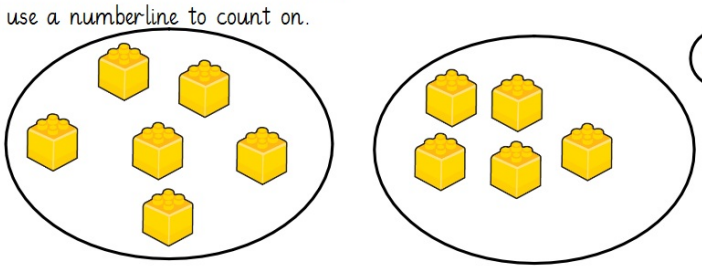
Shaftesbury
Primary School
Growing together

Calculation Policy
2022-2023

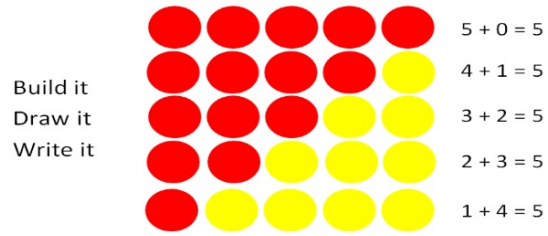
Addition - EYFS

End of Year Expectation:

Using quantities and objects, add two single digit numbers and count on to find the correct answer.
Say which number is one more or onel less than a given number to 20.
Solve simple word problems involving addition and doubling
In practical activities uses vocabulary related to addition.
Begin to record addition number sentences.
Begin to use a numberline to count on.

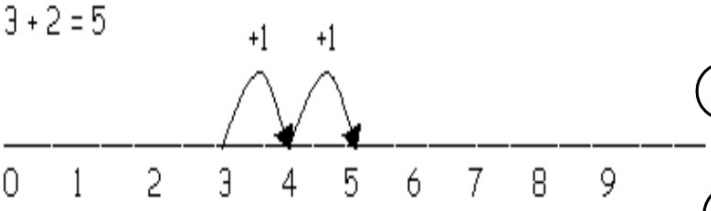


1 Using concrete objects and maniputlatives to support solving problems. Later pupils will draw pictures to find a solution.
6+5=11 Introduce systematic counting to ensure accuracy. Children should be able to subitise to 6 in Reception.



2 Explore numbers individually to 10 e.g. the story of 4

4 + 0 = 4
3 + 1 = 4
2 + 2 = 4
1 + 3 = 4



3 Add two one digit numbers using fingers, grouping together of objects in sets and then with a number line.

4 Children begin to add 3 numbers to find a total.

Children will solve a number problem with a sentence by putting the larger number first with totals of no more than ten to begin with.

Addition - Year 1

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

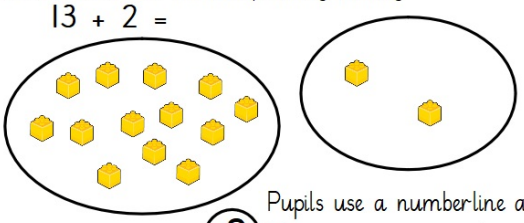
End of Year Expectation:

Read, write and interpret addition number sentences using + and = symbols.
Represent and use number bonds within 20.
Add one-digit and two-digit numbers to 20, including 0.
Solve 1 step problems involving addition using concrete objects, pictoral representations and a numberline/number sqaure
Use addition to solve missing number problems.
Begin to recall and use addition facts to 20 fluently.

NB Refer to EYFS for skill development e.g. subitising

1

13 + 2 =



Children organise objects to enable effective and efficient counting. Joining two groups and recounting using one to one correspondence. Pupils understand that counting on from the greater is more efficient. Pupils should be encouraged to rely on number bonds knowledge as time goes on rather than using counting on as a main strategy.

Children begin to add 3 sets of numbers.

2

Pupils use a numberline and then a 100 square to add on, correctly continuing onto the next line. They can add 10 to any given number on a 100 square and describe its position.

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

3

Recognise doubles to double 6

4

23 + 12 =

10 2

23 + 10 + 2 =

Children begin to partition 2 digit numbers and then begin adding 10 and then units.
Work within 20 to begin with and then progress to adding a 2-digit and 2-digit e.g. 17 + 12

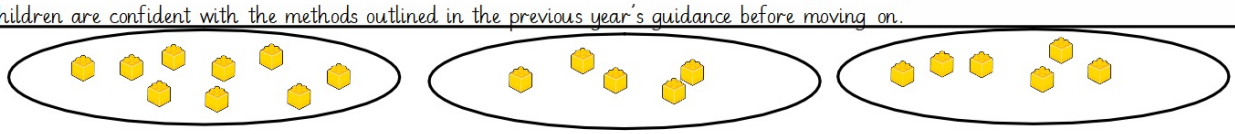
Addition - Year 2

End of Year Expectation:

Add numbers using concrete objects, pictorial representations, and mentally, including: 3 one-digit numbers., a two-digit number and units, a two-digit number and tens and 2 two-digit numbers.
Solve addition problems, including numbers, quantities and measures
Recall and use addition facts to 20 fluently
Derive and use related addition facts up to 100.
Understand that addition can be done in any order (commutative law).
Understand the link between addition and subtraction, and use this to check calculations and solve missing number problems.
NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

1

9+5+6



When working out, children will begin to rearrange the number order to start with the largest. However in Y2 pupils should start to look for patterns e.g. Taking 1 from 5 and adding to 9 will make 10 so now the calculation is 10 + 4 + 6 = ? Recognising pairs of numbers to 10 so 4 + 6 = 10

2

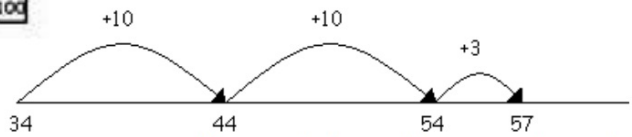
Use a number line or 100 square to add TU+TU.
Partition the smallest number adding then tens then the units.

