Voyage
EDUCATION PARTNERSHIP

STANILAND ACADEMY

Maths Calculation Policy

www.voyage-education.org

Addition - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

In Year 1, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships. Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

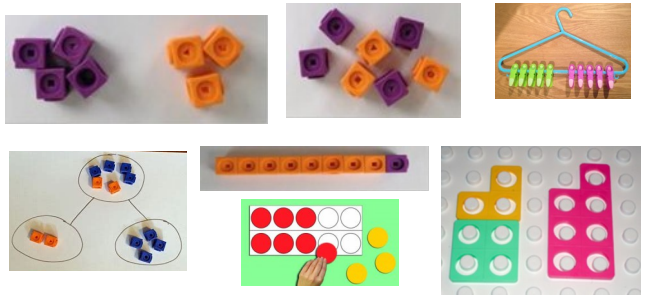
- Represent and use number bonds and related subtraction facts within 20
- Add one-digit and two-digit numbers to 20, including zero
- Read, write and interpret mathematical statements involving addition (+) and equals (=) signs
- Solve one-step problems that involve addition using concrete objects and pictorial representations, and missing number problems such as 7 = ? + 3

Non-statutory requirements:

- Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.
- Pupils combine and increase numbers, counting forwards and backwards.
- They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

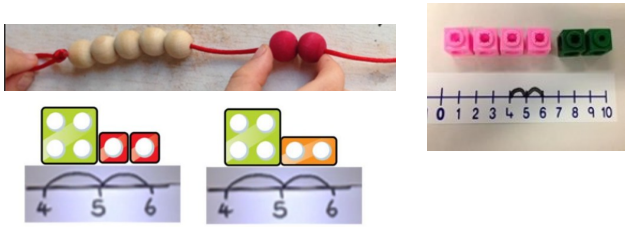
Concrete

Combining two parts to make a whole.



N.B. A range of objects and other manipulatives should also be used here e.g. teddies, stones, counters, sticks.
As you progress here, start to make links with the pictorial.

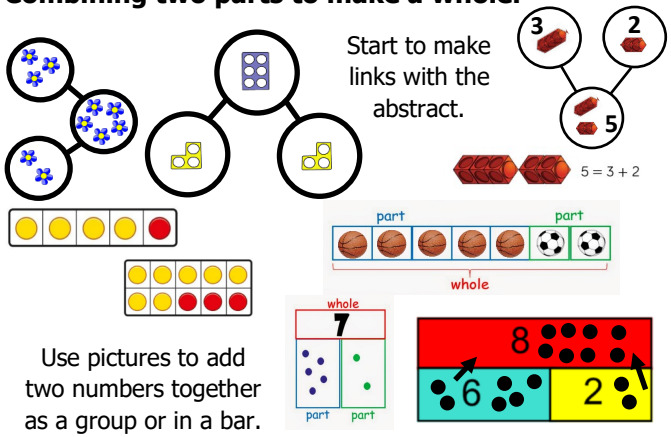
Counting on - *using cubes, numicon, bead strings etc.*



Start with the larger number then count on using the smaller number 1 by 1 to find the answer.

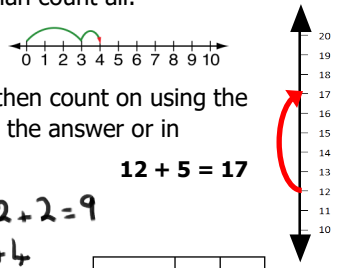
Pictorial

Combining two parts to make a whole.

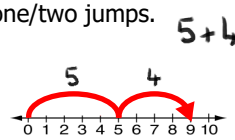


Use pictures to add two numbers together as a group or in a bar.

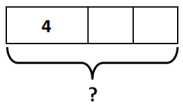
Counting on - use a numberline which encourages the children to count on, rather than count all.



Start with the larger number then count on using the smaller number 1 by 1 to find the answer or in one/two jumps.



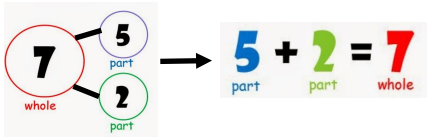
12 + 5 = 17



A bar model can also be used which encourages children to count on.

Abstract

Combining two parts to make a whole.



5 is a part, 2 is a part and the whole is 7.

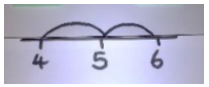
Use the part whole diagram to move towards the abstract.

3 + 7 = 10 **9 = 8 + 1**

6 + 4 ◯ 3 + 6 ● + ▲ = 4

Counting on - the abstract number line:

- What is 5 more than 9?
- What is the sum of 5 and 5?
- What's the total of 12 and 3?
- What's the total of 5 and 12? - put larger number first or look at a range of different strategies e.g. 10 + 2



Place the larger number in your head and count on with the smaller number to find your answer.

Lead on to questions such as this:

- 5 + ? = 8 What do we add to 5 to make 8?

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

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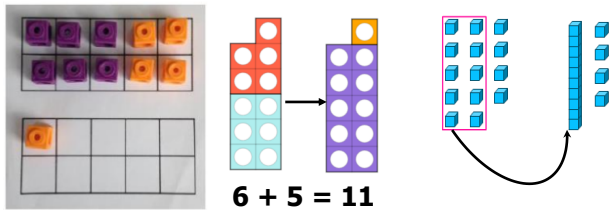
Concrete

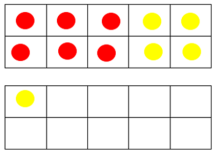
Regrouping to make 10 - using ten frames, counters/cubes. Base 10 or using Numicon.



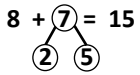
Start with the larger number and use the smaller number to make 10.

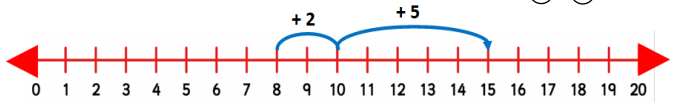
Pictorial

Regrouping to make 10 - children to draw the ten frame and the counters/cubes.



Use pictures or a number line. Regroup or partition the smaller number to make 10 e.g. 7 + 5 becomes 7 + 3 + 2 = 12.





Abstract

Regrouping to make 10

8 + 6 = 14

If I am at eight, how many more do I need to make 10? How many more do I add on now

Children to develop an understanding of equality e.g.

6 + ☐ = 11 **6 + 5 = 5 + ☐**

6 + 5 = ☐ + 4

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 2, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

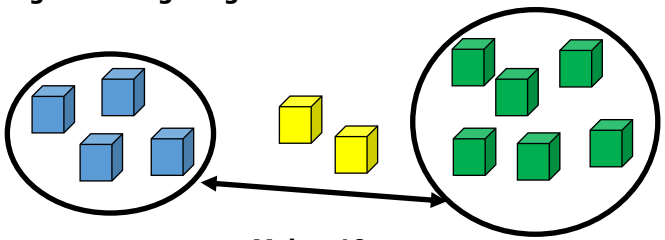
- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- Add numbers mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers
- Add numbers using concrete objects and pictorial presentations, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; adding three one-digit numbers
- Show that addition of two numbers can be done in any order
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
- Solve problems with addition using concrete objects and pictorial representations, including those involving numbers, quantities and measures

Non-statutory requirements:

- Pupils extend their understanding of the language of addition and subtraction to include sum and difference.
- Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 – 7 = 3 and 7 = 10 – 3 to calculate 30 + 70 = 100; 100 – 70 = 30 and 70 = 100 – 30. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.
- Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Concrete

Adding three single digits

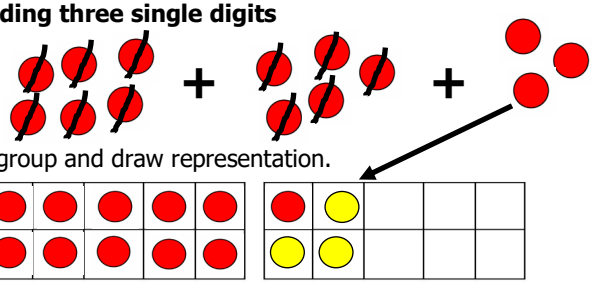


Makes 10

Combine to make 10 first if possible, or bridge 10 then add third digit. 10 and two more makes 12.

Pictorial

Adding three single digits



Regroup and draw representation.

Then add the three more (shown in a different colour here).
N.B. Children may not need to draw a tens frame here.

Abstract

Adding three single digits

Combine the two numbers that make/bridge ten then add on the third.

4 + 7 + 6 = 10 + 7
10 = 17

Before this stage ensure that the children are confident at using a range of manipulatives to add numbers before using a place value grid; they should be confident in grouping tens and ones e.g. 34 + 5 = 39 (34 is 3 tens and 4 ones. 4 ones and 5 ones are 9 ones. The total is 3 tens and 9 ones.)

23 + 5
No exchange

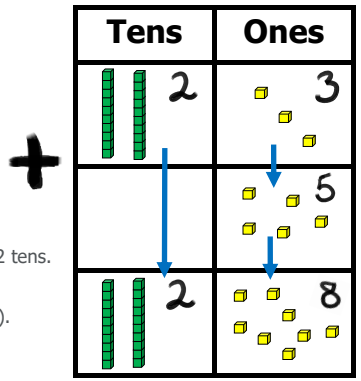
Step 1:
- Make the calculation.

Step 2:
- Combine all the ones. There are 8 ones.

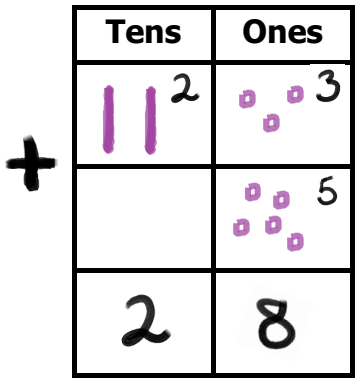
Step 3:
- Move the tens down. There are 2 tens.

Step 4:
- There are 2 tens and 8 ones (28).

23 + 5 = 28



23 + 5
No exchange



23 + 5
No exchange

```
  2  3
+    5
-------
  2  8
-------
```

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

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- Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Concrete

23 + 9

Exchanging ones

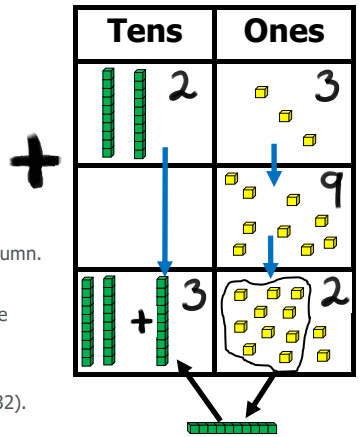
Step 1:
- Make the calculation.

Step 2:
- Combine all the ones.

Step 3:
- Exchange 10 ones for a 10.
  The 10 must go in the tens column.

Step 4:
- Combine all the tens. There are three tens.

Step 5:
- There are 3 tens and 2 ones (32).
  23 + 9 = 32



34 + 20

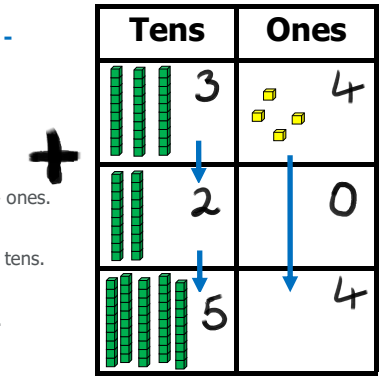
Adding multiples of 10 only - not bridging a 100

Step 1:
- Make the calculation.

Step 2:
- Move the ones down. There are 4 ones.

Step 3:
- Combine all the tens. There are 5 tens.

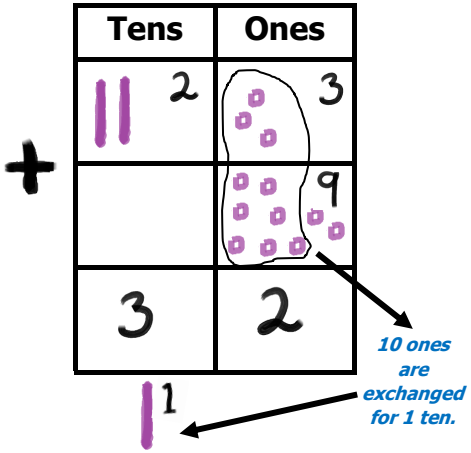
Step 4:
- There are 5 tens and 4 ones (54).
  34 + 20 = 54



Pictorial

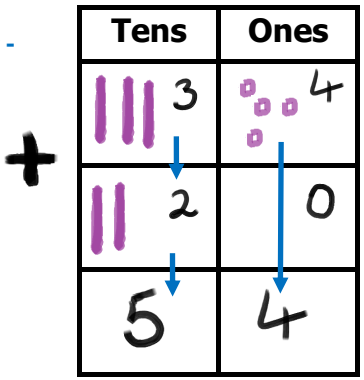
23 + 9

Exchanging ones



34 + 20

Adding multiples of 10 only - not bridging a 100



Abstract

23 + 9

Exchanging ones

$$\begin{array}{r} 2\ 3 \\ +\ \ 9 \\ \hline 3\ 2 \\ \hline 1 \end{array}$$

34 + 20

Adding multiples of 10 only - not bridging a 100

$$\begin{array}{r} 3\ 4 \\ +\ 2\ 0 \\ \hline 5\ 4 \end{array}$$

Key Vocabulary:

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Addition - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

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- Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Concrete

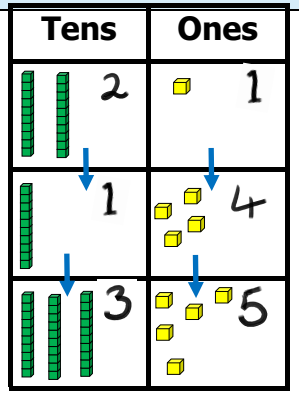
21 + 14
No exchange

Step 1:
- Make the calculation.

Step 2:
- Combine all the ones. There are 5 ones.

Step 3:
- Combine all the tens. There are 3 tens.

Step 4:
- There are 3 tens and 5 ones (35).
  21 + 14 = 35



28 + 16
Exchanging ones

Step 1:
- Make the calculation.

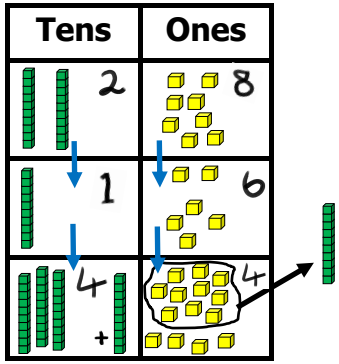
Step 2:
- Combine all the ones. There are 14 ones.

Step 3:
- Exchange 10 ones for a 10.

Step 4:
- The 10 must go in the tens column.

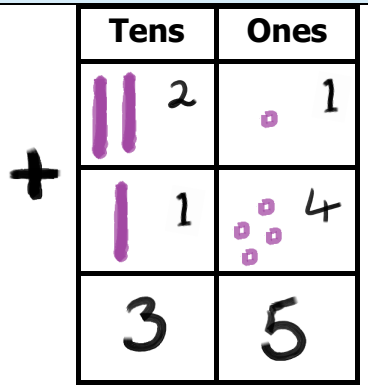
Step 5:
- Combine all the tens. There are 4 tens.

Step 6:
- There are 4 tens and 4 ones (44). **28 + 16 = 44**

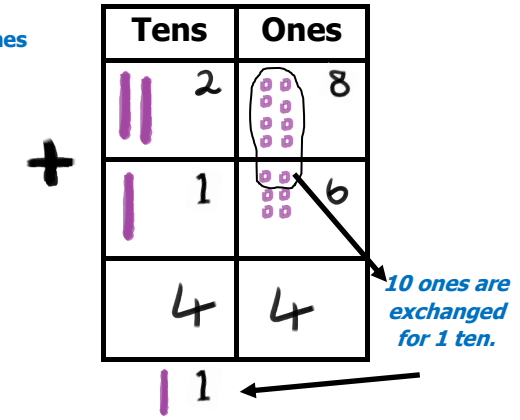


Pictorial

21 + 14
No exchange



28 + 16
Exchanging ones



Abstract

21 + 14
No exchange

$$\begin{array}{r} 2\ 1 \\ +\ 1\ 4 \\ \hline 3\ 5 \end{array}$$

28 + 16
Exchanging ones

$$\begin{array}{r} 2\ 8 \\ +\ 1\ 6 \\ \hline 4\ 4 \\ \hline 1 \end{array}$$

Key Vocabulary:

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Addition - Year 3 Calculation Policy

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National Curriculum statutory requirements:

- Add numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Add numbers with up to three digits, using formal written methods of columnar addition
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.

Non-statutory requirements:

- Practise solving varied addition questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar addition with increasingly large numbers up to three digits to become fluent.

Concrete

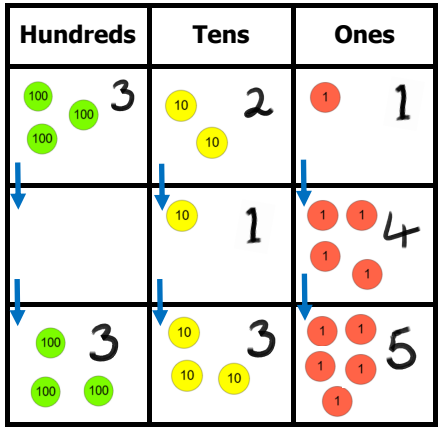
321 + 14
No exchange

Step 1:
- Position the counters on the grid.

Step 2:
- Combine the ones.
  Combine the tens.
  Combine the hundreds.

Step 3:
- There are 3 hundreds, 3 tens and 5 ones (335).

321 + 14 = 335



328 + 26
Exchanging ones

Step 1:
- Position the counters on the grid.

Step 2:
- Combine all the ones.

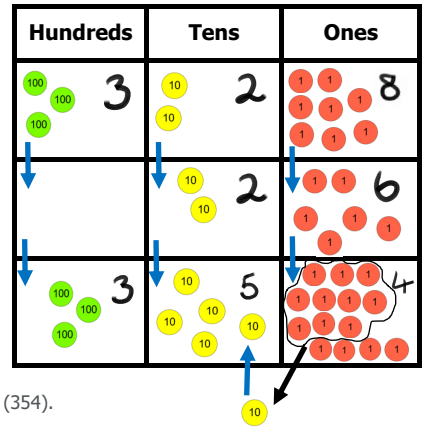
Step 3:
- Exchange 10 ones for a 10. The 10 must go in the tens column.

Step 4:
- Combine all the tens.

Step 5:
- Combine the hundreds.

