200 …

Learn the multiplication facts to 12 x 12 and use place value to derive related facts.

6 x 7 = 42 70 x 6 = 420

42 ÷ 6 = 7 420 ÷ 6 = 70

How many sixes in 54?

Divide 63 by 7

350 divided by 5

108 ÷ 12, what is the quotient?

Recognise and use factor pairs

List the factor pairs of 32

Derive corresponding halves of doubles of multiples of 50 to 1000 and multiples of 1000.

Half of 150 is ☐ 700÷2=☐ 6000÷2=☐

Mental methods and jottings

Divide mentally using place value, known and derived facts including dividing by 1.

Counting on

126 ÷ 6 (by counting on in sixes from 120).

With Jottings

161 ÷ 7 (by counting on in sevens from 7 x 20 using a number line to keep track)

With remainders: 163 ÷ 7

Partitioning

Without crossing the tens boundary:

78 ÷ 6 = 13 Partition in to multiples of the divisor

60 ÷ 6 = 10 ; *18 ÷ 6 = 3*

10 + 3 = 13

Written Calculations

Begin to divide 2-digit and 3-digit numbers by a 1-digit number using a formal written layout.

e.g.

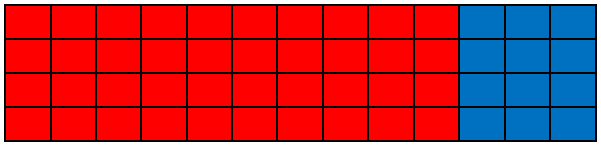
98 ÷ 7

138 ÷ 3

Towards a formal written method

Alongside pictorial representations and the use of models and images, children should progress onto short division using a bus stop method.

52 ÷ 4



4	40	12

	10	3	= 13
4	40	12	

inverse

Generalisations

True or false? Dividing by 10 is the same as dividing by 2 and then dividing by 5. Can you find any more rules like this?

Is it sometimes, always or never true that □ ÷ Δ = Δ ÷ □?

Inverses and deriving facts. 'Know one, get lots free!' e.g.: 2 x 3 = 6, so 3 x 2 = 6, 6 ÷ 2 = 3, 60 ÷ 20 = 3, 600 ÷ 3 = 200 etc.

Sometimes, always, never true questions about multiples and divisibility. (When looking at the examples on this page, remember that they **may not** be 'always true'!) E.g.:

- Multiples of 5 end in 0 or 5.
- The digital root of a multiple of 3 will be 3, 6 or 9.
- The sum of 4 even numbers is divisible by 4.

Using Numicon, diennes or place value counters as support.

With jottings

Partitioning crossing the tens boundary.

185 ÷ 5 = 37 *(150 ÷ 5 = 30; 35 ÷ 5 = 7)*

30 + 7 = 37

With remainders: 187 ÷ 5

Continue to partition number in different ways:

762 = 700 + 60 + 2; 600 + 120 + 42

Doubling and halving

600÷4 (halve & halve again)

Half of 600 is 300, half of 300 is 150

With jottings

112 ÷ 8 (halve, halve and halve again)

Half of 112 = 56, half of 56 = 28, half of 28 = 14

Factors

500 ÷ 20 (Divide 500 by 10 then divide by 2)

With jottings

90 ÷ 6 (Divide 90 by 3 then divide by 2)

Estimating

Estimate the answer to a calculation:

138 ÷ 3 is between 40 threes and 50 threes.

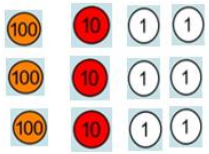
Use inverse operations and equivalent calculations to check answers:

Check 98 ÷7 = 14 with 7 x 14 = 98

Short division can also be modelled for understanding using place value counters as shown below.

Calculations with 2 and 3-digit dividends. E.g.

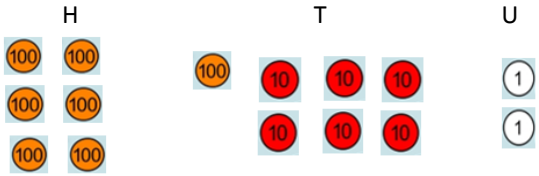
98 ÷ 7; 336 ÷ 3



How many groups of 3 can you make with the hundreds?

Extending to:

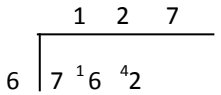
762 ÷ 6



How many groups of 6 can you make with the hundreds? (1 group) – move the other hundred to the tens column.

How many groups of 6 can you make with the tens? (the hundred is worth 10 tens) – (2 groups) – move the remaining 4 tens to the units.

How many groups of 6 can you make with the 42 units? (7 groups)

		 **Remainders** Continue to make sensible decisions about rounding up or down after division in the context of a problem. (See NCETM video – Division with exchange)

DIVISION: Y5

Understanding the operation and related vocabulary.