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

3

Pupils must be proficient in using the 100 square, counting on and back from any number. Which number is below, above, to the left of/right of a given number. They must be secure with mental methods of calculation, working horizontally to partition numbers effectivley.

23 = 57



4

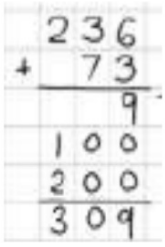
Moving on to using partitioning to add TU + TU e.g. 83 + 42 (expanded method only)

83 + 42 = 125

40 2

83 + 40 = 120

123 + 2 =125



Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, doub
count on, number line, sum, tens, units, partition, addition, column, tens boundary

Addition - Year 3

End of Year Expectation:

Add numbers mentally, including a three-digit number and ones, a three digit number and ones, a three-digit number and tens, a three-digi number and hundreds

Add numbers with up to three digits, using formal written methods - begin to use compact column addition to add numbers with three digits

Estimate the answer to an addition calculation, using inverse to check.

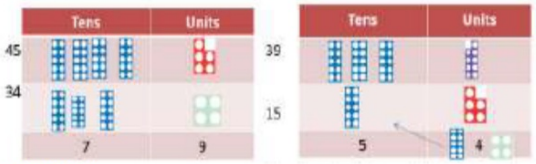
Solve addition problems, including missing number problems, using number facts, place value and more complex additio

When do we know children are ready for this method?

Do they know addition and subtraction facts to 20?

Do they understand place value and can they partition numbers?

Can they explain their mental strategies orally and record them using informal jottings?



Example calculation:

c) 34+25 (no crossover)

57+29 = 77

57 + 20 = 77

77 + 9 = 86

Mental partitioning to add tens and units.

(1) Example calculation:

a) 121 + 6 = 127

b) 123 + 8 = 131

Children count on using mental methods or a numberline /200 square

(2)

Example calculation:

e)121 + 12 = 133 (no cross over)

f) 123 + 18 = 141 (bridging once)

g) 79+86 = 165 (multiple bridging)

Begin investigating benefits of column addition for calculation type g)

(3) **176 + 147 = 323**

Use this intermediate step only if children experience difficulty moving on from partitioning method

```
  176
+ 147
  ---
   13    (7 + 6)
  110    (70 + 40)
  200    (100 + 100)
  ---
  323
```

expanded method:

(4)

```
  236
+ 73
  ---
  309
  1
```

Compact column addition

Add the units first, carry numbers underneath the bottom line, remind pupils of actual value eg, 3 tens add 7 tens.

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact

Addition - Year 4

End of Year Expectation:

Add numbers with up to 4 digits using the formal written method of columnar addition where appropriate

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines with three and four digit numbers, as appropriate.

1

Further develop the formal written method of addition, with three-digit numbers.

Revisit the expanded method first, if necessary:

176 + 147 = 323

176		
+ 147		
13	(7 + 6)	
+ 110	(70 + 40)	
200	(100 + 100)	
323		

This will lead into the formal written method...

2

176 + 147 = 323

Use the language of place value to ensure understanding:

'Seven add six equals 13. Write three in the units column and 'carry' one across into the tens column (10).

40 add 70 and the ten that we carried equals 120.

Write 2 in the tens column (20) and 'carry' 1 across into the hundreds column (100). 100 add 100 and the 100 that has been carried equals 300. Write 3 in the hundreds column (300).

	1 4 7	
+	1 7 6	
	3 2 3	
	1 1	

Children use and apply this method to money and measures.

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse

3

If children are confident, introduce the addition of a four-digit number and a three digit number:

1845 + 526 = 2371

	1 8 4 5	
+	5 2 6	
	2 3 7 1	
	1 1	

Continue to develop with addition of two four-digit numbers and with decimals (in the context of money or measures).

Addition - Year 5

End of Year Expectation:

Add whole numbers with more than 4 digits, including using formal written method (columnar addition.

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines with larger numbers (and decimals), as appropriate.

① **21848 + 1523 = 23371**

$$\begin{array}{r} 21848 \\ +\ 1523 \\ \hline 23371 \\ {\scriptstyle 1\ \ 1\ \ \ \ \ } \end{array}$$

Continue to use the language of place value to ensure understanding.
Ensure that the digits that have been 'carried' are recorded under the line in the correct column.

② Use the formal written method for the addition of decimal numbers:

£154.75 + £233.82 = £388.57

$$\begin{array}{r} 154{\cdot}75 \\ +\ 233{\cdot}82 \\ \hline 388{\cdot}57 \\ {\scriptstyle 1\ \ \ \ \ \ } \end{array}$$

Ensure that the decimal points line up.

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

Addition - Year 6

End of Year Expectation:

To use formal written method (columnar addition) for larger numbers and decimals

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines with larger numbers (and decimals), as appropriate.

(1) **21848 + 1523 = 23371**

$$\begin{array}{r} 21848 \\ +\ 1523 \\ \hline 23371 \\ {\scriptstyle 1\ \ 1} \end{array}$$

Continue to use the language of place value to ensure understanding

Ensure that the digits that have been 'carried' are recorded under the line in the correct column.

(2) Use the formal written method for the addition of decimal numbers:

£154.75 + £233.82 = £388.57

$$\begin{array}{r} 154{\cdot}75 \\ +\ 233{\cdot}82 \\ \hline 388{\cdot}57 \\ {\scriptstyle 1} \end{array}$$

Ensure that the decimal points line up.