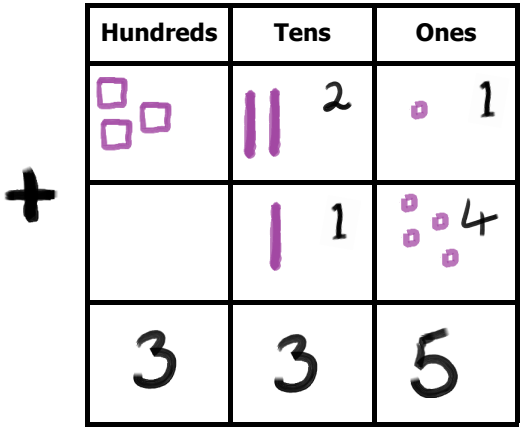
Step 6:
- There are 3 hundreds, 5 tens and 4 ones (354).

328 + 26 = 354

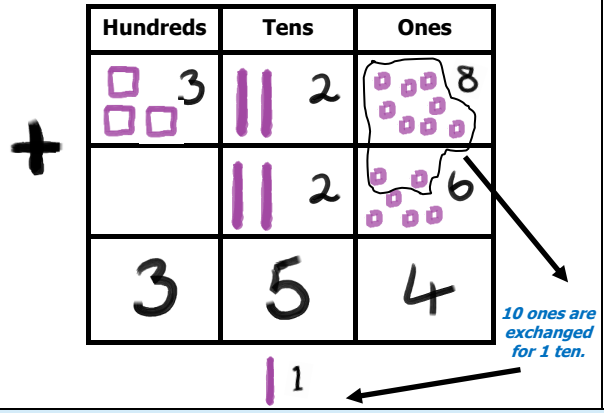


Pictorial

321 + 14
No exchange



328 + 26
Exchanging ones



Abstract

321 + 14
No exchange

$$\begin{array}{rrr} 3 & 2 & 1 \\ + & 1 & 4 \\ \hline 3 & 3 & 5 \end{array}$$

328 + 26
Exchanging ones

$$\begin{array}{rrr} 3 & 2 & 8 \\ + & 2 & 6 \\ \hline 3 & 5 & 4 \\ & 1 & \end{array}$$

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

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Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- Add numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Add numbers with up to three digits, using formal written methods of columnar addition
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.

Non-statutory requirements:

- Practise solving varied addition questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar addition with increasingly large numbers up to three digits to become fluent.

Concrete

371 + 54
Exchanging tens

Step 1:
- Position the counters on the grid.

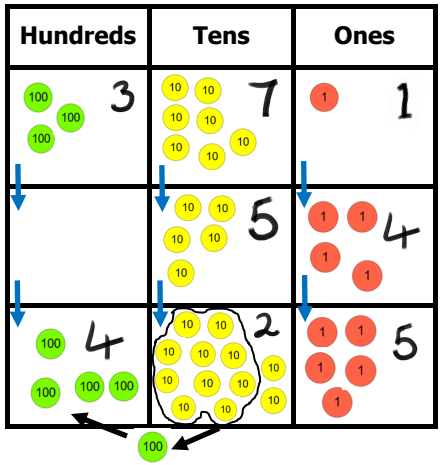
Step 2:
- Combine the ones.

Step 3:
- Combine the tens.

Step 4:
- Exchange 10 tens for 100. The 100 must go in the hundreds column.

Step 5:
- Combine the hundreds.

Step 6:
- There are 4 hundreds, 2 tens and 5 ones. **371 + 54 = 425**



368 + 44
Exchanging ones and tens

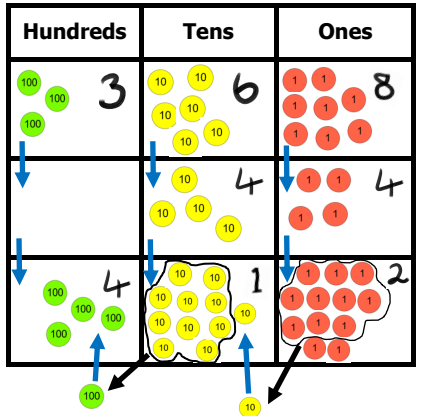
Step 1:
- Position the counters on the grid.

Step 2:
- Combine all the ones. Exchange 10 ones for a 10. The 10 must go in the tens column.

Step 3:
- Combine all the tens. Exchange 10 tens for a 100. The 100 must go in the hundreds column.

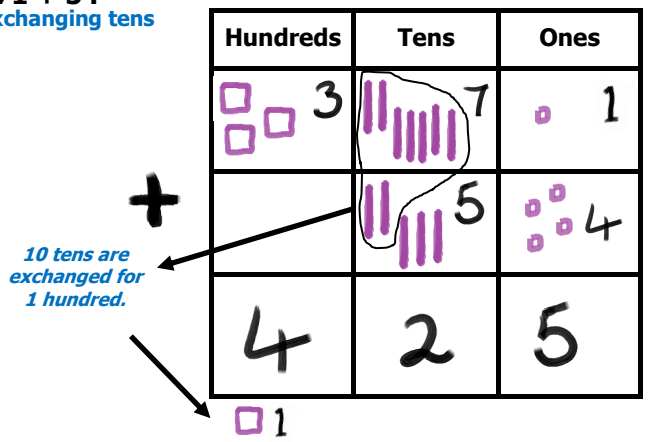
Step 5:
- Combine the hundreds.

Step 6:
- There are 4 hundreds, 1 ten and 2 ones. **368 + 44 = 412**

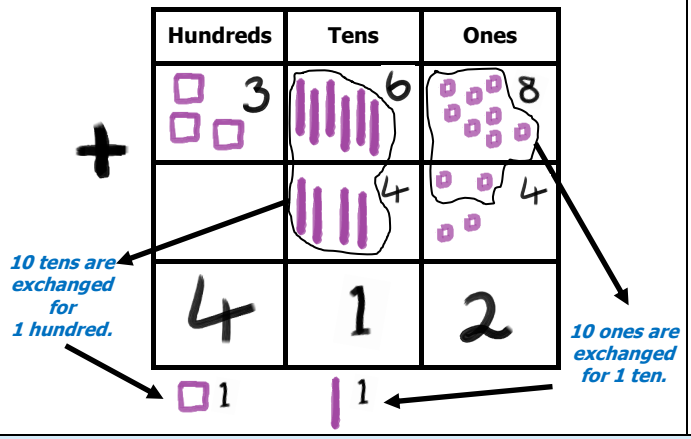


Pictorial

371 + 54
Exchanging tens



368 + 44
Exchanging ones and tens



Abstract

371 + 54
Exchanging tens

$$\begin{array}{rrr} & 3 & 7 & 1 \\ + & & 5 & 4 \\ \hline & 4 & 2 & 5 \\ \hline & 1 & & \end{array}$$

368 + 44
Exchanging ones and tens

$$\begin{array}{rrr} & 3 & 6 & 8 \\ + & & 4 & 4 \\ \hline & 4 & 1 & 2 \\ \hline & 1 & 1 & \end{array}$$

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- Add numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Add numbers with up to three digits, using formal written methods of columnar addition
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.

Non-statutory requirements:

- Practise solving varied addition questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar addition with increasingly large numbers up to three digits to become fluent.

Concrete

371 + 224
No exchange

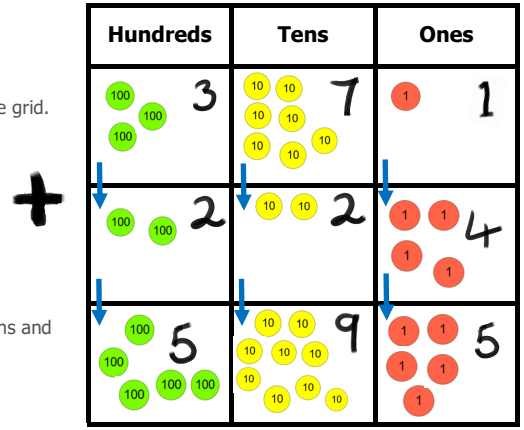
Step 1:
- Position the counters on the grid.

Step 2:
- Combine the ones.

Step 3:
- Combine the tens.

Step 4:
- Combine the hundreds.

Step 5:
- There are 5 hundreds, 9 tens and 5 ones. **371 + 224 = 595**



321 + 149
Exchanging ones

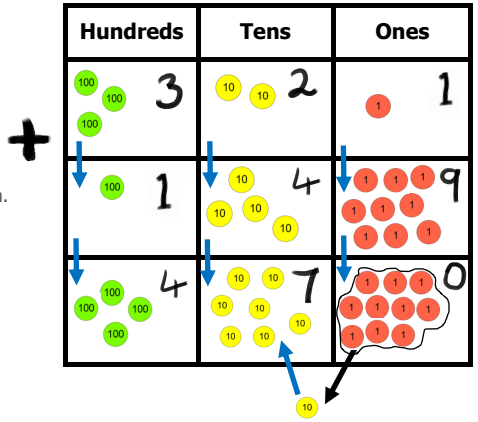
Step 1:
- Position the counters on the grid.

Step 2:
- Combine all the ones.
- Exchange 10 ones for a 10.
- The 10 must go in the tens column.

Step 3:
- Combine all the tens.

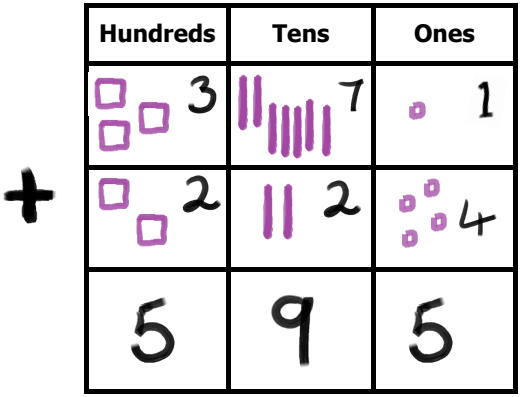
Step 4:
- Combine the hundreds.

Step 5:
- There are 4 hundreds, 7 tens and 0 ones. **321 + 149 = 470**

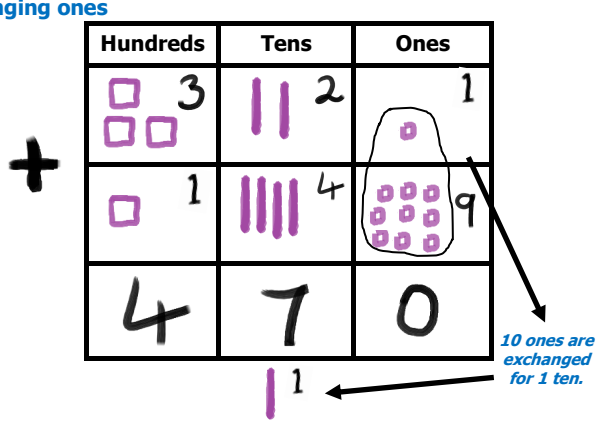


Pictorial

371 + 224
No exchange



321 + 149
Exchanging ones



Abstract

371 + 224
No exchange

$$\begin{array}{r} 3\ 7\ 1 \\ +\ 2\ 2\ 4 \\ \hline 5\ 9\ 5 \end{array}$$

321 + 149
Exchanging ones

$$\begin{array}{r} 3\ 2\ 1 \\ +\ 1\ 4\ 9 \\ \hline 4\ 7\ 0 \\ \hline \ 1\ \end{array}$$

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- Add numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Add numbers with up to three digits, using formal written methods of columnar addition
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.

Non-statutory requirements:

- Practise solving varied addition questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar addition with increasingly large numbers up to three digits to become fluent.

Concrete

371 + 278
Exchanging tens

Step 1:
- Position the counters on the grid.

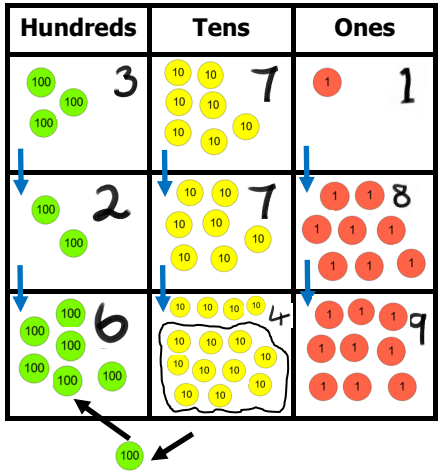
Step 2:
- Combine the ones.

Step 3:
- Combine the tens.

Step 4:
- Exchange 10 tens for 100. The 100 must go in the hundreds column.

Step 5:
- Combine the hundreds.

Step 6:
- There are 6 hundreds, 4 tens and 9 ones. **371 + 278 = 649**



368 + 345
Exchanging ones and tens

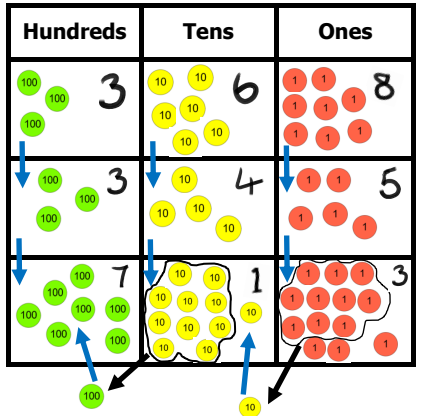
Step 1:
- Position the counters on the grid.

Step 2:
- Combine all the ones. Exchange 10 ones for a 10. The 10 must go in the tens column.

Step 3:
- Combine all the tens. Exchange 10 tens for a 100. The 100 must go in the hundreds column.

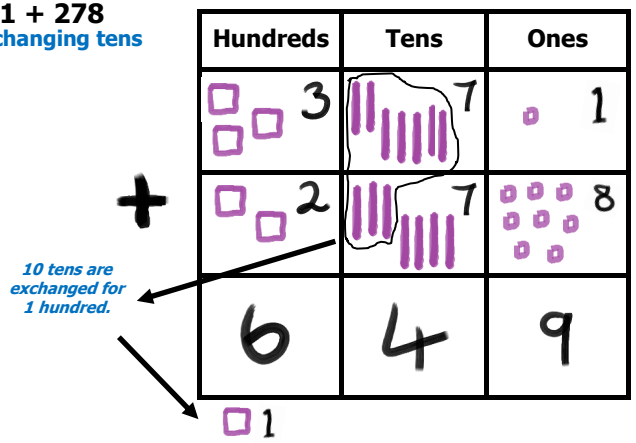
Step 4:
- Combine the hundreds.

Step 5:
- There are 7 hundreds, 1 ten and 3 ones.
  368 + 345 = 713

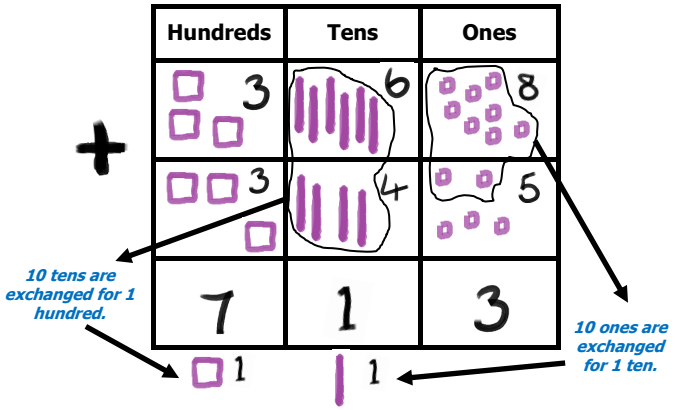


Pictorial

371 + 278
Exchanging tens



368 + 345
Exchanging ones and tens



Abstract

371 + 278
Exchanging tens

$$\begin{array}{r} 3\ 7\ 1 \\ +\ 2\ 7\ 8 \\ \hline 6\ 4\ 9 \\ \hline 1 \end{array}$$

368 + 345
Exchanging ones and tens

$$\begin{array}{r} 3\ 6\ 8 \\ +\ 3\ 4\ 5 \\ \hline 7\ 1\ 3 \\ \hline 1\ \ 1 \end{array}$$

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 4 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.

National Curriculum statutory requirements:

- Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve addition two-step problems in contexts, deciding which operations and methods to use and why.

Non-statutory requirements:

- Pupils continue to practise both mental methods and columnar addition with increasingly large numbers to aid fluency.
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers.

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers.
This section is split into stages of progression.

STAGE 1: 4 digit + 2 digit

Suggested order of teaching:

- **no exchange**
- **one exchange**
- **two exchanges**

	Th	H	T	O
+			T	O

STAGE 2: 4 digit + 3 digit

Suggested order of teaching:

- **no exchange**
- **one exchange**
- **two exchanges**
- **three exchanges**

	Th	H	T	O
+		H	T	O

STAGE 3: 4 digit + 4 digit

Suggested order of teaching:

- **no exchange**
- **one exchange**
- **two exchanges**
- **three exchanges**

	Th	H	T	O
+	Th	H	T	O

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.

Throughout Year 5, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Add numbers mentally with increasingly large numbers
- Add and whole numbers with more than 4 digits, including using formal written methods (columnar addition)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition multi-step problems in contexts, deciding which operations and methods to use and why

Non-statutory requirements:

- Pupils practise using the formal written methods of columnar addition with increasingly large numbers to aid fluency.
- They practise mental calculations with increasingly large numbers to aid fluency (e.g. 12 462 – 2300 = 10 162).

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers.

This section is split into stages of progression.

STAGE 1: 5 digit + 3 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	TTh	Th	H	T	O
+			H	T	O

STAGE 2: 5 digit + 4 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	TTh	Th	H	T	O
+		Th	H	T	O

STAGE 3: 5 digit + 5 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	TTh	Th	H	T	O
+	TTh	Th	H	T	O

STAGE 4: 6 digit + 3 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	HTh	TTh	Th	H	T	O
+				H	T	O

STAGE 5: 6 digit + 4 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	HTh	TTh	Th	H	T	O
+			Th	H	T	O

STAGE 6: 6 digit + 5 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

	HTh	TTh	Th	H	T	O
+		TTh	Th	H	T	O

STAGE 7: 6 digit + 6 digit

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

	HTh	TTh	Th	H	T	O
+	HTh	TTh	Th	H	T	O

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.

National Curriculum statutory requirements:

- Add numbers mentally with increasingly large numbers
- Add and whole numbers with more than 4 digits, including using formal written methods (columnar addition)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition multi-step problems in contexts, deciding which operations and methods to use and why

Non-statutory requirements:

- Pupils practise using the formal written methods of columnar addition with increasingly large numbers to aid fluency.
- They practise mental calculations with increasingly large numbers to aid fluency (e.g. 12 462 – 2300 = 10 162).

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers. This section is split into stages of progression.

STAGE 1

Suggested order of teaching:

- no exchange
- one exchange

	O	.	t
+	O	.	t
		.	