Understanding the operation

Continue to understand the distributive law and recognise that

65 ÷ 5 is the same as (50 ÷ 5) + (15 ÷ 5)

Continue to relate fractions and division.

Understand:

- Scaling by simple fractions
- Simple rates
- Begin to understand links to ratio problems.
-

Continue using a range of equations as in year 4 but with appropriate numbers.

☐= 540 ÷6 ☐=3.2÷8 48=☐÷☐

90÷30 = 6x☐ ☐x☐ > 600÷8

Continue to solve missing number problems

☐= 540 ÷6 ☐=3.2÷8 48=☐÷☐

90÷30 = 6x☐ ☐x☐ > 600÷8

Begin to use brackets.

(60+3) ÷ 7 = ☐ ☐=10 + (1.4 ÷2)

Vocabulary

Read, spell and pronounce mathematical vocabulary related to division correctly.

see year 4
common factors
prime number, prime factors
composite numbers
short division
square number
cube number

Mental Calculations

Number facts

Count regularly using a range of multiples, and powers of 10, 100 and 1000, building fluency.

Practice and apply the multiplication facts to 12 x 12.
Use knowledge of counting in multiples to counting in decimal steps (one decimal place).

0.6 1.2 1.8 2.4 ….

Derive corresponding halves of doubles of decimals (to 1 place) using knowledge of place value.

Half of 0.4 = 0.2 3.6 ÷ 2 = 1.8

Continue to recall division facts for multiplication tables to 12 x 12 fluently and derive and use related facts:

560 divided by 7 divide 2.1 by 7
4500 ÷ 5, what is the quotient?
3.2 divided by 4

Identify multiples and factors and common factors of two numbers and primes.

list the multiples of 9 between 150 and 180 (using tests of divisibility)

Mental methods and jottings

Divide mentally drawing upon known number facts.
Use factors to construct equivalence statements.
Begin to divide tenths and 1-digit whole numbers and tenths by 1-digit whole numbers.

Partitioning

Using distributive law:

546 ÷ 6 (540 ÷ 6 = 90; 6 ÷ 6 = 1 so 90 + 1 = 91)

Written Calculations

Divide numbers up to 4 -digits by a 1-digit number using a formal written method (short division) and interpret remainders appropriately for the context
e.g.
3075 ÷ 5; 6831 ÷ 9

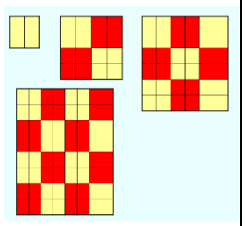
Short division:

As year 4 but with larger numbers and as children become more confident they can move away from using practical resources as support.

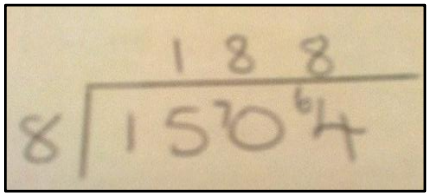
Remainders

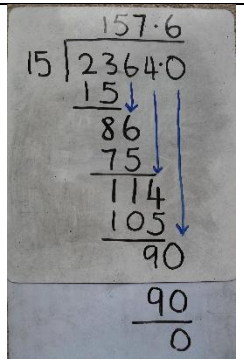
Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding.

(See NCETM video – Division with exchange)

inverse power of **Generalisations** The = sign means equality. Take it in turn to change one side of this equation, using multiplication and division, e.g. Start: **24 = 24** Player 1: **4 x 6 = 24** Player 2: **4 x 6 = 12 x 2** Player 1: **48 ÷ 2 = 12 x 2** Sometimes, always, never true questions about multiples and divisibility. E.g.: • If the last two digits of a number are divisible by 4, the number will be divisible by 4. • If the digital root of a number is 9, the number will be divisible by 9. • When you square an even number the result will be divisible by 4 (one example of 'proof' shown left) 	With Jottings 24.5 ÷ 7 (21 ÷ 7 = 3; 3.5 ÷ 7 = 0.5 so 3 + 0.5 = 3.5) Continue to partition number in different ways: 762 = 700 + 60 + 2; 600 + 120 + 42 **Doubling and halving** 14.8 ÷ 4 (halve and halve again) *Half of 14.8 = 7.4; half of 7.4 = 3.7* With jottings: 3800 ÷ 50 (divide by 100 then double) *3800 ÷ 100 = 38; double 38 = 76.* **Factors** 84÷20 (halve and divide by 10) 84÷2=42 42÷10=4.2 With jottings 150 ÷ 6 (150 ÷ 3 = 50, then 50 ÷ 2 = 25). **Using known facts and place value** 8.4 ÷ 7 (multiply dividend by 10, then divide quotient by 10) 84÷7 =12, 12÷10=1.2 **Estimating** Use rounding to check answers to calculation and determine, in the context of a problem, levels of accuracy: 256 ÷ 12 is approximately 2560 ÷ 10. Continue to use appropriate strategies to check answers: Check 860 ÷ 9 by using the inverse.	