Key vocabulary add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

Our aim is that by the end of Y6 children use mental methods (with jottings) when appropriate, but for calculations that they cannot do in their heads, they use an efficient formal written method accurately and with confidence

Subtraction - EYFS

End of Year Expectation:

Proficiency in counting.
Using quantities and objects, subtract two single digit numbers and count back to find the correct answer
Solve simple word problems involving subtraction and halving.
Understand that subtraction is not commutative and the largest number must come first in a calculation.

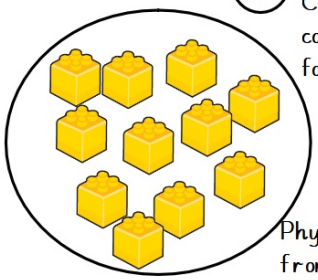
Children consolidate understanding of subtraction practically using bead strings, cubes etc and in real life contexts

Small intervention groups. 5 minutes a day to ensure progress through these steps.

Counting:

1
- Stable order principle (number names)
- One to one principle (one number for each item)
- Cardinal principle (last number)
- Order irrelevance principle (conservation)
- Abstraction principle

2 Counting out a set with 1 to 1 correspondance, positioning objects for accuracy with counting.



Physically subtracting 7 from the set to find a new total.

3 Using concrete objects to support
11 - 7 = 4

Children to write and solve subtraction sentences within 10 using manipulatives for support and then a number line. Progress to numbers rom 11 to 20.

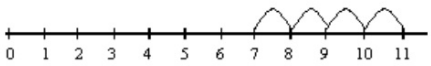
The story of a number:

4

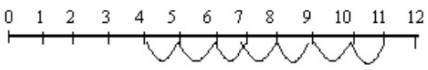
$4 - 3 = 1$
$4 - 2 = 2$
$4 - 1 = 3$
$4 - 0 = 4$

5 **Investigating difference and then counting back on a number line.**

The difference between 7 and 11
(Counting up)



11 – 7
(Counting back)

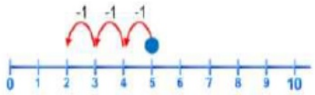


Subtraction - Year 1

End of Year Expectation:

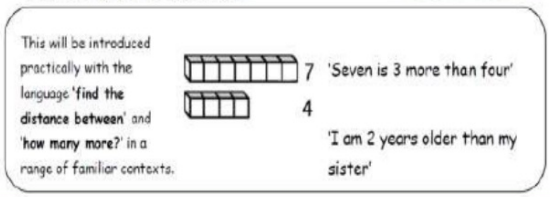
Subtract one-digit and two-digit numbers within 20, including zero.
Use number bonds and related subtraction facts within 20.
Solve one-step word problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems.
NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

1. Children consolidate understanding of subtraction practically using bead strings, cubes etc and in real life contexts. They are introduced to more formal recording using number lines, then using empty numbers lines.



5 - 3 = 2

2. Model subtraction practically and using number tracks, number lines and 100 squares and practically.
Find the difference between - this is to be done practically using the language 'find the distance between' and 'how many more than?'



Children to find small difference on a number line.

Children to write and solve subtraction sentences with numbers no greater than 20 on a number line.

3. Embed number bonds and make connections:-
10 - 1 = 9 so 20 - 1 = 19
9 - 1 = 8 so 19 - 1 = 18

4. Children can subtract numbers up to 100 using a hundred square.

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

Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is...

Subtraction - Year 2

End of Year Expectation:

Subtract numbers using concrete objects, pictorial representations, and mentally, including

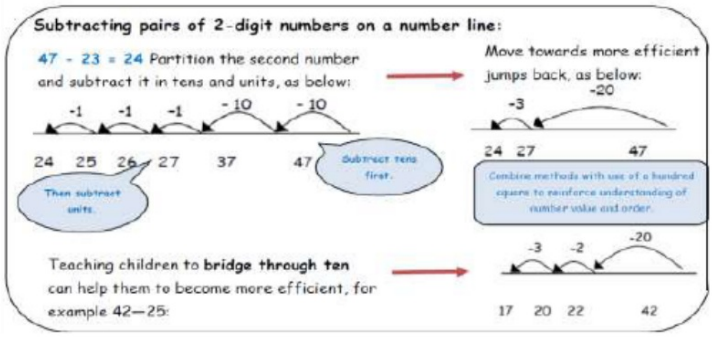
> a two-digit number and ones
> a two-digit number and tens
> 2 two-digit numbers
> 3 one-digit numbers

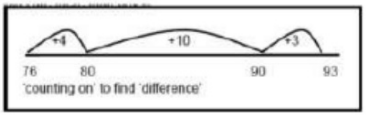
NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Year 2 Subtract with 2-digit numbers

1. Use practical equipment such as Dienes and Numicon to model sub-

2. Subtract first on a on a numbered number line, then on an empty number line, by counting back, aiming to develop mental subtraction skills.





Children should also learn how to count on in order to find the difference. They should be given opportunities to explore when to count on and when to count back.

Step 1 can also involve using 100 square

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

3. Move to Same method however link to 100 square

47 - 23 =
47 - 20 = 27 (counting back on 100 square)
27 - 3 = 24 (7 - 3 = 4)

Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, partition, tens units

Subtraction - Year 3

End of Year Expectation:

Subtract numbers mentally including:

> a three-digit number and ones

> a three-digit number and tens

> a three-digit number and hundreds

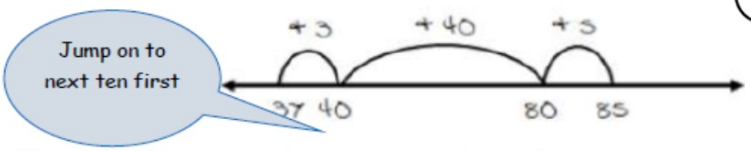
Subtract numbers up to three digits using formal written methods

Estimate an answer to a calculation and use inverse operations to check answers.