Ensure pupils are exposed to calculations such as 6 + 4.6 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 2

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges

	O	.	t	h
+	O	.	t	h
		.		

Ensure pupils are exposed to calculations such as 8 + 5.06 at this stage so that they understand that they have to add 0s as place holders.

STAGE 3

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges

	T	O	.	t
+	T	O	.	t
			.	

Ensure pupils are exposed to calculations such as 24 + 8.2 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 4

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	T	O	.	t	h
+	T	O	.	t	h
			.		

Ensure pupils are exposed to calculations such as 28.23 + 42 and 56.3 + 8.07 at this stage so that they understand that they have to add 0s as place holders.

STAGE 5

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	H	T	O	.	t
+	H	T	O	.	t
				.	

Ensure pupils are exposed to calculations such as 411 + 600.4 at this stage so that they understand that they have to add a 0 as a place holder.

STAGE 6

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	H	T	O	.	t	h
+	H	T	O	.	t	h
				.		

Ensure pupils are exposed to calculations such as 823.99 + 125.2 at this stage so that they understand that they have to add 0s as place holders.

STAGE 7

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	Th	H	T	O	.	t
+	Th	H	T	O	.	t
					.	

Ensure pupils are exposed to calculations such as 7825.6 + 1230 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 8

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

	Th	H	T	O	.	t	h
+	Th	H	T	O	.	t	h
					.		

Ensure pupils are exposed to calculations such as 1134.05 + 5691 at this stage so that they understand that they have to add 0s as place holders.

STAGE 9

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

	TTh	Th	H	T	O	.	t
+	TTh	Th	H	T	O	.	t
						.	

Ensure pupils are exposed to calculations such as 32204 + 14798.2 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 10

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

	TTh	Th	H	T	O	.	t	h
+	TTh	Th	H	T	O	.	t	h
						.		

Ensure pupils are exposed to calculations such as 21134.99 + 55691.4 at this stage so that they understand that they have to add 0s as place holders.

By the end of Year 5, pupils should be able to add two decimal numbers (up to the values shown) using different numbers of decimal places.

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Addition - Year 6 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate thus developing the Year 5 experiences.
Throughout Year 6, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Perform mental calculations, including with mixed operations and large numbers
- Solve problems involving addition, including multi-step problems in contexts, deciding which operations and methods to use and why
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
- Solve addition multi-step problems in contexts, deciding which operations and methods to use and why

Non-statutory requirements:

- Pupils practise addition for larger numbers, using the formal written methods.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils round answers to a specified degree of accuracy, e.g. to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals.
This section is split into stages of progression.

STAGE 1: whole numbers with the same number of places

No exchange, one exchange, multiple exchanges

E.g. maximum expectation shown below (though can go into 10 million)

	M	HTh	TTh	Th	H	T	O
+	M	HTh	TTh	Th	H	T	O
	M	HTh	TTh	Th	H	T	O

STAGE 2: whole numbers with a different number of places

No exchange, one exchange, multiple exchanges

E.g. maximum expectation shown below though second number can be any number up to and into the HTh

	M	HTh	TTh	Th	H	T	O
			TTh	Th	H	T	O
+	M	HTh	TTh	Th	H	T	O

STAGE 3: decimal numbers with a different number of places.

Remember to give examples that require place holders.

No exchange, one exchange, multiple exchanges

E.g. maximum expectation shown below (though can go into 10 million) and only up to thousandths)

	M	HTh	TTh	Th	H	T	O	.	t	h	th
+	M	HTh	TTh	Th	H	T	O	.	t	h	th
	M	HTh	TTh	Th	H	T	O	.	t	h	th

STAGE 3: decimal numbers with a different number of places.

Remember to give examples that require place holders.

No exchange, one exchange, multiple exchanges

E.g 1

			TTh	Th	H	T	O	.	t	
+					H	T	O	.	t	h
			TTh	Th	H	T	O	.	t	h

N.B. you can go up to a million and up to thousandths

STAGE 3: decimal numbers with a different number of places.

Remember to give examples that require place holders.

No exchange, one exchange, multiple exchanges

E.g 2

	HTh	TTh	Th	H	T	O	.	t	h	
+			Th	H	T	O	.	t	h	th
		TTh	Th	H	T	O	.	t	h	th

N.B. you can go up to a million and up to thousandths

STAGE 3: decimal numbers with a different number of places.

Remember to give examples that require place holders.

No exchange, one exchange, multiple exchanges

E.g 3

	M	HTh	TTh	Th	H	T	O	.	t	h	th
+		HTh	TTh	Th	H	T	O	.	t		
			TTh	Th	H	T	O	.	t	h	th

N.B. you can go up to a million and up to thousandths

Key Vocabulary:

add, addition, more, plus, increase, sum, total, altogether, difference, same as, equals, sign, units/ones, inverse, how many more to make …?, is the same as, combine, exchange

Subtraction - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 1, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- Represent and use number bonds and related subtraction facts within 20
- Subtract one-digit and two-digit numbers to 20, including zero
- Read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs
- Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9

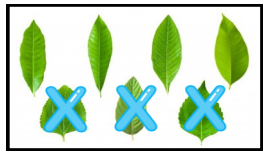
Non-statutory requirements:

- Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.
- Pupils combine and increase numbers, counting forwards and backwards.
- They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

Concrete

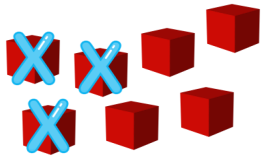
Taking away by removing objects (within 10)

N.B. Children to physically remove the objects not cross out.



7 - 3 = 4

3 less than 7 is 4



7 - 3 = 4

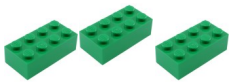
7 subtract 3 is 4

A range of objects and other manipulatives should also be used here e.g. teddies, stones, counters, sticks.

As you progress here, start to make links with the pictorial.

Counting back (within 10) - *using cubes, numicon, bead strings etc.*

Move objects away from the group, counting backwards.

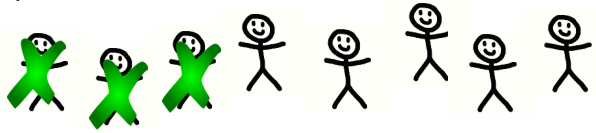


Move the beads along the bead string as you count backwards.

Pictorial

Taking away by removing objects (within 10)

Children to draw and cross out representations to show taking away.



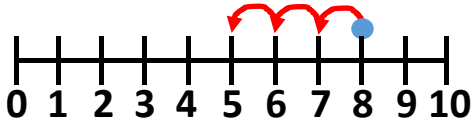
8 - 3 = 5

3 less than 8 is 5

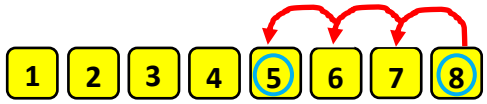
8 subtract 3 is 5

Begin to use a bar model to show these representations also.

Counting back (within 10) - *do this pictorially and through the use a numberline. Counting back in ones.*



8 - 3 = 5



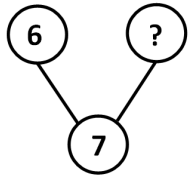
8 - 3 = 5

Abstract

Taking away by removing objects (within 10)

6	
2	?

6 - 2 = ?



9 - 4 = ?

? = 8 - 7

Counting back (within 10)

Put 9 in your head and count back 4.

What number are you at?

9 - 4 = ?

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 1, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- Represent and use number bonds and related subtraction facts within 20
- Subtract one-digit and two-digit numbers to 20, including zero
- Read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs
- Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9

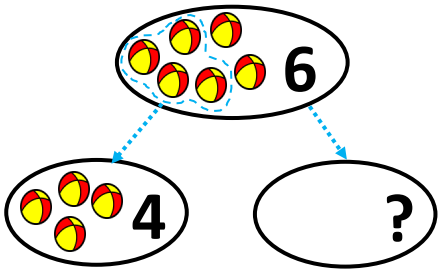
Non-statutory requirements:

- Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.
- Pupils combine and increase numbers, counting forwards and backwards.
- They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

Concrete

Find a missing part (within 10)

Children separate a whole into parts and understand how one part can be found by subtraction. *(Links to addition.)*



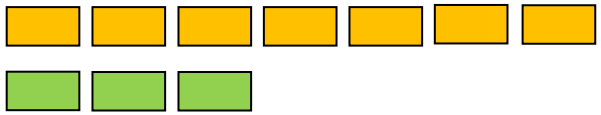
If **6** is the whole and **4** is one of the parts, what is the other part?

6 - 4 = ?

6 - ? = 4

Finding the difference

Arrange the two groups so that the difference between them can be worked out (like a bar model).



7 is 4 more than 3.

3 is 4 less than 7.

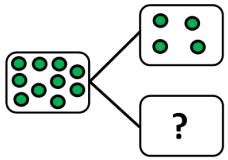
The difference between 7 and 3 is 4.

Pictorial

Finding a missing part (within 10)

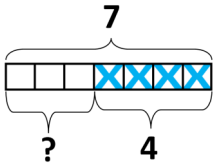
Use pictorial representations to show the part.

Children represent a whole and a part and understand how to find the missing part by subtraction.



10 - 4 = ?

10 - ? = 4



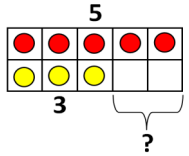
7 - 4 = ?

7 - ? = 4

Finding the difference

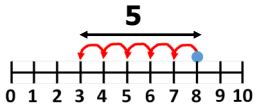
Represent objects using sketches or counters to support finding the difference.

5 - 3 = 2



The difference between 5 and 3 is 2.

5 is 2 more than 3 and 3 is 2 less than 5.



8 - 5 = 3

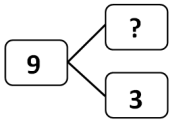
The difference between 8 and 3 is 5.

8 is 5 more than 3 and 3 is 5 less than 5.

Abstract

Finding a missing part (within 10)

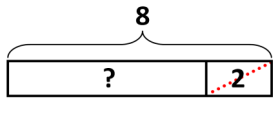
Children use a part-whole model to support the subtraction to find a missing part.

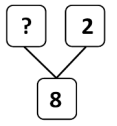


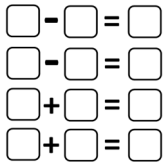
9 - 3 = ?

9 - ? = 3

Make links to addition.

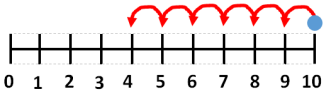






Finding the difference

Children understand 'find the difference' as subtraction.



The difference between 10 and 4 is 6.

10 - 6 = 4

10 is 6 more than 4 and 4 is 6 less than 10.

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

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Non-statutory requirements:

- Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.
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- They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

Concrete

Subtraction of one-digit number within 20 (not bridging 10).

Use a bead string, for example, to subtract 1s efficiently.

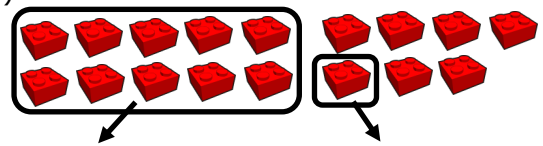
Make links to known number facts e.g.

5 - 2 = 3

15 - 2 = 13

Subtraction within 20 (10s and 1s)

Use objects to subtract the ten and then the remaining ones e.g. 17 - 11 (consider the arrangement of the objects).

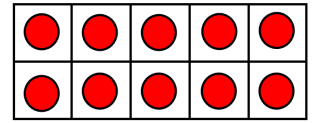


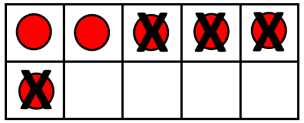
Subtract the 10 **Subtract the 1**

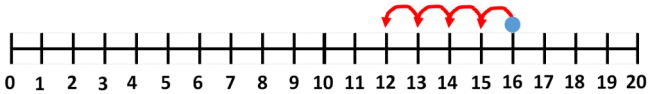
17 - 11 **17 - 10 = 7** **7 - 1 = 6** **17 - 11 = 6**

Pictorial

Subtraction of one-digit number within 20 (not bridging 10).







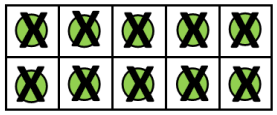
Make links to known number facts e.g.

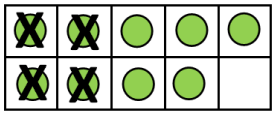
6 - 4 = 2

16 - 4 = 12

Subtraction within 20 (10s and 1s)

Draw/use ten frames to represent the efficient method of subtracting 10s and 1s.





Subtract the 10 **Subtract the 1s**

19 - 14 **19 - 10 = 9** **9 - 4 = 5** **19 - 14 = 5**

Abstract

Subtraction of one-digit number within 20 (not bridging 10).

Calculate subtractions using known number facts with confidence e.g.

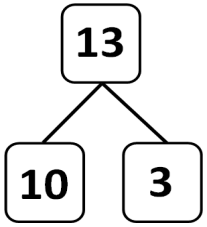
I know 8 - 7 = 1 so I can use this number fact to help me to answer 18 - 7 = ?

I know 10 - 6 = 4 so I can use this number fact to help me to answer 20 - 6 = ?

Use prior learning on subtraction to find the difference to find missing parts with in 20 but not bridging 10.

Subtraction within 20 (10s and 1s)

Use a part whole model to support the calculation.



20 - 13

20 - 10 = 10

10 - 3 = 7

20 - 13 = 7

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

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Non-statutory requirements:

- Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 – 7 = 9; 7 = 16 – 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.
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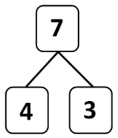
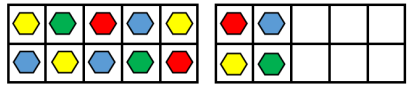
Concrete

Subtraction bridging 10 (using number bonds).

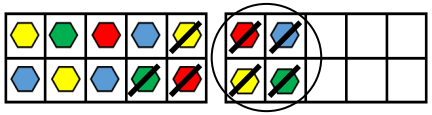
Arrange objects into a 10 and some 1s, then split the subtracting number into parts using knowledge of number bonds e.g. **14 - 7**

7 is 4 and 3





I can take away the 4 and then the 3.



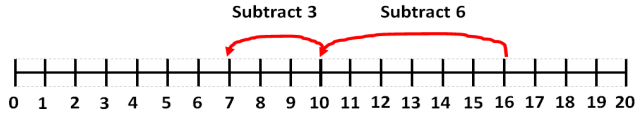
14 - 7 = 7

Pictorial

Subtraction bridging 10 (using number bonds).

Represent the calculation using tens frames and number lines e.g. **16 - 9**

With 9, I can take away the 6 and then the 3.

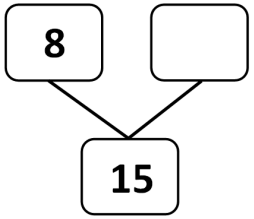


16 - 9 = 7

Abstract

Subtraction bridging 10 (using number bonds).

Use a part-whole model to support the method e.g. 15 - 8



Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 2, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- Subtract numbers mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers
- Subtract numbers using concrete objects and pictorial presentations, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers
- Show that subtraction of two numbers cannot be done in any order
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
- Solve problems with subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures

Non-statutory requirements:

- Pupils extend their understanding of the language of addition and subtraction to include sum and difference.
- Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 – 7 = 3 and 7 = 10 – 3 to calculate 30 + 70 = 100; 100 – 70 = 30 and 70 = 100 – 30. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.
- Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Concrete	Pictorial	Abstract

Before this stage ensure that the children are confident at using a range of manipulatives to subtract numbers before using a place value grid; they should be confident in grouping tens and ones e.g. 27 - 5 = 22 (27 is 2 tens and 7 ones. 7 ones subtract 5 ones are 2 ones. The total is 2 tens and 5 ones.)

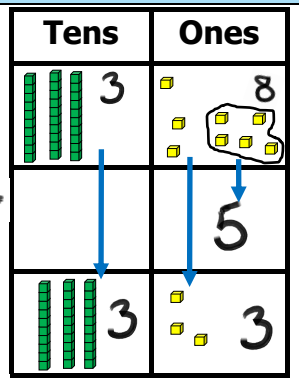
38 - 5 No exchange

Step 1:
- Position the Base 10 on the grid (top row).

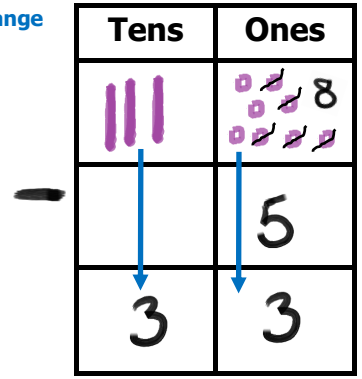
Step 2:
- **Ones** column (8 ones subtract 5 ones). Move down 5 ones from the top to the middle row and then subtract them away. Move the remaining 3 ones down from the top to the bottom row.

Step 3:
- **Tens** column (3 tens subtract 0 tens). Move down 3 tens from the top row to the bottom row.

Step 4:
- There are 3 tens and 3 ones (33). **38 - 5 = 33**



38 - 5 No exchange



38 - 5 No exchange

$$\begin{array}{r} 3\ 8 \\ -\ \ 5 \\ \hline 3\ 3 \end{array}$$

52 - 6 Exchanging 10s

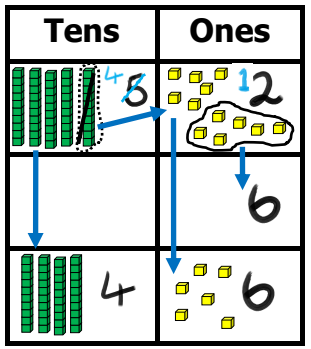
Step 1:
- Position the base 10 on the grid (top row).

Step 2:
- **Ones** column (2 ones subtract 6 ones) - there needs to be an exchange here. Go to the tens column and exchange 1 ten for 10 ones. Add the 10 ones to the ones (top row) - you now have 12 ones. You have 4 tens left in the tens column - cross out the 5 and change to a 4 to show this.

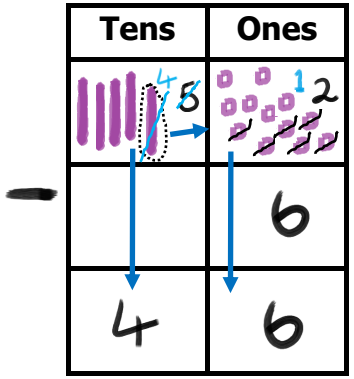
Step 3:
- **Ones** column - now move down 6 counters from the top to the middle row and then subtract them away. Move the remaining 6 counters down from the top to the bottom row.

Step 4:
- **Tens** column (4 tens subtract 0 tens) - move down 4 tens from the top row to the bottom row.