DIVISION: Y6

Understanding the operation and related vocabulary.	Mental Calculations	Written Calculations
Understanding the operation Continue to relate fractions and division. Understand: - Scaling by simple fractions - Simple rates - Begin to understand links to ratio problems. Use their knowledge of order of operations. Understand that when there are no brackets, do multiplication or division before addition or subtraction. Understand that if the examples are at the same level of priority then work out the examples from left to right. Continue using a range of equations as in year 5 but with appropriate numbers. ☐= 540 ÷0.6 ☐=0.48÷8 4.8=☐÷☐ 9÷0.3 = 6x☐ ☐x☐ > 0.56÷8 Explore the order of operations using brackets. compare 14 ÷ (2 x 5) with (14 ÷ 2) x 5 **Vocabulary** Read, spell and pronounce mathematical vocabulary related to division correctly. see years 4 and 5 Common multiple **Generalisations**	**Number facts** Children should count regularly, building on previous work in previous years. Use knowledge of counting in multiples to counting in decimal steps (two decimal places). 0.09 0.18 0.27 0.36 … Continue to recall division facts for multiplication tables to 12 x 12 fluently and derive and use related facts: *3000 divided by 60 divide 0.12 by 6* *5800 ÷ 6, what is the quotient?* *0.64 divided by 8* Derive corresponding halves of decimals (to 2 places) using knowledge of place value. Half of 0.48 is ☐ 0.74÷2=☐ Using known facts and place value: 0.99 ÷ 11 (multiply dividend by 100, then divide quotient by 100) *99 ÷ 11 = 9, 9 ÷ 100 = 0.09* Identify common factors, common multiples and prime numbers. 15 ÷ 6 (divide by 3 then 2) 15 ÷ 3 = 5 5 ÷ 2 = 2.5 **Mental methods and jottings** Perform mental calculations, including with mixed operations, large numbers and decimals. **Partitioning** Using distributive law: 18.12 ÷ 3 (18 ÷ 3 = 6; 0.12 ÷ 3 = 0.4 so 6 + 0.4 = 6.4)	Divide numbers up to 4 digits by a 2-digit whole number using a formal written method (short division and long division). Divide numbers (up to two decimal places) by 1-digit and 2-digit whole numbers. Give answers up to 2 decimal places. Calculate decimal fractions e.g. **Short division:** 56.4 ÷ 4; 5246 ÷ 22; 19.88 ÷ 7; 1504 ÷ 8  **Long division:** 2360 ÷ 15; 187.5 ÷ 15

Order of operations: brackets first, then multiplication and division (left to right) before addition and subtraction (left to right). Children could learn an acrostic such as PEMDAS, or could be encouraged to design their own ways of remembering. Sometimes, always, never true questions about multiples and divisibility. E.g.: If a number is divisible by 3 and 4, it will also be divisible by 12. (also see year 4 and 5, and the hyperlink from the Y5 column) Using what you know about rules of divisibility, do you think 7919 is a prime number? Explain your answer.	With Jottings 2.58 ÷ 6 (2.4 ÷ 6 = 0.4; 0.18 ÷ 6 = 0.03 so 0.4 + 0.03 = 0.43) **Doubling and halving** 9.6 ÷ 40 (halve and halve again and divide by 10) *Half of 9.6 = 4.8; half of 4.8 = 2.4; 2.4 ÷ 10 = 0.24* With jottings: 1700 ÷ 25 (divide by 100 then double and double) *1700 ÷ 100 = 17; double 17 = 34; double 34 is 68* **Using known facts and place value** 0.99÷11 (multiply dividend by 100, then divide quotient by 100) 99÷11=9, 9÷100=0.09 **Factors** 15 ÷ 6 (divide by 3 then 2) 15 ÷ 3 = 5 5 ÷ 2 = 2.5 With jottings 900 ÷ 12 (900 ÷ 3 = 300, then 300 ÷ 2 = 150 then 150 ÷ 2 = 75) **Estimating** Use estimation to check answers to calculation and determine, in the context of a problem, levels of accuracy: 5872 ÷ 54 is approximately 6000 ÷ 50. Continue to use appropriate strategies to check answers: Check 4581 ÷ 27 by using the inverse.	 **Remainders** Interpret remainders as whole number remainders, fractions, decimals or by rounding, as appropriate for the context. Round answers to a specified degree of accuracy. (See NCETM video – Division with exchange)