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

(2) **Year 3** Subtract with 2 and 3-digit numbers

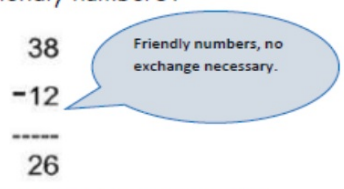
Subtract on an empty number line (ENL) by counting on



Children should understand when to count back where appropriate, using place value or number facts. This skill should be reinforced through mental work.

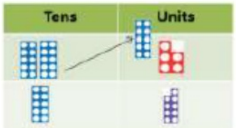
Begin to use formal column subtraction method, first using 'friendly numbers'.

(3)



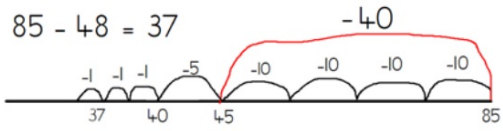
Teach the children to consider the most appropriate method

(4) Move to formal subtraction using 'take and make'.



$$\begin{array}{r} {}^{5}\not{6}\,{}^{1}3 \\ -\,1\,5 \\ \hline 4\,8 \end{array}$$

(1)



Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, partition, tens units, take and make, exchange, digit, value, hundreds

Subtraction - Year 4

End of Year Expectation:

Subtract numbers with up to 4 digits using the formal written method of columnar subtraction where appropriat

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines with three and four digit numbers, as appropriate.

1 Continue to develop the formal written method of subtraction by revisiting the expanded method first, if necessary. Continue to use base-ten materials to support understanding.

258 - 73 = 185

$$\begin{array}{r} 200 + 50 + 8 \\ -\quad 70 + 3 \end{array} \quad \text{becomes} \quad \begin{array}{r} 100 + 150 + 8 \\ -\quad 70 + 3 \\ \hline 100 + 80 + 5 \end{array} = 185$$

This leads to the formal written method, involving decomposition.

$$\begin{array}{r} {}^{1}\cancel{2}\,{}^{15}\cancel{5}\,8 \\ -\quad 7\,3 \\ \hline 1\,7\,5 \end{array}$$

Use the language of place value to ensure understanding. In this example it has been necessary to exchange from the hundreds column.

2 Further develop by subtracting a three-digit number from a three-digit number

637 – 252 = 385

$$\begin{array}{r} 600 + 30 + 7 \\ -\ 200 + 50 + 2 \end{array} \qquad \begin{array}{r} 500 + 130 + 7 \\ -\ 200 + \ 50 + 2 \\ \hline 300 + \ 80 + 5 \end{array} = 385$$

Ensure that children are confident in partitioning numbers in this way.

This leads to a formal written method:

$$\begin{array}{r} {}^{5}\cancel{6}\,{}^{13}\cancel{3}\,7 \\ -\ 2\,5\,2 \\ \hline 3\,8\,5 \end{array}$$

Use the language of place value to ensure understanding and use baseten materials, if necessary.

3 When children are confident, develop with four digit numbers and decimal numbers (in the context of money and measures)

3625 – 1219 = 2406

$$\begin{array}{r} 3\,6\,{}^{1}\cancel{2}\,{}^{15}\cancel{5} \\ -\ 1\,2\,1\,9 \\ \hline 2\,4\,0\,6 \end{array}$$

Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, partition, tens units, take and make, exchange, digit, value, hundreds, inverse

Subtraction - Year 5

End of Year Expectation:

Subtract whole numbers with more than 4 digits, including using formal written method (columnar subtraction

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines with larger numbers (and decimals), as appropriate.

1

Continue to develop the formal written method for subtraction with three and four digit numbers (see Y4 guidance), returning to an expanded method and using base ten materials, if necessary.

503 – 278 = 225

$$\begin{array}{r} 500+\ 0+3 \\ -\ 200+70+8 \\ \hline \end{array} \qquad \begin{array}{r} 400+90+13 \\ -\ 200+70+\ 8 \\ \hline 200+20+\ 5 \end{array}$$

In this example 503 has to be partitioned into 400+90+13 in order to carry out the subtraction calculation.

2

This leads into the formal written method (there is potential for error in this example):

$$\begin{array}{r} {\scriptstyle 4\ 9\ 13} \\ \cancel{5}\,\cancel{0}\,\cancel{3} \\ -\ 2\ 7\ 8 \\ \hline 2\ 2\ 5 \end{array}$$

There are no tens in the first number (503) so we have to exchange a hundred for 10 tens before we can exchange a ten for ten ones/units

3

When children are confident extend with larger numbers (and decimal numbers). Return to an expanded method, if necessary.

12731 – 1367 = 11364

$$\begin{array}{r} {\scriptstyle 6\ 12\ 11} \\ 1\ 2\ \cancel{7}\ \cancel{3}\ \cancel{1} \\ -\ \ 1\ 3\ 6\ 7 \\ \hline 1\ 1\ 3\ 6\ 4 \end{array}$$

In this example it has been necessary to exchange from the tens and the hundreds columns

4

Introduce subtraction of decimals, initially in the context of money and measures

£166.25 – £83.72 = £82.53

$$\begin{array}{r} {\scriptstyle 16\ 5\ 12} \\ \cancel{1}\,\cancel{6}\,\cancel{6}\cdot\cancel{2}\,5 \\ -\ 8\,3\cdot 7\,2 \\ \hline 8\,2\cdot 5\,3 \end{array}$$

Ensure the decimal points line up.

Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, partition, tens units, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal

Subtraction - Year 6

End of Year Expectation:

To use formal written method (columnar subtraction) for larger numbers and decimals

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines with larger numbers (and decimals), as appropriate.

1. Extend children with larger numbers (and decimal numbers).

12731 – 1367 = 11364

$$\begin{array}{r} {\scriptstyle 6\ \ 12\ 11} \\ 1\,2\,\cancel{7}\,\cancel{3}\,\cancel{1} \\ -\ \ 1\,3\,6\,7 \\ \hline 1\,1\,3\,6\,4 \end{array}$$

In this example it has been necessary to exchange from the tens and the hundreds columns.

2. Continue subtraction of decimals, initially in the context of money and measures.

£166.25 – £83.72 = £82.53

$$\begin{array}{r} {\scriptstyle 16\ \ 5\ \ 12} \\ \cancel{1}\,\cancel{6}\,\cancel{6}\cdot\cancel{2}\,5 \\ -\ 8\,3\cdot 7\,2 \\ \hline 8\,2\cdot 5\,3 \end{array}$$

Ensure the decimal points line up.

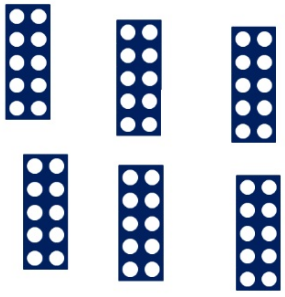
Key vocabulary equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, partition, tens units, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal

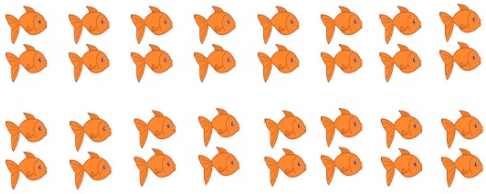
Our aim is that by the end of Y6 children use mental methods (with jottings) when appropriate, but for calculations that they cannot do in their heads, they use an efficient formal written method accurately and with confidence

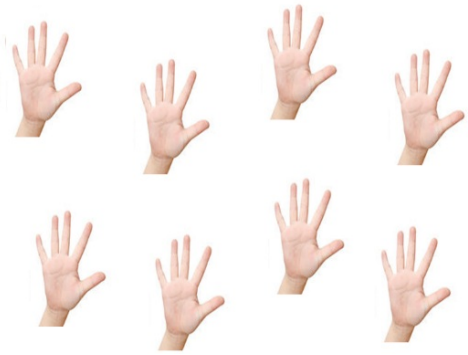
Multiplication - EYFS

End of Year Expectation: (ELG)
Solve problems including doubling

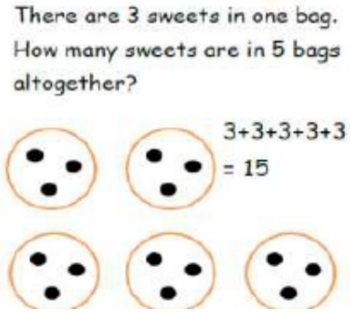
1 Investigating groups of numbers which are equal/the same.







2 Multiply with concrete objects, arrays and pictorial representations



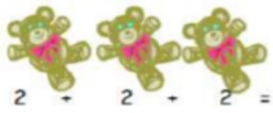
Multiplication - Year 1

End of Year Expectation:

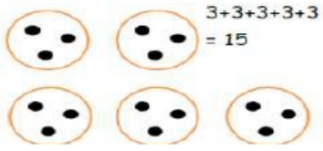
Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

1. **Year 1** Multiply with concrete objects, arrays and pictorial representations

How many legs will 3 teddies have?

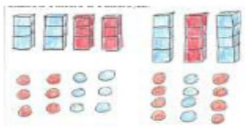


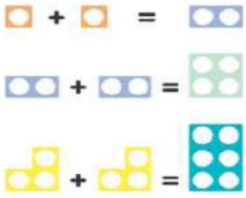
There are 3 sweets in one bag.
How many sweets are in 5 bags altogether?



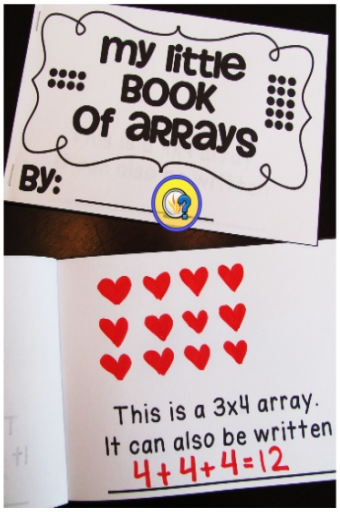
2. Count in 2s, 5s, 10s

3. Use visual and concrete arrays and 'sets of' objects to find the answers to '3 lots of 4', 2 lots of 5' etc





4. Numicon to find doubles to double 6



Key vocabulary - groups of, lots of, times, array, altogether, multiply, count

Multiplication - Year 2

End of Year Expectation:

Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables including odd and even numbers

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the correct signs.

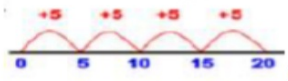
Show that multiplication of two numbers can be done in any order (commutative) and division cannot.

Solve problems involving multiplication using materials, arrays, repeated addition, mental methods and multiplication facts including problems in context.

Year 2 Multiplication using arrays and repeated addition.