Step 5:
- There are 4 tens and 6 ones (46). **52 - 6 = 46**



52 - 6 Exchanging 10s



52 - 6 Exchanging 10s

$$\begin{array}{r} {}^{4}\cancel{5}\ {}^{1}2 \\ -\ \ 6 \\ \hline 4\ 6 \end{array}$$

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 2 Calculation Policy

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Concrete

Pictorial

Abstract

Before this stage ensure that the children are confident at using a range of manipulatives to subtract numbers before using a place value grid; they should be confident in grouping tens and ones e.g. 27 - 5 = 22 (27 is 2 tens and 7 ones. 7 ones subtract 5 ones are 2 ones. The total is 2 tens and 5 ones.)

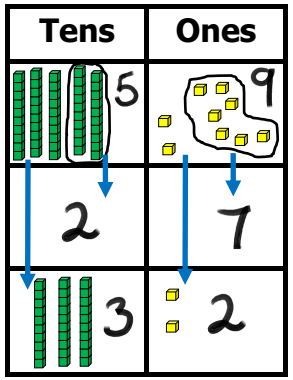
59 - 27 No exchange

Step 1:
- Position the counters on the grid (top row).

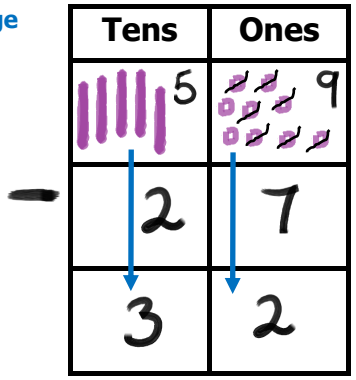
Step 2:
- **Ones** column (9 ones subtract 7 ones) - move down 7 ones from the top to the middle row and then subtract them away. Move the remaining 2 ones down from the top to the bottom row.

Step 3:
- **Tens** column (5 tens subtract 2 tens) - move down 2 tens from the top row to the middle row and then subtract them away. Move the remaining 3 tens down from the top to the bottom row.

Step 4:
- There are 3 tens and 2 ones (32). **59 - 27 = 32**



59 - 27 No exchange



59 - 27 No exchange

$$\begin{array}{r} 5\ 9 \\ -\ 2\ 7 \\ \hline 3\ 2 \end{array}$$

73 - 29 Exchanging 10s

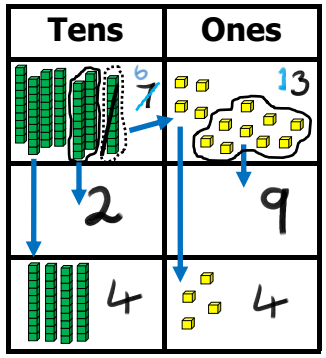
Step 1:
- Position the counters on the grid (top row).

Step 2:
- **Ones** column (3 ones subtract 9 ones) - there needs to be an exchange here. Go to the tens column and exchange 1 ten for 10 ones. Add the 10 ones to the ones (top row) - you now have 13 ones. You have 6 tens left in the tens column - cross out the 7 and change to a 6 to show this.

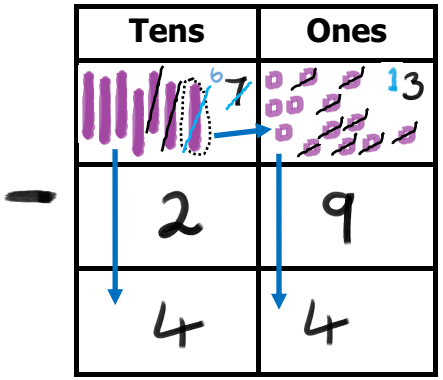
Step 3:
- **Ones** column - now move down 9 counters from the top to the middle row and then subtract them away. Move the remaining 4 counters down from the top to the bottom row.

Step 4:
- **Tens** column (6 tens subtract 2 tens) - move down 2 tens from the top row to the middle row and then subtract them away. Move the remaining 4 tens down from the top to the bottom row.

Step 5:
- There are 4 tens and 4 ones (44). **73 - 29 = 44**



73 - 29 Exchanging 10s



73 - 29 Exchanging 10s

$$\begin{array}{r} {}^{6}\cancel{7}\ {}^{1}3 \\ -\ 2\ 9 \\ \hline 4\ 4 \end{array}$$

Key Vocabulary:
equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Subtract numbers with up to three digits, using formal written methods of columnar subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

Non-statutory requirements:

- Practise solving varied subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar subtraction with increasingly large numbers up to three digits to become fluent.

Concrete

346 - 24 No exchange

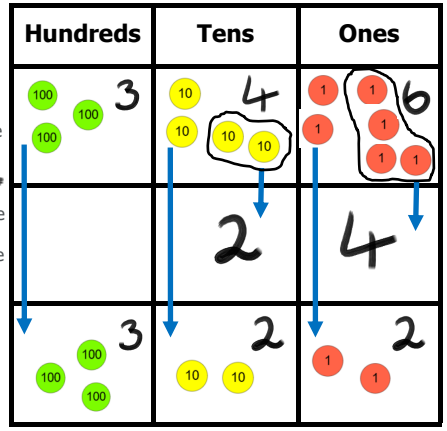
Step 1:
- Position the counters on the grid (top row).

Step 2:
- **Ones** column (6 ones subtract 4 ones) - move down 4 ones from the top to the middle row and then subtract them away. Move the remaining 2 ones down from the top to the bottom row.

Step 3:
- **Tens** column (4 tens subtract 2 tens) - move down 2 tens from the top row to the middle row and then subtract them away. Move the remaining 2 tens down from the top to the bottom row.

Step 4:
- **Hundreds** column (3 hundreds subtract 0 hundreds) - move the 3 hundreds down into the bottom row.

Step 5: I
- There are 3 hundreds, 2 tens and 2 ones (322). **346 - 24 = 322**



342 - 25 Exchanging tens

Step 1:
- Position the counters on the grid (top row).

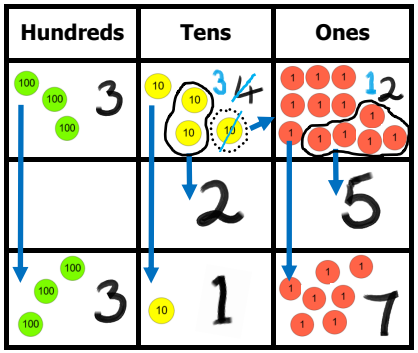
Step 2:
- **Ones** column (2 ones subtract 5 ones) - there needs to be an exchange here. Go to the tens column and exchange 1 ten for 10 ones. Add the10 ones to the ones (top row) - you now have 12 ones. You have 3 tens left in the tens column - cross out the 4 and change to a 3 to show this.

Step 3:
- **Ones** column - now move down 5 counters from the top to the middle row and then subtract them away. Move the remaining 7 counters down from the top to the bottom row.

Step 4:
- **Tens** column (3 tens subtract 2 tens) - move down 2 tens from the top row to the middle row and then subtract them away. Move the remaining 1 ten down from the top to the bottom row.

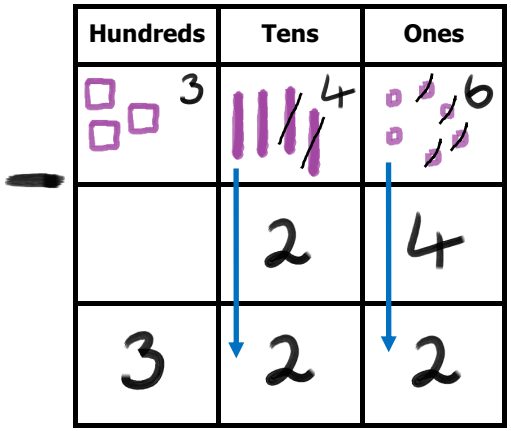
Step 5:
- **Hundreds** column (3 hundreds subtract 0 hundreds) - move the 3 hundreds down into the bottom row.

Step 6:
- There are 3 hundreds, 1 ten and 7 ones (317). **342 - 25 = 317**

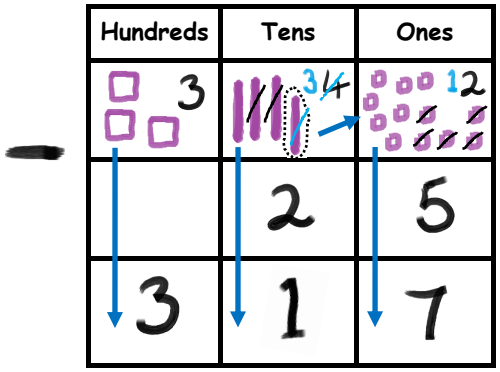


Pictorial

346 - 24 No exchange



342 - 25 Exchanging tens



Abstract

346 - 24 No exchange

$$\begin{array}{r} 3\ 4\ 6 \\ -\ \ 2\ 4 \\ \hline 3\ 2\ 2 \end{array}$$

342 - 25 Exchanging tens

$$\begin{array}{r} 3\ \ \cancel{4}^{3}\ \ 12 \\ -\ \ 2\ 5 \\ \hline 3\ 1\ 7 \end{array}$$

Key Vocabulary:
equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

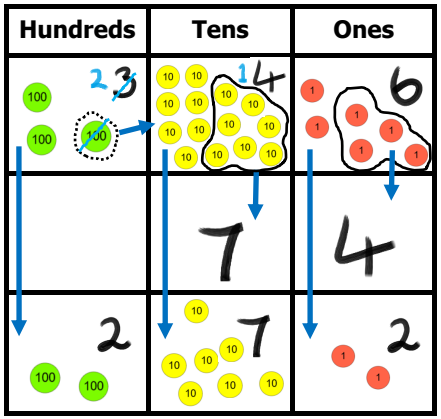
- Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Subtract numbers with up to three digits, using formal written methods of columnar subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

Non-statutory requirements:

- Practise solving varied subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar subtraction with increasingly large numbers up to three digits to become fluent.

Concrete

346 - 74 Exchanging hundreds



Step 1:
- Position the counters on the grid (top row).

Step 2:
- **Ones** column (6 ones subtract 4 ones) - move down 4 ones from the top to the middle row and then subtract them away. Move the remaining 2 ones down from the top to the bottom row.

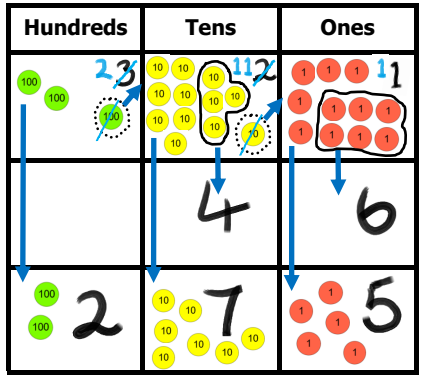
Step 3:
- **Tens** column (4 tens subtract 7 tens) - there needs to be an exchange here. Go to the hundreds column and exchange 1 hundred for 10 tens. Add the 10 tens to the tens (top row) - you now have 14 tens. You have 2 hundreds left in the hundreds column - cross out the 3 and change to a 2 to show this.

Step 4:
- **Tens** column - move down 7 tens from the top row to the middle row and then subtract them away. Move the remaining 7 tens down from the top to the bottom row.

Step 5:
- **Hundreds** column (2 hundreds subtract 0 hundreds) - move the 2 hundreds down into the bottom row.

Step 6:
- There are 2 hundreds, 7 tens and 2 ones (272). **346 - 74 = 272**

321 - 46 Exchanging tens and hundreds



Step 1:
- Position the counters on the grid (top row).

Step 2:
- **Ones** column (1 one subtract 6 ones) - there needs to be an exchange here. Go to the tens column and exchange 1 ten for 10 ones. Add the 10 ones to the ones (top row) - you now have 11 ones. You have 1 ten left in the tens column - cross out the 2 and change to a 1 to show this.

Step 3:
- **Ones** column - you now have 11 ones subtract 6 ones. Move down 6 ones from the top to the middle and subtract them away. Move the remaining 5 ones from the top to the bottom row.

Step 4:
- **Tens** column (1 tens subtract 4 tens) - there needs to be an exchange here. Go to the hundreds column and exchange 1 hundred for 10 tens. Add the 10 tens to the tens (top row) - you now have 11 tens; show this by adding a 1 to the existing 1 to make 11. You now have 2 hundreds left in the tens column - cross out the 3 and change to a 2 to show this.

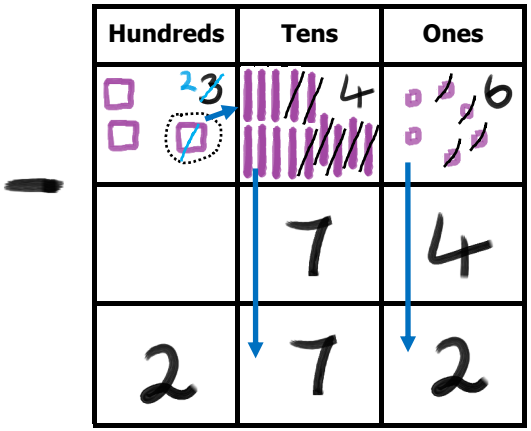
Step 5:
- **Tens** column (11 tens subtract 4 tens) - move down 4 tens from the top row to the middle row and then subtract them away. Move the remaining 7 tens down from the top to the bottom row.

Step 6:
- **Hundreds** column (2 hundreds subtract 0 hundreds) - move the 2 hundreds down into the bottom row.

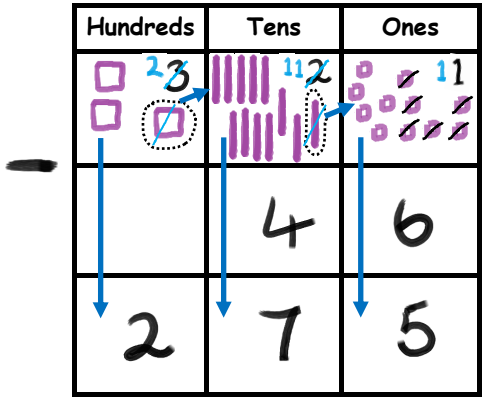
Step 7:
- There are 2 hundreds, 7 tens and 5 ones (275). **321 - 46 = 275**

Pictorial

346 - 74 Exchanging hundreds



321 - 46 Exchanging tens and hundreds



Abstract

346 - 74 Exchanging hundreds

$$\begin{array}{r} {}^{2}\cancel{3}\,{}^{1}4\;6 \\ -\;\;\;7\;4 \\ \hline 2\;7\;2 \end{array}$$

321 - 46 Exchanging tens and hundreds

$$\begin{array}{r} {}^{2}\cancel{3}\,{}^{11}\cancel{2}\;{}^{1}1 \\ -\;\;\;4\;6 \\ \hline 2\;7\;5 \end{array}$$

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

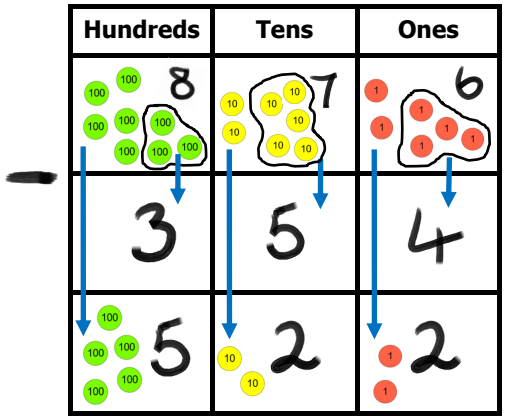
- Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Subtract numbers with up to three digits, using formal written methods of columnar subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

Non-statutory requirements:

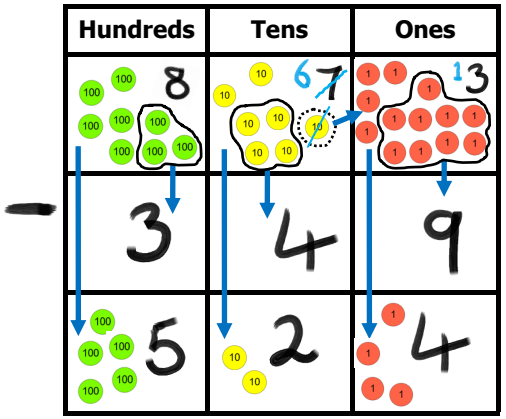
- Practise solving varied subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar subtraction with increasingly large numbers up to three digits to become fluent.

Concrete

876 - 354 No exchange

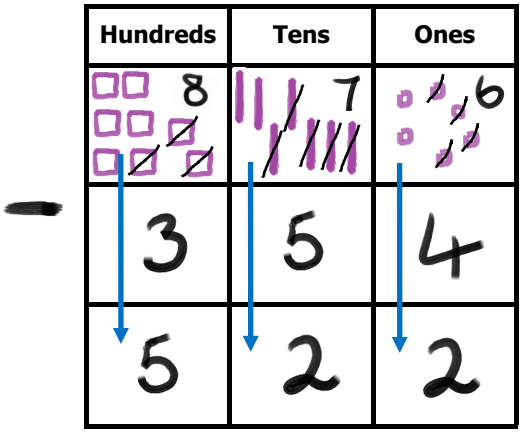


873 - 349 Exchanging tens

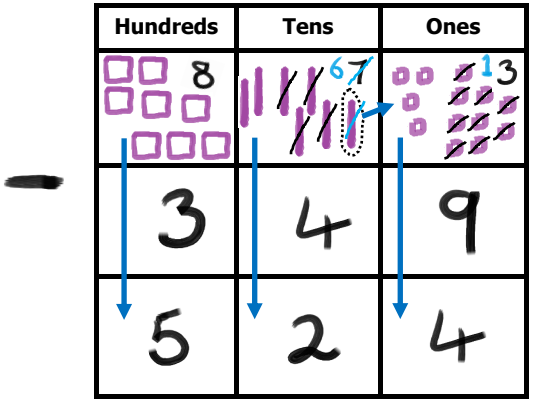


Pictorial

876 - 354 No exchange



873 - 349 Exchanging tens



Abstract

876 - 354 No exchange

$$\begin{array}{r} 876 \\ -\ 354 \\ \hline 522 \end{array}$$

873 - 349 Exchanging tens

$$\begin{array}{r} 8\ \overset{6}{\cancel{7}}\ \overset{1}{}3 \\ -\ 349 \\ \hline 524 \end{array}$$

Key Vocabulary:
equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

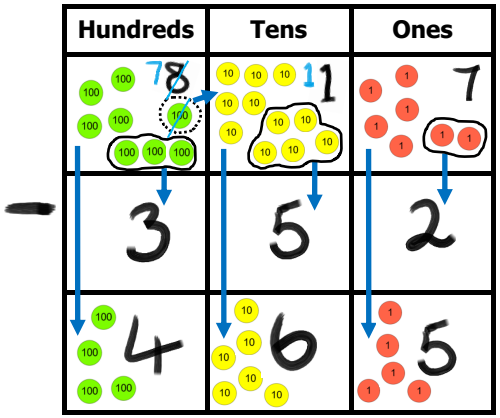
- Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Subtract numbers with up to three digits, using formal written methods of columnar subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

Non-statutory requirements:

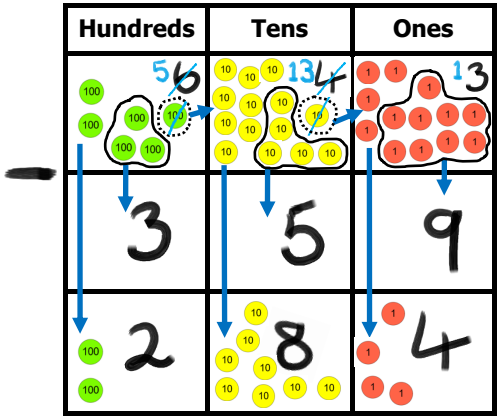
- Practise solving varied subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using co-lumnar subtraction with increasingly large numbers up to three digits to become fluent.