(using at least 2s, 5s and 10s)

Starting from zero, make equal jumps on a number line to work out multiplication facts and write multiplication



Use repeated addition on a number line:

4 X 5 = 20

Use arrays and Numicon to help teach children to understand the commutative law of multiplication and give

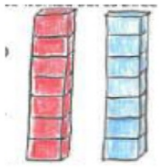
5 x 3 = 15

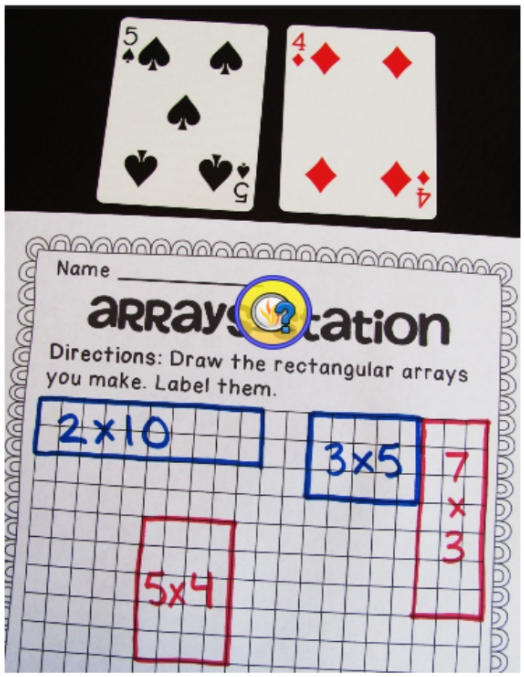
3 x 5 = 15

Learn doubles to double 20

Begin to double multiples of 5 to 100

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





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

Multiplication - Year 3

End of Year Expectation:

Recall and use multiplication facts for the 3's, 4's and 8's

Write and calculate mathematical statements for multiplication tables (2,3,4,5,8,10's times tables) including for two-digit numbers times one-digit numbers using mental methods and formal written methods.

Solve problems including missing number problems involving multiplication with correspondance problems in which n objects are connected to m objects.

Year 3 multiply 2-digit numbers by a single digit number

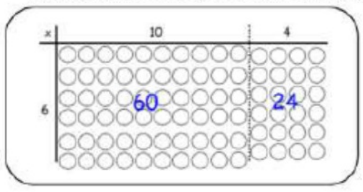
Introduce the grid method for multiplying 2 digits by 1 digit

Eg. 23 x 8 = 184

X	20	3
8	160	24

160 + 24 = 184

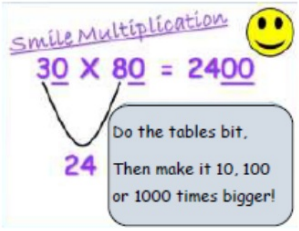
Link the layout of the grid to an array initially:



Demonstrate how the array links to the grid calculation

Children MUST be able to do the following before moving onto grid method:

- Partition numbers into tens and units
- Multiply multiples of ten by a single digit (Smile multiplication) using their knowledge of multiplication facts and times tables.
- Recall and work out multiplication facts in the 2,3,4,5,8 and 10 times tables



Autumn - Number facts and multiplying by 10

Spring Grid method 13 x 4=

Summer Grid method 18 x 8

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

Multiplication - Year 4

End of Year Expectation:

> *Recall multiplication facts for multiplication tables up to 12 x 12*
> *Multiply two-digit and three-digit numbers by a one-digit number using formal written layou*

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to teach the use of empty number lines, as appropriate. (Y3 guidance)

1. Further develop the grid method for two-digit numbers multiplied by a one- digit number.

36 x 4 = 144

X	30	6
4	120	24

120 + 24 = 144 (add the partial products)

2. Expanded short multiplication (two-digit number by a one-digit number):

36 x 4 = 144

```
  36
x  4
+ 24   (4 x 6)
 120   (4 x 30)
 144
```

Include an addition symbol when adding partial products.

3. This leads to short multiplication (formal method) of a two-digit number multiplied by a one- digit number:

```
  36
 x 4
 144
  2
```

36 x 4 = 144

Use the language of place value to ensure understanding.
Ensure that the digit 'carried over' is written under the line in the correct column.

Continue to practise the formal method of short multiplication of a two-digit number by a one -digit number throughout Y4.

4. If children are confident, continue to develop short multiplication with three- digit numbers multiplied by a one-digit number.

```
  127
x   6
   42   (6x7)
+ 120   (6x20)
  600   (6x100)
  762
```

127 x 6 = 762

then onto this..

```
  127
x   6
  762
  1 4
```

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

Multiplication - Year 5

End of Year Expectation:

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-dig numbers

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Build on the work covered in Y4 with the formal method of short multiplication (two-digit number multiplied by a one-digit number)

When children are confident introduce multiplication by a two-digit number.

If necessary, return to the grid method and/or expanded method first.

1

Expanded long multiplication (two-digit numbers multiplied by a teen- number):

23 x 13 = 299

```
  23
 X13
   9   (3 x 3)
  60   (3 x 20)
 +30   (10 x 3)
 200   (10 x 20)
 299
```

2

Compact long multiplication (formal method):

23 x 13 = 299

Use the language of place value to ensure understanding.

Add the partial products.

```
  23
 X13
 +69
 230
 299
```

3

Two-digit numbers multiplied by two-digit numbers):

56 x 27 = 1512

```
  56
 X27
  42   (7x6)
 350   (7x50)
+120   (20x6)
1000   (20x50)
1512
 1
```

```
  56
 x 27
 394
+1120
 1512
  1
```

Expanded method .... Moving onto .... Compact long multiplcation.

4

When children are confident with long multiplication extend with three-digit numbers multiplied by a two-digit number.

124 x 26 = 3224

```
  124
 X 26
 7144
+2480
 3224
 1 1
```

Use the language of place value to ensure understanding.