Concrete

817 - 352 Exchanging hundreds

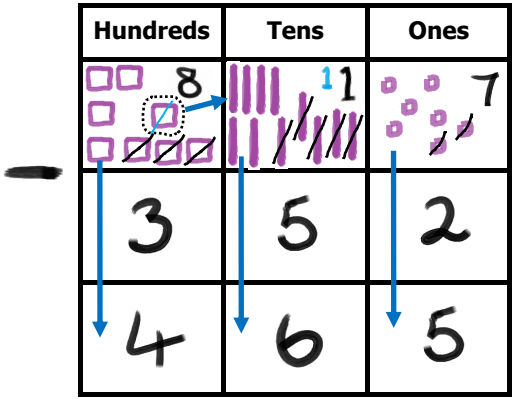


643 - 359 Exchanging tens and hundreds

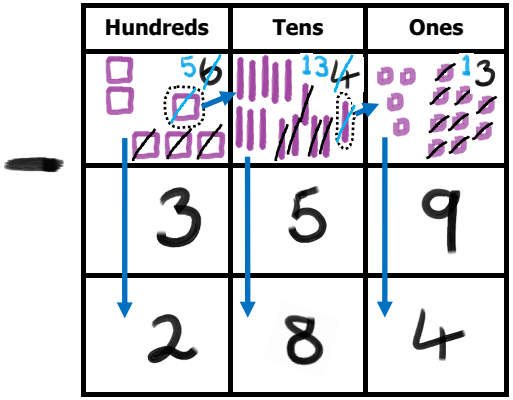


Pictorial

817 - 352 Exchanging hundreds



643 - 359 Exchanging tens and hundreds



Abstract

817 - 352 Exchanging hundreds

$$\begin{array}{r} {}^{7}\cancel{8}\ {}^{1}1\ 7 \\ -\ 3\ 5\ 2 \\ \hline 4\ 6\ 5 \end{array}$$

643 - 359 Exchanging tens and hundreds

$$\begin{array}{r} {}^{5}\cancel{6}\ {}^{13}\cancel{4}\ {}^{1}3 \\ -\ 3\ 5\ 9 \\ \hline 2\ 8\ 4 \end{array}$$

Key Vocabulary:
equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

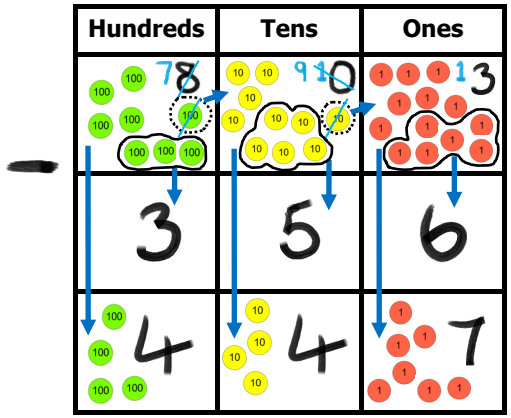
- Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds
- Subtract numbers with up to three digits, using formal written methods of columnar subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex subtraction.

Non-statutory requirements:

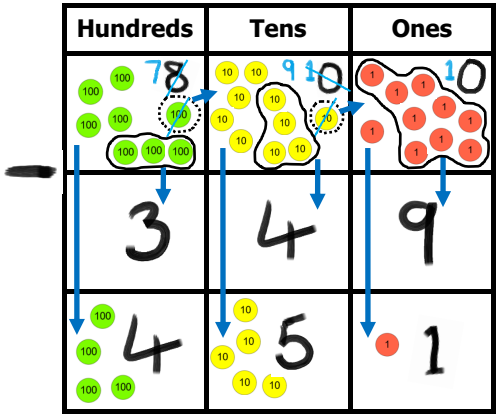
- Practise solving varied subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.
- Use understanding of place value and partitioning, and practise using columnar subtraction with increasingly large numbers up to three digits *to become fluent.*

Concrete

803 - 356 **Exchanging tens and hundreds with a zero in the tens column**

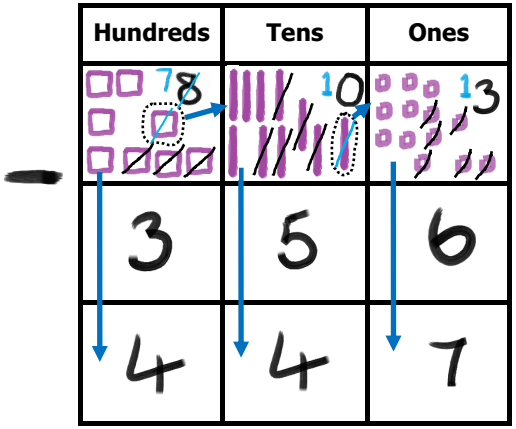


800 - 349 **Exchanging tens and hundreds - with a zero in the ones and tens column**

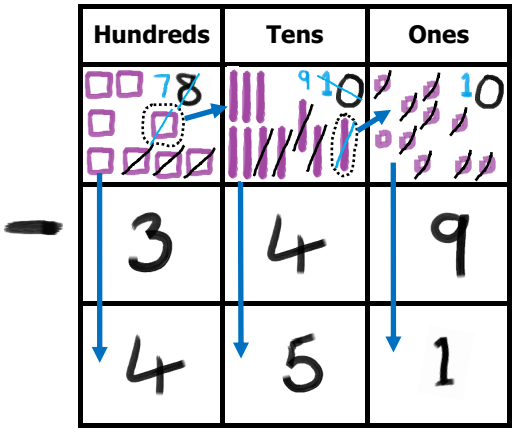


Pictorial

803 - 356 **Exchanging tens and hundreds - with a zero in the tens column**



800 - 349 **Exchanging tens and hundreds - with a zero in the ones and tens column**



Abstract

803 - 356 **Exchanging tens and hundreds - with a zero in the tens column**

$$\begin{array}{r} {}^{7}\cancel{8}\ {}^{9}\cancel{1}0\ {}^{1}3 \\ -\ 3\ 5\ 6 \\ \hline 4\ 4\ 7 \end{array}$$

800 - 349 **Exchanging tens and hundreds - with a zero in the ones and tens column**

$$\begin{array}{r} {}^{7}\cancel{8}\ {}^{9}\cancel{1}0\ {}^{1}0 \\ -\ 3\ 4\ 9 \\ \hline 4\ 5\ 1 \end{array}$$

Key Vocabulary:
equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 4 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 4, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate.
- Estimate and use inverse operations to check answers to a calculation.
- Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Non-statutory requirements:

- Practise both mental methods and columnar subtraction with increasingly large numbers to aid fluency.
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers.

Some children may still need the CPA approach, please see earlier work.
This section is split into stages of progression.

STAGE 1: 4 digit - 2 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges

	Th	H	T	O
-			T	O

STAGE 2: 4 digit - 3 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	Th	H	T	O
-		H	T	O

STAGE 3: 4 digit - 4 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	Th	H	T	O
-	Th	H	T	O

STAGE 4: Subtracting multiple zeroes
Suggested order of teaching:

- one exchange
- two exchanges
- three exchanges

	$^{6}\cancel{7}$	$^{9}\cancel{0}$	$^{9}\cancel{0}$	$^{1}0$
-	3	5	9	1
	3	4	0	9

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.

National Curriculum statutory requirements:

- Subtract numbers mentally with increasingly large numbers
- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use

Non-statutory requirements:

- Pupils practise using the formal written methods of columnar subtraction with increasingly large numbers to aid fluency.
- They practise mental calculations with increasingly large numbers to aid fluency (for example, 12 462 – 2300 = 10 162).

Some children may still need the CPA approach, please see earlier work.
This section is split into stages of progression.

STAGE 1: 5 digit - 3 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	TTh	Th	H	T	O
-			H	T	O

STAGE 2: 5 digit - 4 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	TTh	Th	H	T	O
-		Th	H	T	O

STAGE 3: 5 digit - 5 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	TTh	Th	H	T	O
-	TTh	Th	H	T	O

STAGE 4: 6 digit - 3 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

	HTh	TTh	Th	H	T	O
-				H	T	O

STAGE 5: 6 digit - 4 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	HTh	TTh	Th	H	T	O
-			Th	H	T	O

STAGE 6: 6 digit - 5 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

	HTh	TTh	Th	H	T	O
-		TTh	Th	H	T	O

STAGE 7: 6 digit - 6 digit
Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

	HTh	TTh	Th	H	T	O
-	HTh	TTh	Th	H	T	O

STAGE 8:

Ensure that pupils are confident with exchange when a number includes zeroes e.g:

	7	8	0	0	0
-		5	6	9	2

	9	5	0	0	0	0
-			4	9	7	9	4

	6	0	0	0	0	0
-	2	4	8	5	9	8

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.

National Curriculum statutory requirements:

- Subtract numbers mentally with increasingly large numbers
- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy

Non-statutory requirements:

- Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency.
- They practise mental calculations with increasingly large numbers to aid fluency (for example,

Some children may still need the CPA approach, please see earlier work.
This section is split into stages of progression.

STAGE 1

Suggested order of teaching:

- no exchange
- one exchange

O	.	t
- O	.	t
	.	

Ensure pupils are exposed to calculations such as 6 - 4.6 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 2

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges

O	.	t	h
- O	.	t	h
	.		

Ensure pupils are exposed to calculations such as 8 - 5.06 at this stage so that they understand that they have to add 0s as place holders.

STAGE 3

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges

T	O	.	t
- T	O	.	t
		.	

Ensure pupils are exposed to calculations such as 24 - 8.2 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 4

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

T	O	.	t	h
- T	O	.	t	h
		.		

Ensure pupils are exposed to calculations such as 68.23 - 42 and 56.3 - 8.07 at this stage so that they understand that they have to add 0s as place holders.

STAGE 5

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges

H	T	O	.	t
- H	T	O	.	t
		.		

Ensure pupils are exposed to calculations such as 811 - 600.4 at this stage so that they understand that they have to add a 0 as a place holder.

STAGE 6

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

H	T	O	.	t	h
- H	T	O	.	t	h
			.		

Ensure pupils are exposed to calculations such as 823.99 - 125.2 at this stage so that they understand that they have to add 0s as place holders.

STAGE 7

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges

Th	H	T	O	.	t
- Th	H	T	O	.	t
				.	

Ensure pupils are exposed to calculations such as 7825.6 - 1230 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 8

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

Th	H	T	O	.	t	h
- Th	H	T	O	.	t	h
				.		

Ensure pupils are exposed to calculations such as 9134.05 - 5691 at this stage so that they understand that they have to add 0s as place holders.

STAGE 9

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges

TTh	Th	H	T	O	.	t
- TTh	Th	H	T	O	.	t
					.	

Ensure pupils are exposed to calculations such as 32204 - 14798.2 at this stage so that they understand that they have to add 0 as a place holder.

STAGE 10

Suggested order of teaching:

- no exchange
- one exchange
- two exchanges
- three exchanges
- four exchanges
- five exchanges
- six exchanges

TTh	Th	H	T	O	.	t	h
- TTh	Th	H	T	O	.	t	h
					.		

Ensure pupils are exposed to calculations such as 81134.99 - 55691.4 at this stage so that they understand that they have to add 0s as place holders.

By the end of Year 5, pupils should be able to subtract two decimal numbers (up to the values shown) using different numbers of decimal places.

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Subtraction - Year 6 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate thus developing Year 5 experiences.
Throughout Year 6, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method. If

National Curriculum statutory requirements:

- Perform mental calculations, including with mixed operations and large numbers
- Solve problems involving subtraction
- Solve subtraction multi-step problems in contexts, deciding which operations and methods
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
- Use their knowledge of the order of operations to carry out calculations involving the four operations

Non-statutory requirements:

- Pupils practise addition for larger numbers, using the formal written methods.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils round answers to a specified degree of accuracy, e.g. to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = *9.*

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals.
This section is split into stages of progression.

STAGE 1 - whole numbers with the same number of places: no exchange, one exchange, multiple exchanges

E.g. maximum expectation shown below (though can go into 10 million)

	M	HTh	TTh	Th	H	T	O
-	M	HTh	TTh	Th	H	T	O
	M	HTh	TTh	Th	H	T	O

STAGE 2 - whole numbers with a different number of places: no exchange, one exchange, multiple exchanges

E.g. maximum expectation shown below

	M	HTh	TTh	Th	H	T	O
-		HTh	TTh	Th	H	T	O
	M	HTh	TTh	Th	H	T	O

STAGE 3 - decimal numbers with the same number of places: no exchange, one exchange, multiple exchanges

E.g. maximum expectation shown below (though can go into 10 million)

	M	HTh	TTh	Th	H	T	O	.	t	h	th
-	M	HTh	TTh	Th	H	T	O	.	t	h	th
	M	HTh	TTh	Th	H	T	O	.	t	h	th

STAGE 4 - decimal numbers with a different number of places: no exchange, one exchange, multiple exchanges

E.g 1

	TTh	Th	H	T	O	.	t	
-			H	T	O	.	t	h
	TTh	Th	H	T	O	.	t	h

N.B. you can go up to a million and up to thousandths

STAGE 4 - decimal numbers with a different number of places: no exchange, one exchange, multiple exchanges

E.g 2

	HTh	TTh	Th	H	T	O	.	t	h	
-			Th	H	T	O	.	t	h	th
		TTh	Th	H	T	O	.	t	h	th

N.B. you can go up to a million and up to thousandths

STAGE 4 - decimal numbers with a different number of places: no exchange, one exchange, multiple exchanges

E.g 3

	M	HTh	TTh	Th	H	T	O	.	t	h	th
-		HTh	TTh	Th	H	T	O	.	t		
		TTh	Th	H	T	O	.	t	h	th	

N.B. you can go up to a million and up to thousandths

Key Vocabulary:

equal to, take, less, leaves, take away, less than, the difference, subtract, minus, fewer, decrease, '7 take away 3, the difference is four'

Multiplication - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

In Year 1, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

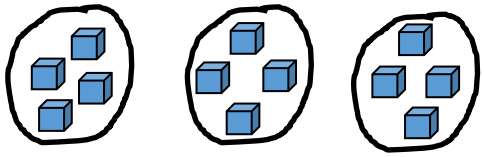
- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher

Non-statutory requirements:

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

Concrete

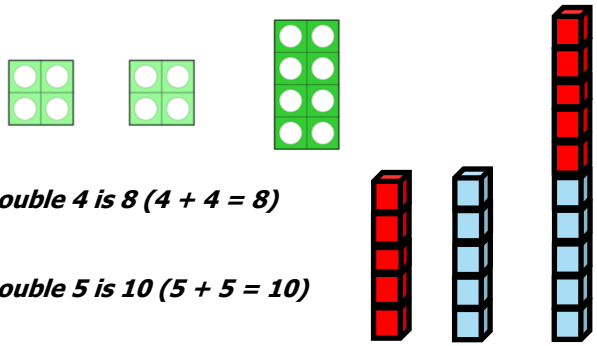
Recognising and making equal and unequal groups.



Children arrange objects in equal and unequal groups and understand how to recognise whether they are equal.

Doubling

Use manipulatives to show how to double a number.



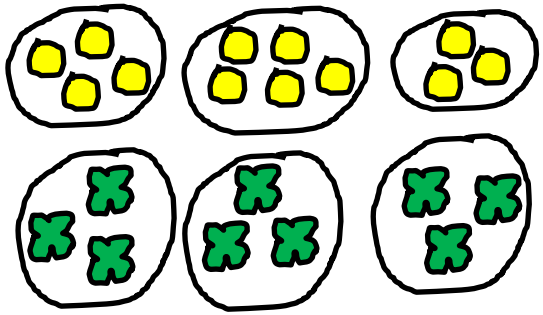
Double 4 is 8 (4 + 4 = 8)

Double 5 is 10 (5 + 5 = 10)

Pictorial

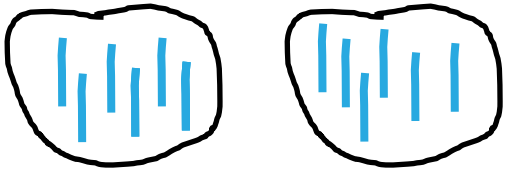
Recognising and making equal and unequal groups.

Children draw and represent equal and unequal groups.



Doubling

Draw doubles using a range of representations.



Double 6 is 12 (6 + 6 = 12)

Abstract

Recognising and making equal and unequal groups.

Describe equal groups

This is 3 equal groups of 4

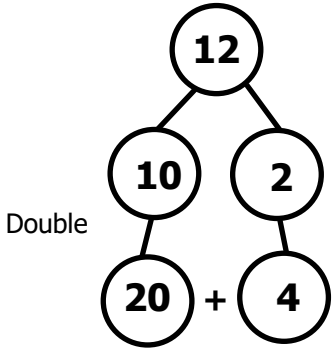
(4 and 4 and 4)

Doubling

5 + 5 = ?

14 = 7 + 7

Partition a number and then double each part before recombining.



Double 12 is 24.

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as', repeated addition, equal groups, unequal groups, array

Multiplication - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

In Year 1, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- 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

Non-statutory requirements:

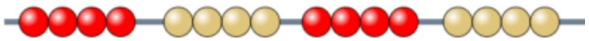
- Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

Concrete

Recognising and making equal groups (repeated addition).

There are 5 equal groups with 3 in each group.

3 + 3 + 3 + 3 + 3 = 15



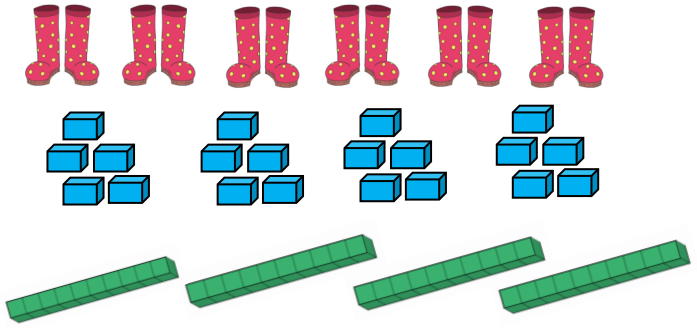
There are 4 equal groups with 4 in each group.

4 + 4 + 4 + 4 = 15

*Children **can** begin to relate this to multiplication if ready.*

Counting in multiples of 2, 5 and 10.

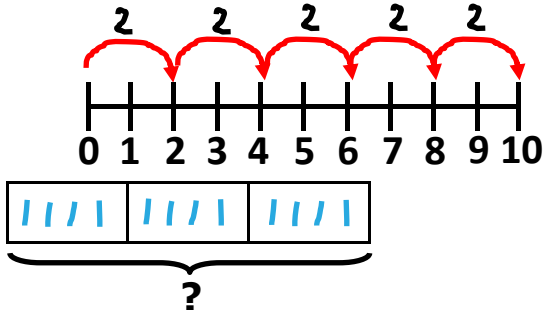
Count in multiples supported by concrete objects placed into equal groups (skip counting)



Pictorial

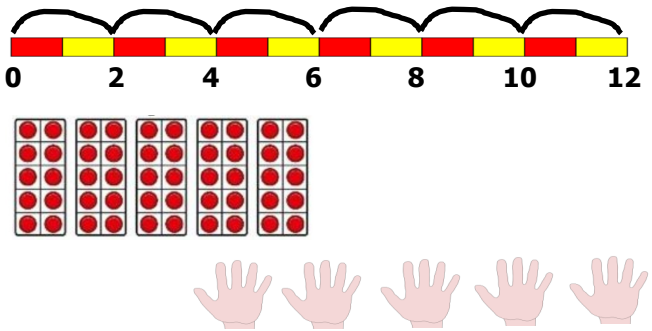
Recognising and making equal groups (repeated addition).

Use pictorial representations including numberlines to solve calculations.



Counting in multiples of 2, 5 and 10.

Use a numberline and other pictorial presentations to support counting in multiples.



Abstract

Recognising and making equal groups (repeated addition).

4 + 4 + 4 = 12

3 lots of 4 = 12

3 x 4 = 12

Counting in multiples of 2, 5 and 10.

Count in multiples of number aloud.

Write sequences with multiples of numbers.

Write the missing numbers in the sequence.

2, 4, 6, 8, 10, 12, 14, 16, 18, 20

5, 10, 15, 20, 25, 30

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as', repeated addition, equal groups, unequal groups, array

Multiplication - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 2, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

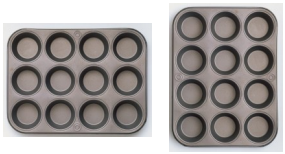
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

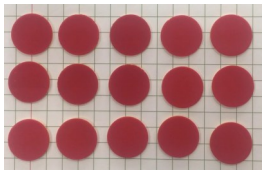
Non-statutory requirements:

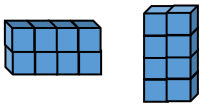
- Pupils use a variety of language to describe multiplication and division.
- Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.
- Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).

Concrete

Create arrays to illustrate commutativity using a range of concrete objects.



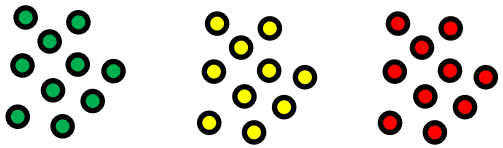




Children should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer. Make links to repeated addition.

Building on from Year 1, learn the ×2, ×5 and ×10 table facts .

Develop an understanding of how to unitise groups of 2, 5 and 10 and learn corresponding times-table facts.

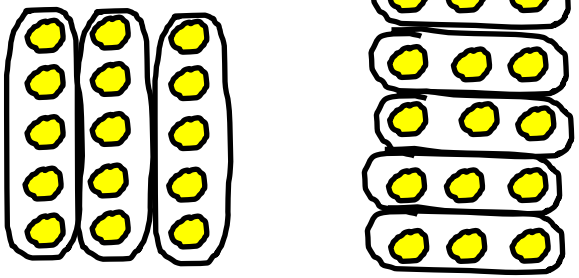


Groups of 10 …
10, 20, 30
3 × 10 = 30

Pictorial

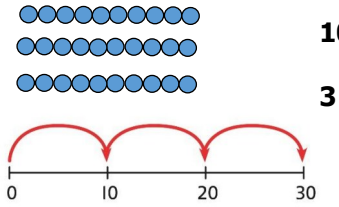
Create arrays to illustrate commutativity using a range of concrete objects.

Children to represent the arrays pictorially.



Building on from Year 1, learn the ×2, ×5 and ×10 table facts .

Understand how to relate counting in unitised groups and repeated addition with knowing key times-table facts



10 + 10 + 10 = 30

3 × 10 = 30

Abstract

Create arrays to illustrate commutativity using a range of concrete objects.

Children to be able to use an array to write a range of calculations e.g.

10 = 2 × 5

5 × 2 = 10

2 + 2 + 2 + 2 + 2 = 10

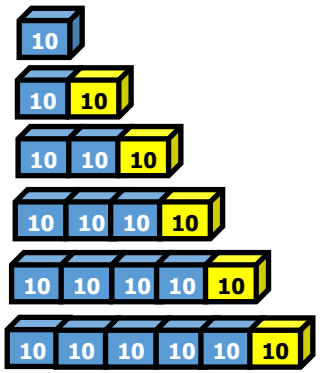
10 = 5 + 5

Building on from Year 1, learn the ×2, ×5 and ×10 table facts.

Understand how the times-tables increase and contain patterns.

5 × 10 = 50

6 × 10 = 60



Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to' , 'is the same as' , repeated addition, equal groups, unequal groups, array

Multiplication - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication 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, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Non-statutory requirements:

- Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.
- Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, 4 × 12 × 5 = 4 × 5 × 12 = 20 × 12 = 240) and multiplication and division facts (for example, using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (for example, 30 × 2 = 60, 60 ÷ 3 = 20 and 20 = 60 ÷ 3).
- Pupils develop reliable written methods for multiplication, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication.
- Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?

Concrete

13 x 3 Two-digit by one-digit (no exchange into tens)

Either Base 10 or place value counters can be used here.

Step 1:
- Partition the 13 into 10 and 3 and write these numbers on the grid in the correct columns. Place the number that you are multiplying the 13 by at the side (see the 3 on the diagram).

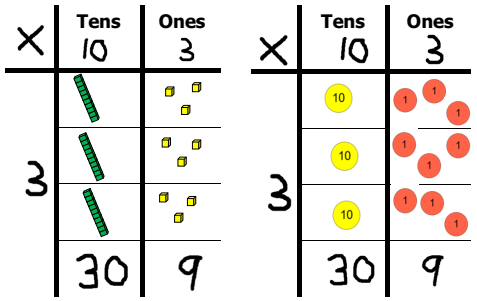
Step 2:
- Use concrete resources to represent the 10 and 3 and position them in the grid at the top.

Step 3:
- 13 is being multiplied by 3 so you need three rows of 13 in total. Add two more rows of 13 using the concrete resources. You now have 3 lots of 13.

Step 4:
- Count up all the ones - you have 9 in total. Write this number on the grid.

Step 5:
- Count up all the tens - you have 30 in total. Write this number on the grid.

Step 6:
- Add the two totals together (30 + 9). **13 x 3 = 39**



14 x 4 Two-digit by one digit (exchange into tens)

Step 1:
- Partition the 14 into 10 and 4 and write these numbers on the grid in the correct columns. Place the number that you are multiplying the 14 by at the side (see the 4 on the diagram).

Step 2:
- Use concrete resources to represent the 10 and 4 and position them in the grid at the top.

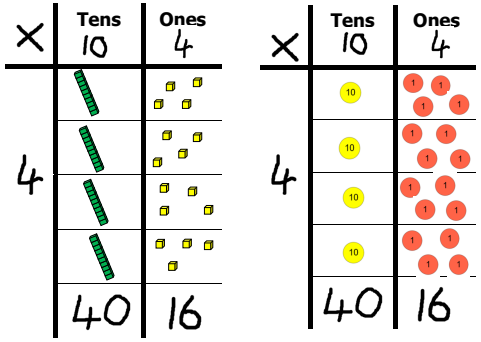
Step 3:
- 14 is being multiplied by 4 so you need four rows of 14 in total. Add three more rows of 14 using the concrete resources. You now have 4 lots of 14.

Step 4:
- Count up all the ones - you have 16 in total. Write this number on the grid.

Step 5:
- Count up all the tens - you have 40 in total. Write this number on the grid.

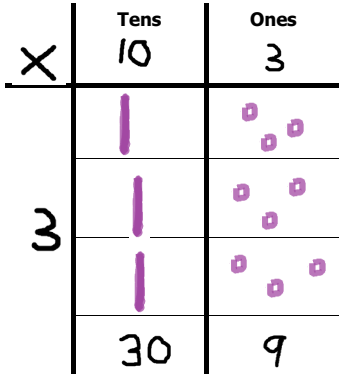
Step 6:
- Model that the 16 can be partitioned into one 10 and 6 ones, the ten here can be exchanged into the tens column.

Step 7:
- Add the two totals together (40 + 16). **14 x 4 = 56**

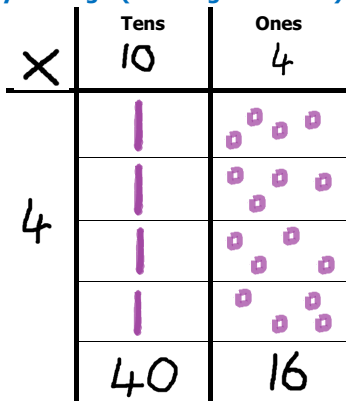


Pictorial

13 x 3 Two-digit by one-digit (no exchange into tens)



14 x 4 Two-digit by one digit (exchange into tens)



Abstract

13 x 3 Two-digit by one-digit (no exchange into tens)

Expanded short multiplication first.

	1	3	
x		3	
		9	(3 x 3)
+	3	0	(3 x 10)
	3	9	

14 x 4 Two-digit by one digit (with exchange into tens)

Expanded short multiplication first.

	1	4	
x		4	
	1	6	(4 x 4)
+	4	0	(4 x 10)
	5	6	

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as', repeated addition, equal groups, unequal groups, array, scaling

Multiplication - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication 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, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Non-statutory requirements:

- Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.
- Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (for example, using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (for example, $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).
- Pupils develop reliable written methods for multiplication, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication.
- Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?

Concrete

22 x 4 Two-digit by one-digit (no exchange into tens)

Either Base 10 or place value counters can be used here.

Step 1:
- Partition the 22 into 20 and 2 and write these numbers on the grid in the correct columns. Place the number that you are multiplying the 22 by at the side (see the 4 on the diagram).

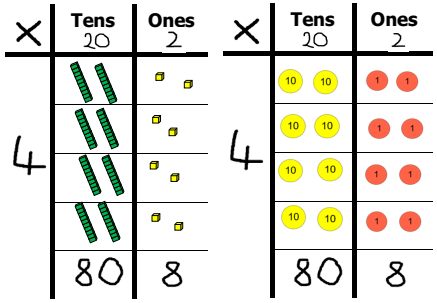
Step 2:
- Use concrete resources to represent the 20 and 2 and position them in the grid at the top.

Step 3:
- 22 is being multiplied by 4 so you need four rows of 22 in total. Add three more rows of 22 using the concrete resources. You now have 4 lots of 22.

Step 4:
- Count up all the ones - you have 8 in total. Write this number on the grid.

Step 5:
- Count up all the tens - you have 80 in total. Write this number on the grid.

Step 6:
- Add the two totals together (80 + 8). **22 x 4 = 88**



38 x 4 Two-digit by one digit (exchange into tens)

N.B. Base 10 can still be used.

Step 1:
- Partition the 38 into 30 and 8 and write these numbers on the grid in the correct columns. Place the number that you are multiplying the 38 by at the side (see the 4 on the diagram).

Step 2:
- Use concrete resources to represent the 30 and 8 and position them in the grid at the top.

Step 3:
- 38 is being multiplied by 4 so you need four rows of 38 in total. Add three more rows of 38 using the concrete resources. You now have 4 lots of 38.

These three steps apply to expanded short multiplication:

Step 4:
- Count up all the ones - you have 32 in total. Write this number on the grid.

Step 5:
- Count up all the tens - you have 120 in total. Write this number on the grid.

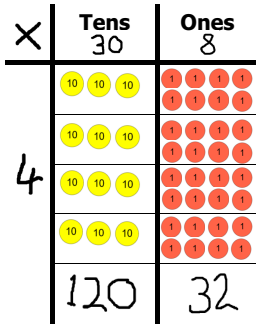
Step 6:
- Add the two total together (120 + 32). 38 x 8 = 152

These three steps apply to expanded short multiplication:

Step 4:
- Combine all the ones. You have 32 ones. Exchange 30 ones for 3 tens and move these across to the 10s column.

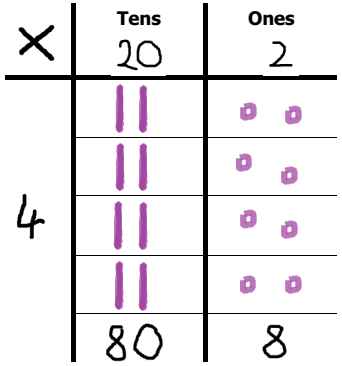
Step 5:
- Combine all the tens (in addition to the 3 tens exchanged in previous step). You have 15 tens. Exchange 10 tens to 1 hundred and move this across to the hundreds column.

Step 6:
- There should now be 1 hundred (in the hundreds column) 5 tens (in the tens column) and 2 ones (in the ones column). **38 x 4 = 152.**

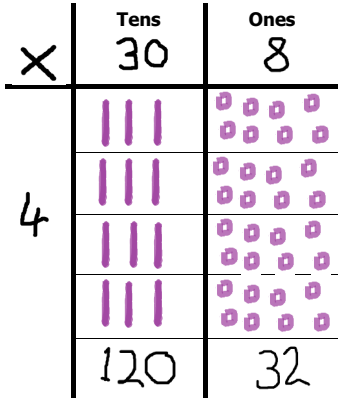


Pictorial

22 x 4 Two-digit by one-digit (no exchange into tens)



38 x 4 Two-digit by one digit (exchange into tens)



Abstract

22 x 4 Two-digit by one-digit (no exchange into tens)

Expanded short multiplication alongside compact short multiplication.

$$\begin{array}{r} 22 \\ \times\ 4 \\ \hline +\ 8 \quad (4 \times 2) \\ +\ 80 \quad (4 \times 20) \\ \hline 88 \end{array}$$

$$\begin{array}{r} 22 \\ \times\ 4 \\ \hline 88 \end{array}$$

38 x 4 Two-digit by one digit (exchange into tens).

Expanded short multiplication first alongside compact short multiplication.

$$\begin{array}{r} 38 \\ \times\ 4 \\ \hline +\ 32 \quad (4 \times 8) \\ +\ 120 \quad (4 \times 30) \\ \hline 152 \end{array}$$

$$\begin{array}{r} 38 \\ \times\ 4 \\ \hline 152 \\ \scriptstyle 1\ 3 \end{array}$$

It is important that the whole school adopt the same 'carry' positions for these numbers.

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as', repeated addition, equal groups, unequal groups, array, scaling

Multiplication - Year 4 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 4, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Recognise and use factor pairs and commutativity in mental calculations
- Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1 and multiplying together three numbers
- 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

Non-statutory requirements:

- Pupils practise recalling and using multiplication tables and related division facts to aid fluency.
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, (e.g. 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).
- Pupils are fluent in the formal written method of short multiplication with exact answers.
- Pupils write statements about the equality of expressions (e.g. use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4)). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations e.g, 2 x 6 x 5 = 10 x 6 = 60.
- Pupils 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.

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals.
This section is split into stages of progression.

STAGE 1: 324 x 2 Three-digit by one-digit (no exchange)

Base 10 or place value counters can be used here if needed.

Both methods for multiplication are shown below - most pupils should move to the compact method once secure with the expanded.

```
  3 2 4
x     2
      8   (2 x 4)
+   4 0   (2 x 20)
  6 0 0   (2 x 300)
  6 4 8
```

```
  3 2 4
x     2
  6 4 8
```

STAGE 2: 323 x 5 Three-digit by one-digit (with exchange)

Base 10 or place value counters can be used here (if needed).

```
    3 2 3
x       5
        1 5   (5 x 3)
+   1 0 0     (5 x 20)
  1 5 0 0     (5 x 300)
  1 6 1 5
```

It is important that the whole school adopt the same 'carry' positions for these numbers.

```
    3 2 3
x       5
  1 6 1 5
    1 1
```

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to' , 'is the same as' , repeated addition, equal groups, unequal groups, array, scaling, multiple, factor

Multiplication - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 5, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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 (nonprime) numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19
- Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- Multiply and divide numbers mentally drawing upon known facts
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- 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
- 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

Non-statutory requirements:

- Pupils practise and extend their use of the formal written methods of short multiplication . They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.
- They use and understand the terms factor, multiple and prime, square and cube numbers.
- Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and meters.
- Distributivity can be expressed as a(b + c) = ab + ac.
- They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 92 x 10).
- Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, 13 + 24 = 12 + 25; 33 = 5 x ?).

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals.
This section is split into stages of progression.

STAGE 1: 3124 x 6 Four-digit by a one-digit (with exchange)

Base 10 or place value counters can be used here if needed.

The children should now be secure with the compact method, however some children may still be working on the expanded method initially.

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

It is important that the whole school adopt the same 'carry' positions for these numbers.

STAGE 2: 42 x 17 Two-digit by a two-digit (with exchange)

The children should look at the expanded method here to develop an understanding of the method.

		4	2	
x		1	7	
		1	4	(7 x 2)
	2	8	0	(7 x 40)
+		2	0	(10 x 2)
	4	0	0	(10 x 40)
	7	1	4	
	1			

Only when the children are secure, should they be moved on to the compact method.

	4	2	
x	1	7	
2	^{1}9	4	
4	2	0	←
7	1	4	
1			

Explain the importance of the zero here. We add a zero because we are multiplying by the tens digit.