Add the partial products.

Extend with short and long multiplication of decimal numbers (initially in the context of money and measures), returning to an expanded method first (see Y6 guidance).

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

Multiplication - Year 6

End of Year Expectation:

Multiply multi-digit numbers (including decimals) up to 4 digits by a two- digit whole number

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

Continue to practise and develop the formal short multiplication method and formal long multiplication method with larger numbers and decimals throughout Y6. Return to an expanded forms of calculation initially, if necessary (see Y5 guidance)

① The grid method (decimal number multiplied by a two-digit number):

53·2 x 24 = 1276·8

x	50	3	0·2	
20	1000	60	4	1064·0
4	200	12	0·8	212·8
				1276·8

② The formal written method of long multiplication:

53·2 x 24 = 1276·8

```
  5 3·2
x 2 4·0
  2 1 1 2·8   (53·2 x 4)
1 0 6 4·0     (53·2 x 20)
1 2 7 6·8
```

It is an option to include ·0 in this example, but not essential.

The prompts (in brackets) can be omitted if children do not need them.

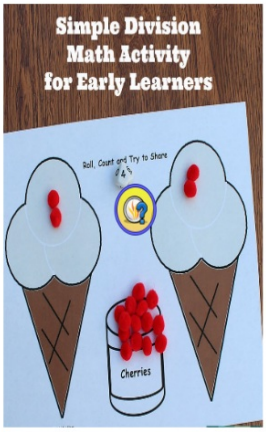
Our aim is that by the end of Y6 children use mental methods (with jottings) when appropriate, but for calculations that they cannot do in their heads, they use an efficient formal written method accurately and with confidence

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

Division - EYFS

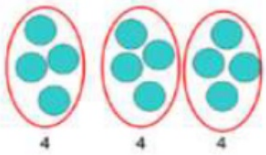
End of Year Expectation:

Solve one step problems involving division by calculating the answer using concrete objects pictorial representations and arrays with the support of the teacher.



Grouping:

Sharing:



12 shared between 3 is 4

Children should solve a division problem within a context.

E.g. 5 children share 15 sweets. How many does each child get?

Can they solve this and write a division statement eg. 15 sweets shared between 5 children gives 3 each.

2

12 shared between 3 equals 4.

1

Division - Year 1

End of Year Expectation:
Solve one step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Key vocabulary

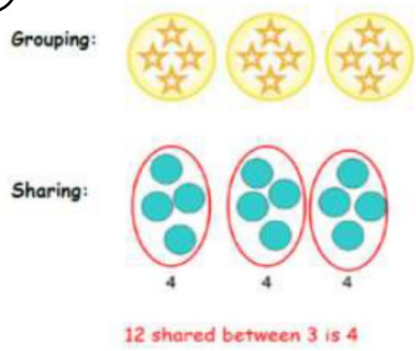
share, share equally, one each, two each…, group, groups of, lots of, array

Year 1 Group and share small quantities

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

(1)

(2)



Children should solve a division problem within a context.

E.g. 5 children share 15 sweets. How many does each child get?

Can they solve this and write a division statement eg. 15 sweets shared between 5 children gives 3 each.

Pupils 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.

Division - Year 2

End of Year Expectation:

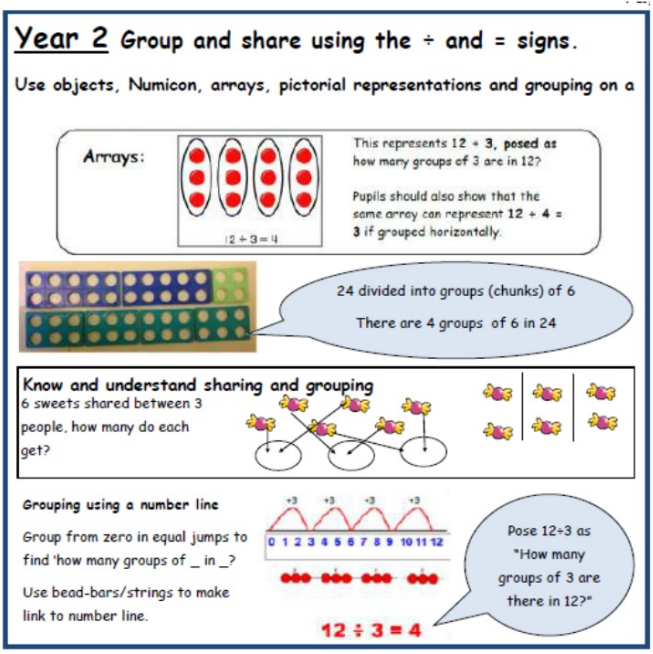
Recall and use division facts for the 2, 5, 10 x tables including recognising odd and ever numbers.

Calculate mathmatical statements for division as inverse of multiplication and write them using the division symbols.

Show and demonstrate division as non-commutative.

Solve problems involving division using materials, arrays, mental methods, division facts including problems in contexts.

1



- using low 2-digit numbers with no remainders and grouping as the preferred method.

Key vocabulary share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over

3

Develop fluency in mathematical talk or patter e.g.

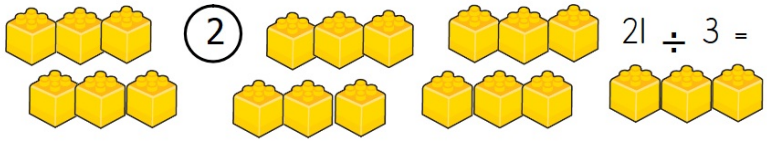
" My question is 21 divided by 3.

I know that the inverse will be ?x 3 = 21

so how may 3's make 21? 3, 6, 9, 12, 15, 18, 21 = 7

7 x 3 = 21 so 21 divided by 3 is 7"

teach alongside the inverse of multiplication:



2

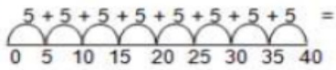
21 ÷ 3 = ☐ ☐ X 3 = 21

Division - Year 3

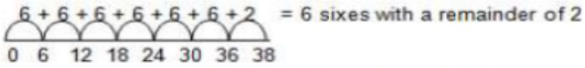
End of Year Expectation:
Recall and use division facts for the 3s, 4s and 8s.
Write and calculate mathematical statements for division (2,3,4,5,8,10)including 2 digit numbers
divided by a 1 digit number using mental methods.
Solve problems including missing number problems involving division.

Year 3 Divide 2-digit numbers by a single digit

Example without remainder:
40 ÷ 5
Ask "How many 5s in 40?"

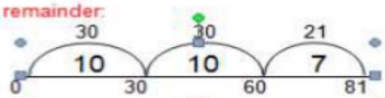


Example with remainder:
38 ÷ 6



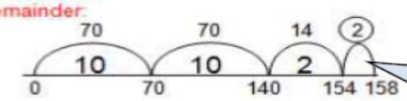
For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.

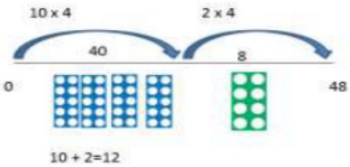
Example without remainder:
81 ÷ 3



This could either be done by working out the numbers of threes in each jump as you go along (10 threes are 30, another 10 threes makes 60, and another 7 threes makes 81. That's 27 threes altogether) or by counting in jumps of known multiples of 3 to reach 81 (30 + 30 + 21) then working out the number of threes in each jump.

Example with remainder:
158 ÷ 7





Grouping on a number line first without, then with remainders

Model first using Dienes, then using bead bar to show link to ENL

y in mathematical talk or patter e.g.
s 32 divided by 8.
e inverse will be ?x 8 = 32
s make 32? 8, 16, 24, 32 = 4
32 divided by 8 is 4"

hat I already know eg

0 x 4 = 40
20 x 4 = 80
30 x 4 = 120
ition 40 + 40 + 40 = 120

nal written layout for division using
on tables that

$$8\overline{)32}\quad 4$$

ights are there in thirty two?'

the formal written layout, introducing

8 r 1

25

Division - Year 4

End of Year Expectation:

> *Recall multiplication and division facts for multiplication tables up to 12 x 12.*
> *Use place value, known and derived facts to divide mentally.*
> *Divide two-digit and three-digit numbers by a one-digit number using formal written layout*

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

1. Continue to write and calculate mathematical statements for division using the multiplication tables that the children know e.g.

$32 \div 8 = 4$ $\quad$ $63 \div 9 = 7$

$100 \div 10 = 10$ $\quad$ $24 \div 2 = 12$

Continue using the formal written layout for division using multiplication tables tha they know:

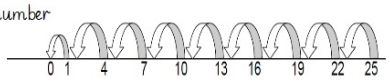
$$8 \overline{)\,32} \quad 4$$

'How many eights are there in thirty two?

2. *Continue using the formal written layout, introducing remainders:*

$$3 \overline{)\,25} \quad 8\text{ r }1$$

This could be modelled using an empty number line, if necessary:
'Eight jumps of three and one left over.'



3. This will lead into the formal written method of long division:

98 ÷ 7 = 14

$$7 \overline{)\,9^{2}8} \quad 14$$

-7 ↓

28

-28

0

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

If children are confident develop further, by dividing three-digit numbers by a onedigit number using the formal method of long division with whole number answers (no remainders).

Division - Year 5

End of Year Expectation:

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpre remainders appropriately for the context.

NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

1. Continue to practise the formal written method of long division with whole number answers.

184 ÷ 8 = 23

```
   2 3
8 ) 1 8 4
  - 1 6 |
    2 4
  - 2 4
      0
```

Use the language of place value to ensure understanding

2. Continue to practise the formal written method of long division with remainders:

432 ÷ 5 = 86 r2

```
     8 6 r 2
5 ) 4 3 2
    4 0
      3 2
      3 0
        2
```

3. The remainder can also be expressed as a fraction, (the remainder divided by the divisor):

$$432 \div 5 = 86\frac{2}{5}$$

Continue to practise, develop and extend the formal method of short division, with and without remainders. interpret and express remainders according to the context.

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

Division - Year 6

End of Year Expectation:

> Divide numbers up to 4 digits by a two-digit number using the formal written method of long division wher appropriate, interpreting remainders according to the context.
> Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, an interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the contex
NB Ensure that children are confident with the methods outlined in the previous year's guidance before moving on.

1. Continue to practise the formal method of long division, with and without remainders, using the language of place value to ensure understanding (see Y5 guidance).

496 ÷ 11 = 45 r1

```
   45 r 1
11 ) 496
    -440
      56
     -55
       1
```

Multiples of the divisor (11) have been subtracted from the dividend (496)

'40 (lots of 11) + 5 (lots of 11) = 45 (lots of 11)'

'1 is the remainder'

Answer: $45\frac{1}{11}$

2. This is an alternative way of recording formal long divisior:

432 ÷ 15 = 28·8

```
    28·8
15 ) 432·0
     30↓
     132
     120
      120
      120
        0
```

NB Only teach this method when children are completely secure with the previous method.
The remainder is expressed as a decimal.

Our aim is that by the end of Y6 children use mental methods (with jottings) when appropriate, but for calculations that they cannot do in their heads, they use an efficient formal written method accurately and with confidence

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