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to' , 'is the same as' , repeated addition, equal groups, unequal groups, array, scaling, multiple, factor

Multiplication - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 5, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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 (nonprime) numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19
- Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- Multiply and divide numbers mentally drawing upon known facts
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- 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
- 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

Non-statutory requirements:

- Pupils practise and extend their use of the formal written methods of short multiplication . They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.
- They use and understand the terms factor, multiple and prime, square and cube numbers.
- Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and meters.
- Distributivity can be expressed as a(b + c) = ab + ac.
- They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 92 x 10).
- Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, 13 + 24 = 12 + 25; 33 = 5 x ?).

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals.
This section is split into stages of progression.

STAGE 3: 534 x 16 Three-digit by a two-digit (with exchange)

The children should look at the expanded method first to develop an understanding of the calculation.

	5	3	4	
x		1	6	
		2	4	(6 x 4)
	1	8	0	(6 x 30)
3	0	0	0	(6 x 500)
+		4	0	(10 x 4)
	3	0	0	(10 x 30)
5	0	0	0	(10 x 500)
8	5	4	4	
	1			

It is important that the whole school adopt the same 'carry' positions for these numbers.

Only when the children are secure, should they be moved on to the compact method.

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

STAGE 4: 3234 x 18 Four-digit by a two-digit

	3	2	3	4	
x			1	8	
			3	2	(8 x 4)
		2	4	0	(8 x 30)
	1	6	0	0	(8 x 200)
2	4	0	0	0	(8 x 3000)
+			4	0	(10 x 4)
		3	0	0	(10 x 30)
	2	0	0	0	(10 x 200)
3	0	0	0	0	(10 x 3000)
5	8	2	1	2	
	1	1			

If the children are secure with the compact method, move straight on to this.

	3	2	3	4
x			1	8
2	15	28	37	2
3	2	3	4	0
5	8	2	1	2
	1	1		

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to' , 'is the same as' , repeated addition, equal groups, unequal groups, array, scaling, multiple, factor

Multiplication - Year 6 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 6, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Identify common factors, common multiples and prime numbers
- Perform mental calculations, including with mixed operations and large numbers
- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Solve problems involving the four operations
- Use their knowledge of the order of operations to carry out calculations involving the four operations

Non-statutory requirements:

- Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.
- Common factors can be related to finding equivalent fractions.

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals, in particular place value counters may be beneficial here.

Once the children are secure with multiplying whole numbers (up to 4 digits by two-digits) move on to decimal numbers.

STAGE 1: 16.2 x 4 Up to tenths multiplied by a one-digit number

	1	6 •	2	
x		4		
		0 •	8	(4 x 0.2)
+	2	4 •	0	(4 x 6)
	4	0 •	0	(4 x 10)
	6	4 •	8	

No exchange initially.

	1	6 •	2
x		4	
	6	4 •	8
	2		

Only when the children are secure, should they be moved on to the compact method.

Once the children are secure with multiplying whole numbers (up to 4 digits by two-digits) move on to decimal numbers.

STAGE 2: 36.23 x 3 Up to hundredths multiplied by a one-digit number

		3	6 • 2	3	
x			3		
			0 • 0	9	(3 x 0.03)
			0 • 6	0	(3 x 0.2)
+		1	8 • 0	0	(3 x 6)
		9	0 • 0	0	(3 x 30)
	1	0	8 • 6	9	
	1				

No exchange initially.

		3	6 • 2	3	
x			3		
	1	0	8 • 6	9	
		1			

Only when the children are secure, should they be moved on to the compact method.

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as', repeated addition, equal groups, unequal groups, array, scaling, multiple, factor

Multiplication - Year 6 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 6, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Identify common factors, common multiples and prime numbers
- Perform mental calculations, including with mixed operations and large numbers
- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- Solve problems involving the four operations
- Use their knowledge of the order of operations to carry out calculations involving the four operations

Non-statutory requirements:

- Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.
- Common factors can be related to finding equivalent fractions.

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals, in particular place value counters may be beneficial here.

STAGE 3: 16.2 x 23 Up to tenths multiplied by a two-digit number. No exchange initially.

```
    1 6 . 2
x   2 3
-----------
      0 . 6   (3 x 0.2)
    1 8 . 0   (3 x 6)
    3 0 . 0   (3 x 10)
+     4 . 0   (20 x 0.2)
  1 2 0 . 0   (20 x 6)
  2 0 0 . 0   (20 x 10)
-----------
  3 7 2 . 6
    1
```

```
    1 6 . 2
x   2 3
-----------
  1 4 8 . 6
1 3 2 4 . 0
-----------
  3 7 2 . 6
    1
```

Only when the children are secure, should they be moved on to the compact method.

STAGE 4: 26.21 x 23 Up to hundredths multiplied by a two-digit number. No exchange initially.

```
      2 6 . 2 1
x     2 3
-------------
        0 . 0 3   (3 x 0.01)
        0 . 6 0   (3 x 0.2)
    1 8 . 0 0   (3 x 6)
    6 0 . 0 0   (3 x 20)
-------------
        0 . 2 0   (20 x 0.01)
-------------
        4 . 0 0   (20 x 0.2)
-------------
  1 2 0 . 0 0   (20 x 6)
  4 0 0 . 0 0   (20 x 20)
-------------
  6 0 2 . 8 3
    1   1
```

```
      2 6 . 2 1
x     2 3 .
-------------
    1 7 8 . 6 3
1 5 2 4 . 2 0
-------------
  6 0 2 . 8 3
    1   1
```

Only when the children are secure, should they be moved on to the compact method.

Key Vocabulary:

double, times, multiplied by, the product of, groups of, lots of, 'is equal to', 'is the same as', repeated addition, equal groups, unequal groups, array, scaling, multiple, factor

Division - Year 1 Calculation Policy

Voyage EDUCATION PARTNERSHIP

In Year 1, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- 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

Non-statutory requirements:

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

Concrete

Grouping

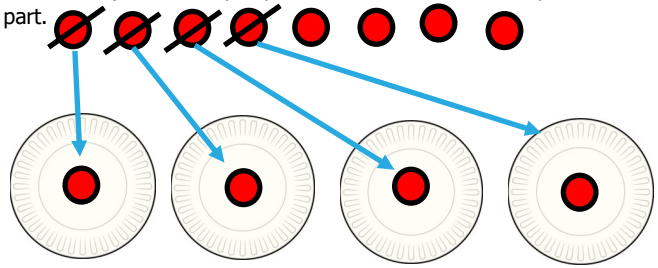
Learn to make equal groups from a whole and find how many equal groups of a certain size can be made. Sort a whole set of objects into equal groups.

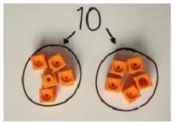
There are 10 children altogether.
There are 2 in each group.
There are 5 groups.

Children to group using a range of objects.

Sharing

Share a set of objects into equal parts and work out how many are in each part.





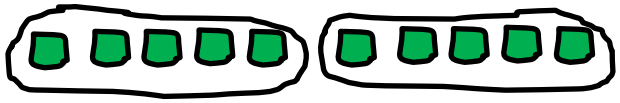
I have 10 cubes, can you share them equally between two groups?

Can also begin to relate to fractions.

Pictorial

Grouping

Represent a whole and work out how many equal groups.

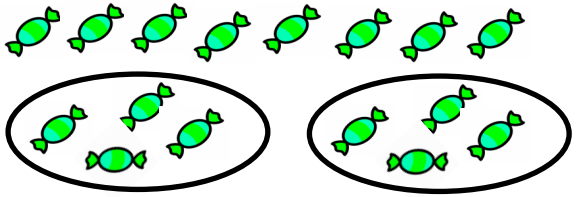


There are 10 in total.
There are 5 in each group.
There are 2 groups.

This can also be shown in a bar.

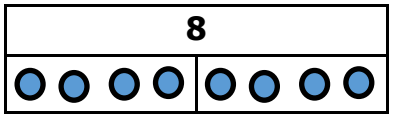
Sharing

Sketch or draw to represent sharing into equal parts.



I have shared 8 sweets between two groups. I have four in each group.

Children can also use a bar model to show understanding.

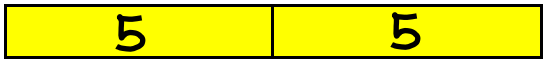


Can also begin to relate to fractions.

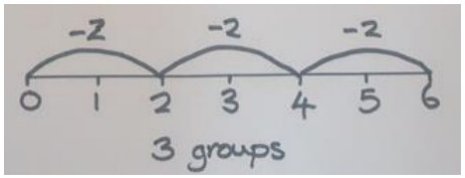
Abstract

Grouping

Children should be encouraged to show simple bar representations.



Children may relate this to counting back in steps of 2, 5 or 10, using an abstract number line to represent the equal groups that have been subtracted.



Sharing

6 shared equally between two groups is?

Share 9 buns between 3 people.

Key Vocabulary:
share, group, divide, divided by, half, 'is equal to', 'is the same as' , equal groups, unequal groups

Division - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 2, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- 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 (×), division (÷) and equals (=) signs
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

Non-statutory requirements:

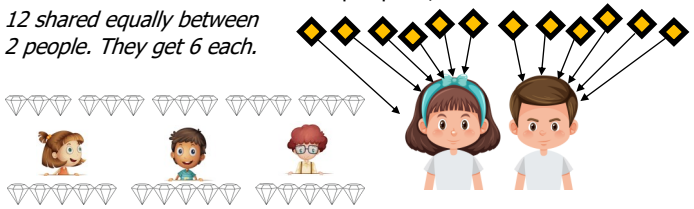
- Pupils use a variety of language to describe multiplication and division.
- Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.
- Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).

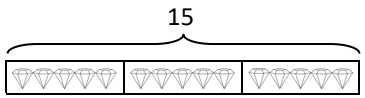
Concrete

Sharing equally

Start with a whole and share into equal parts, one at a time.

12 shared equally between 2 people. They get 6 each.





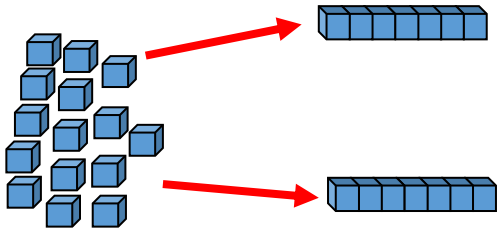
They get 5 each.

Start to understand how this also relates to grouping. To share equally between 3 people, take a group of 3 and give 1 to each person. Keep going until all the objects have been shared.

Grouping equally

Consolidate how to make equal groups from a whole using a range of manipulatives.

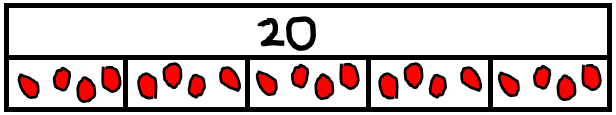
14 divided into 2 equal groups. There are 7 in each group.



Pictorial

Sharing equally

Continue to represent the objects shared into equal parts using a bar model to demonstrate understanding.

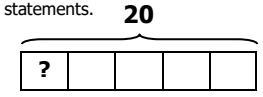


20 shared into 5 equal parts. There are 4 in each part.

Relate this to the relevant division statement.

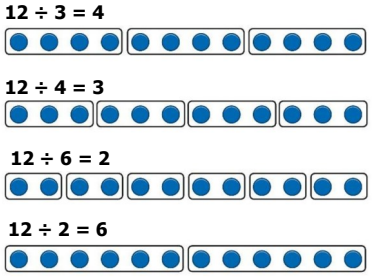
Grouping equally

Begin to understand the relationship between and the division statements.



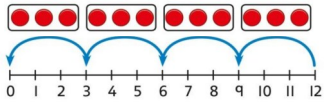
20 ÷ 5 = ?

5 x ? = 20



Understand how to relate division by grouping to repeated subtraction.

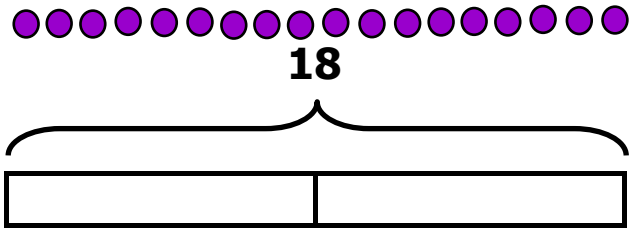
12 divided into groups of 3. 12 ÷ 3 = 4
There are 4 groups.



Abstract

Sharing equally

Use a bar model to support understanding of the division.



18 ÷ 2 = 9 (Relate to multiplication facts also)

Grouping equally

28 ÷ 7 = ?

Divide 28 into 7 groups. How many are in each group?

Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', 'is the same as' , equal groups, unequal groups

Division - Year 2 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 2, children should be encouraged to use the CPA approach to embed their understanding of number and their relationships.
Where possible the concrete, pictorial and abstract should be shown alongside each other so that the children can make links between the way the calculation can be represented.

National Curriculum statutory requirements:

- 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 (×), division (÷) and equals (=) signs
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

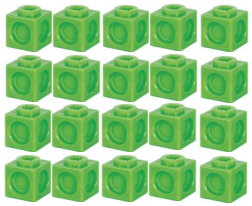
Non-statutory requirements:

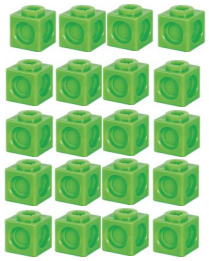
- Pupils use a variety of language to describe multiplication and division.
- Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.
- Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).

Concrete

Division within arrays

Use arrays to make division calculations.



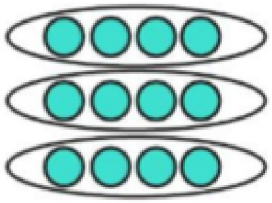


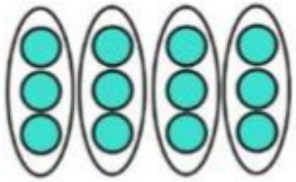
20 ÷ 5 = 4

20 ÷ 4 = 5

Pictorial

Division within arrays





Children divide their array to make groups and show inverse.

12 ÷ 3 = 4 **12 ÷ 4 = 3**

Abstract

Division within arrays

Write calculations for multiplication and division using related facts.

12 ÷ 3 = 4
12 ÷ 4 = 3
3 X 4 =12
4 x 3 = 12

Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', 'is the same as' , equal groups, unequal groups

Division - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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

Non-statutory requirements:

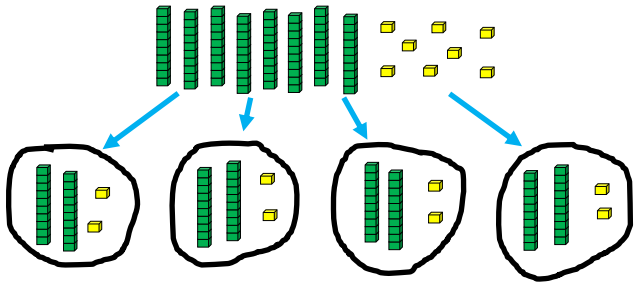
- Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.
- Pupils develop efficient mental methods, for example, using commutativity and associativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (e.g. $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).
- Pupils develop reliable written methods for multiplication, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication.
- Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

Concrete and then pictorial - sharing

STAGE 1: 88 ÷ 4 Two-digit by one-digit (no exchange of the tens) developing the concept of sharing. Use base 10 or place value counters here. The language that you use is important.

Method - sharing out equally

88 ÷ 4 = ?
Dividend Divisor Quotient



When 88 is shared equally into 4 groups.
There is 22 in each group.

How many we begin with — How many in each group

88 ÷ 4 = 22

How many we share between

This can be presented pictorially through drawing simple representations.

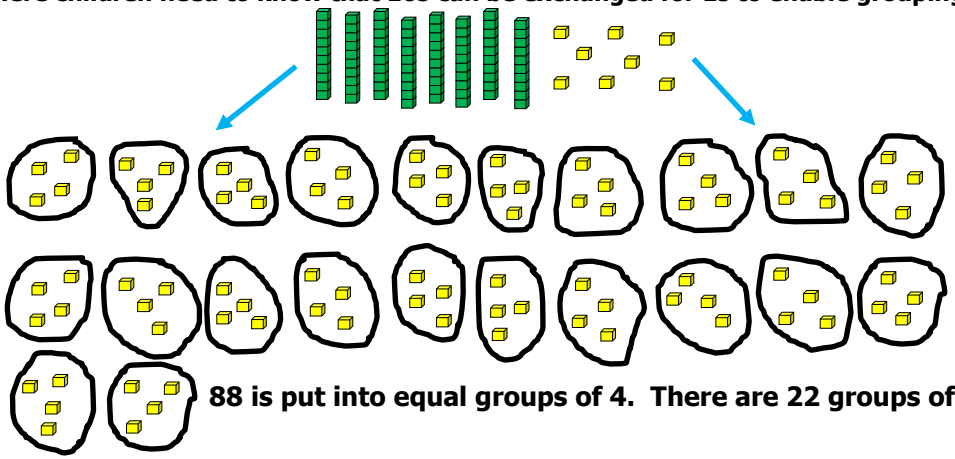
Concrete and then pictorial - grouping

STAGE 1: 88 ÷ 4 Two-digit by one-digit (no exchange of the tens) developing the concept of equal grouping. Use base 10 or place value counters here. The language that you use is important.

Method - grouping

How many amounts of 4 are in 88?

Here children need to know that 10s can be exchanged for 1s to enable grouping



88 is put into equal groups of 4. There are 22 groups of 4.

How many we begin with — how many groups we can make

88 ÷ 4 = 22

How many in each group

It is important that children understand that grouping in 1s is less efficient than grouping in 10s when working with larger dividends but they need to rehearse both as it will deepen their understanding of place value as well as the commutativity of multiplication. With 80 ÷ 4, children need to recognise that 20 groups of 4 ones (20 x 4) is equivalent to 2 groups of 4 tens (2 x 40).

Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', is the same as' , equal groups, unequal groups

Division - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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

Non-statutory requirements:

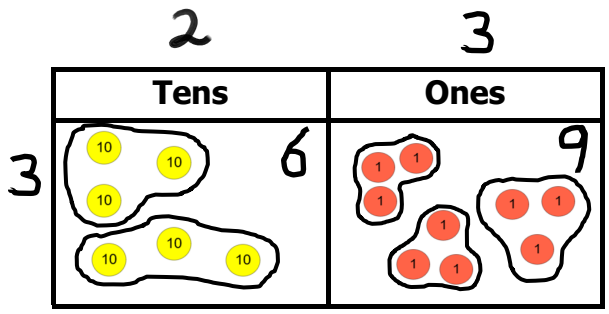
- Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.
- Pupils develop efficient mental methods, for example, using commutativity and associativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (e.g. $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).
- Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

Concrete

STAGE 2: 69 ÷ 3 **Two-digit by one-digit when there is no exchange of tens. Use base 10 or place value counters here.** **Using a place value grid helps to prepare the chn for the more formal written methods in Year 4.**

Step 2: There are 2 groups of 3 tens in 6 tens.

Step 4: There are 3 groups of 3 ones in 9 ones.



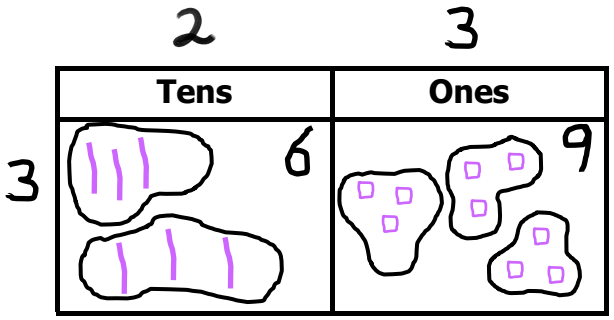
Step 1: How many groups of 3 tens are there in 6 tens?

Step 3: How many groups of 3 ones are in 9 ones?

69 ÷ 3 = 23

Pictorial

STAGE 2: 69 ÷ 3 **Two-digit by one-digit when there is no exchange of tens.**



Abstract

STAGE 2: **Two-digit by one-digit when there is no exchange of tens.**

Use knowledge of the multiplication tables and the earlier methods at this stage, to complete questions where there is no exchange.

The children should not be calculating using the short method of division.

E.g. 84 ÷ 4
68 ÷ 2
66 ÷ 3

Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', is the same as', equal groups, unequal groups

Division - Year 3 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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

Non-statutory requirements:

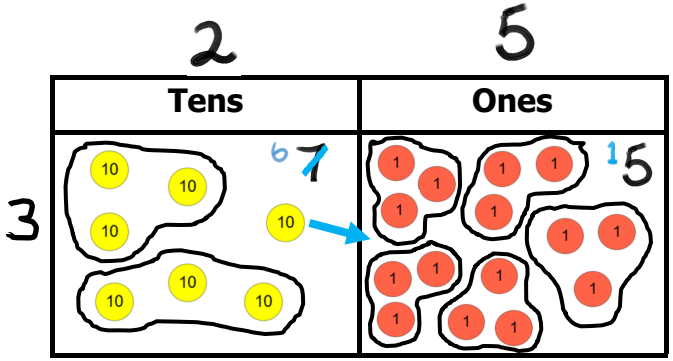
- Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.
- Pupils develop efficient mental methods, for example, using commutativity and associativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (e.g. $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).
- Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

Concrete

STAGE 3: 75 ÷ 3 **Two-digit by one-digit when you have to exchange a ten for ones Use base 10 or place value counters here. Using a place value grid helps to prepare the chn for the more formal written methods in Year 4.**

Step 2: Two groups of 3 tens in 7 tens with 1 ten left over.

Step 5: There are five groups of 3 ones in 15 ones.



Step 1: How many groups of 3 tens are there in 7 tens?

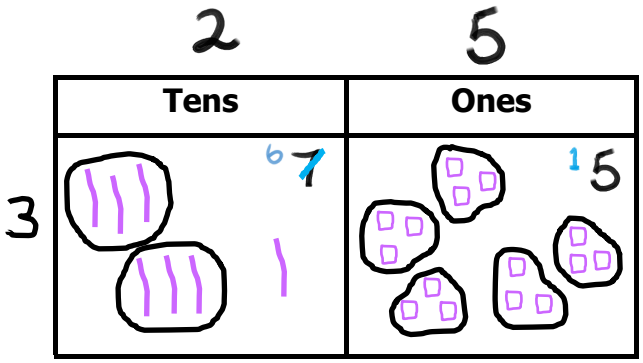
Step 4: How many groups of 3 ones are in 15 ones?

Step 3: I can exchange the 1 ten left over for 10 ones so now I have 15 ones to put into 3 groups.

75 ÷ 3 = 25

Pictorial

STAGE 3: 75 ÷ 3 **Two-digit by one-digit when you have to exchange a ten for ones**



Abstract

STAGE **Two-digit by one-digit when you have to exchange a ten for ones**

Use knowledge of the multiplication tables and the earlier methods at this stage, to complete questions where there is an exchange.

The children should not be calculating using the short method of division.

E.g. 91 ÷ 7
96 ÷ 8
81 ÷ 3
84 ÷ 6

Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', is the same as', equal groups, unequal groups

Division - Year 4 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 3, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Recognise and use factor pairs and commutativity in mental calculations
- 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
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Non-statutory requirements:

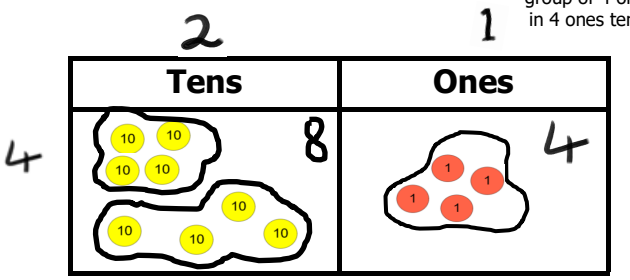
- Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency.
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).
- Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers.
- Pupils write statements about the equality of expressions (for example, use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4)). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, 2 x 6 x 5 = 10 x 6 = 60.

Concrete

STAGE 1: 84 ÷ 4 **Two-digit by one-digit when there is no exchange of tens. Use base 10 or place value counters here.** **Using a place value grid helps to prepare the children for the more formal written methods in Year 4.**

Step 2: There are 2 groups of 4 tens in 8 tens.

Step 4: There is 1 group of 4 ones in 4 ones tens.



Step 1: How many groups of 4 tens are there in 8 tens?

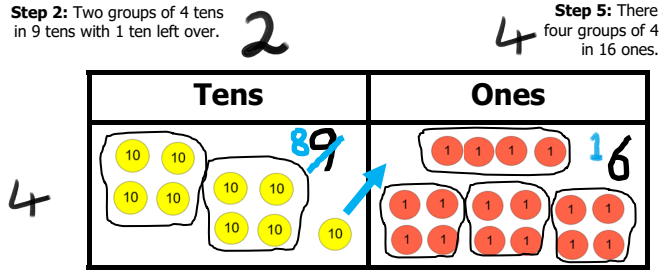
Step 3: How many groups of 4 ones are in 4 ones?

84 ÷ 4 = 21

STAGE 2: 96 ÷ 4 **Two-digit by one-digit with exchange of tens.**

Step 2: Two groups of 4 tens in 9 tens with 1 ten left over.

Step 5: There are four groups of 4 ones in 16 ones.



Step 1: How many groups of 4 tens are there in 9 tens?

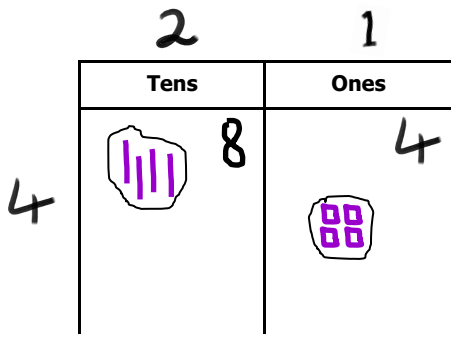
Step 3: I can exchange the 1 ten left over for 10 ones so now I have 16 ones to put into the ones group.

Step 4: How many groups of 4 ones are in 16 ones?

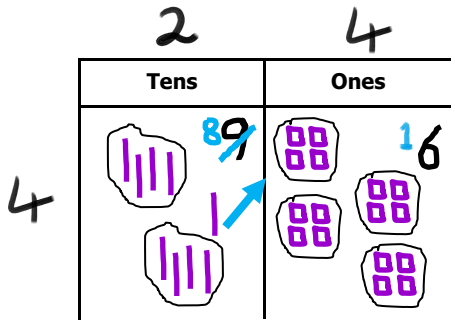
96 ÷ 4 = 24

Pictorial

STAGE 1: 84 ÷ 4 **Two-digit by one-digit when there is no exchange of tens.**



STAGE 2: 96 ÷ 4 **Two-digit by one-digit with exchange of tens.**



Abstract

STAGE 1: 84 ÷ 4 **Two-digit by one-digit when there is no exchange of tens.**

	2	1
	Tens	Ones
4	8	4

STAGE 2: 96 ÷ 4 **Two-digit by one-digit with exchange of tens.**

	2	4
	Tens	Ones
4	8 ~~9~~	1 6

Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', is the same as', equal groups, unequal groups

Division - Year 4 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 4, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

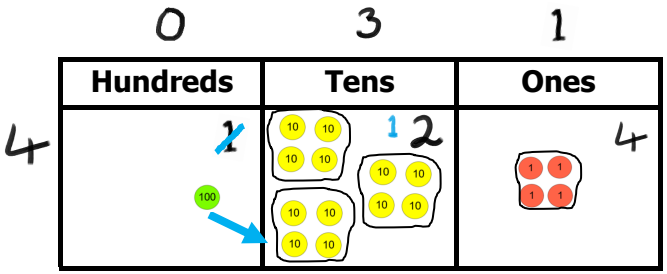
- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Recognise and use factor pairs and commutativity in mental calculations
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Non-statutory requirements:

- Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency.
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).
- Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers.
- Pupils write statements about the equality of expressions (for example, use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4)). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, 2 x 6 x 5 = 10 x 6 = 60.

Concrete

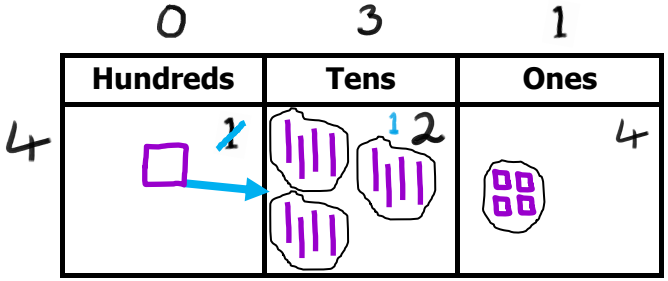
STAGE 3: 124 ÷ 4 Three-digit by one-digit including an exchange.



124 ÷ 4 = 31

Pictorial

STAGE 3: 124 ÷ 4 Three-digit by one-digit including an exchange.



Abstract

STAGE 3: 124 ÷ 4 Three-digit by one-digit including an exchange.

	0	3	1
	Tens		Ones
4	~~1~~	$^{1}2$	4

Key Vocabulary:
share, group, divide, divided by, half, 'is equal to', is the same as' , equal groups, unequal groups

Division - Year 5 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 5, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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
- 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 ratios.

Non-statutory requirements:

- Pupils practise and extend their use of the formal written methods of short division. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.
- Pupils 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 (for example, 98 ÷ 4 = (for example, 98 ÷ 4 = $^{98}/_{4}$ = 24 r 2 = 24 $^{1}/_{2}$ = 24.5 ≈ 25).

Concrete

1275 ÷ 4 Four-digit number divided by a one-digit number. Use place value counters.

Step 1:
- Position the counters on the grid.

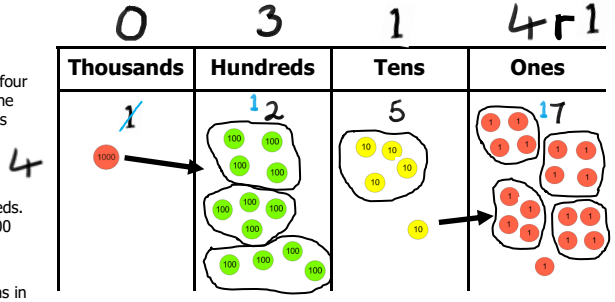
Step 2:
- Thousands column - there are no groups of four thousands in 1000 (write this at the top of the column). Exchange the 1000 for 10 hundreds and add them to the hundreds column.

Step 3:
- Hundreds column - you now have 12 hundreds. There are three groups of 4 hundreds in 1200 (write this at the top of the column).

Step 4:
- Tens column - there is one group of four tens in 50 (write this at the top of the column). You have 1 ten left over. Exchange the 10 for 10 ones and add them to the ones column.

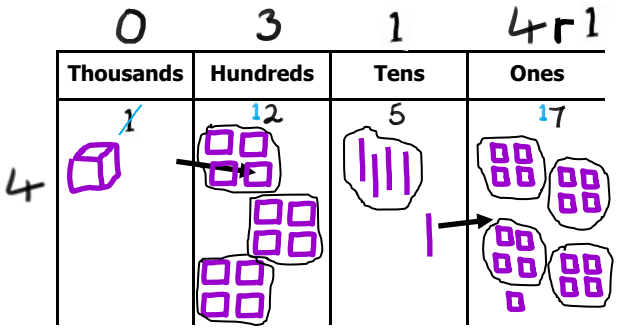
Step 5:
- Ones column - you now have 17 ones. There are 4 groups of 4 ones in 17 (write this at the top of the column). You have 1 left over, this gives a remainder of 1. Add this to the top of the column.

Step 6:
- **1257 ÷ 4 = 314 r 1**



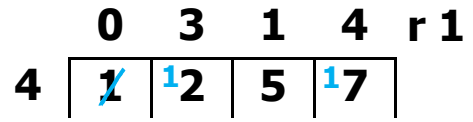
Pictorial

1275 ÷ 4 Four-digit number divided by a one-digit number



Abstract

1275 ÷ 4 Four-digit number divided by a one-digit number



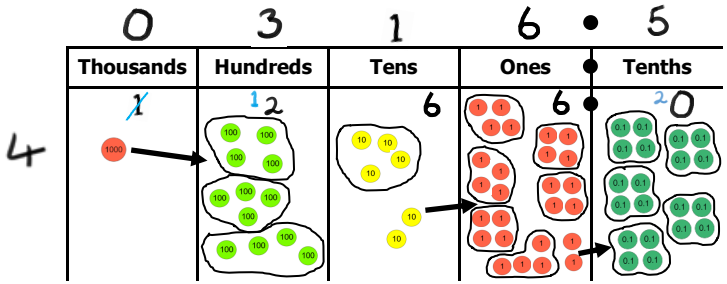
Interpreting remainders depending on the context.

E.g. 1: 1257 cakes are put into boxes of 4. How many boxes are filled? How many cakes, if any, are not put in boxes? *314 boxes are filed with 4 cakes. 1 cakes is left over and not put in a box.*

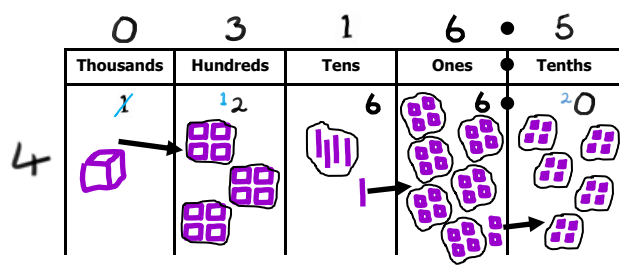
E.g. 2: 1257 large cakes are shared equally between 4 schools. How many cakes does each school get? *Each school will get 314 cakes with 1 cake left over. I need to divide this cake into 4 equal parts. Using my knowledge of division, I know that 1 ÷ 4 can also be written as $^{1}/_{4}$. Each school will get 314 and a quarter cakes.*

E.g. 3: A ribbon is 1275m. It is cut into 4 equal lengths. How long is each piece of ribbon? *(see below)*

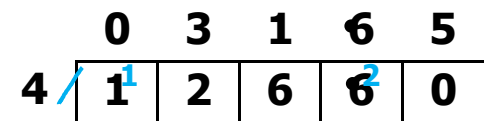
1276 ÷ 4 Decimal as a remainder. Use place value counters.



1276 ÷ 4 Decimal as a remainder.



1276 ÷ 4 Decimal as a remainder.



Key Vocabulary:

share, group, divide, divided by, half, 'is equal to', is the same as', equal groups, unequal groups, remainder, quotient, divisor, dividend

Division - Year 6 Calculation Policy

Voyage EDUCATION PARTNERSHIP

Look at the previous learning and recap where appropriate.
In Year 6, children should be encouraged to consider whether they can calculate mentally, with or without jottings before using a written method.

National Curriculum statutory requirements:

- 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 context
- Divide numbers up to 4 digits by a two-digit number sing the formal written method of short division where appropriate, interpreting remainders according to the context
- Use written division methods in cases where the answer has up to two decimal places
- 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

Non-statutory requirements:

- Larger numbers, using formal methods division of short and long division
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 120, 20, 50 etc but not to a specified number of significant figures
- Pupils are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.

Some children may still need the CPA approach, please see earlier work, especially when dealing with larger numbers or decimals, in particular place value counters may be beneficial here.
This section is split into stages of progression.

STAGE 1: To divide numbers up to 4-digits by 11 or 12.

```
        0  3  4  r 4
    ┌──────────
11  │ 3 37 48
```

```
           0  3  1  5  r 5
       ┌──────────────
12     │ 3 37 18 65
```

N.B. Depending on the context of the problem the pupils should be able to represent the remainder as a decimal or a fraction.

STAGE 2: To divide decimal numbers by a one-digit number (no remainders).

```
        1 • 3  2
    ┌──────────
3   │ 3 • 9  6
```

STAGE 3: To divide a two-digit number by a two-digit whole number using the formal written method of long division (pupils can use jottings; begin with friendly numbers and no remainders).

```
        0  7
    ┌──────
14  │ 9  8
  - │ 7  0   (5 x 14)
    ──────
      2  8
  - │ 2  8   (2 x 14)
    ──────
      0  0
```

```
        0  6  r 9
    ┌──────
15  │ 9  9
  - │ 7  5   (5 x 15)
    ──────
      2  4
  - │ 1  5   (1 x 15)
    ──────
      0  9
```

N.B. Depending on the context of the problem the pupils should be able to interpret the remainder.

STAGE 4: To divide a three-digit number by a two-digit whole number using the formal written method of long division (pupils can use jottings here; begin with friendly numbers and no remainders).

```
        2  1
    ┌──────
13  │ 2  8  6
  - │ 2  6  0   (20 x 13)
    ──────
      0  2  6
  - │    2  6   (2 x 13)
    ──────
      0  0  0
```

```
        2  7  r 8
    ┌──────
14  │ 3  8  6
  - │ 2  8  0   (20 x 14)
    ──────
      1 10  6
  - │    7  0   (5 x 14)
    ──────
      0 2⁄3 16
        2  8   (2 x 14)
    ──────
        0  8
```

STAGE 5: To divide a four-digit number by a two-digit whole number using the formal written method of long division (pupils can use jottings here; begin with friendly numbers and no remainders).

```
        1  3  0  r 6
    ┌──────
15  │ 1  9  5  6
  - │ 1  5  0  0   (100 x 15)
    ──────
      0  4  5  6
  - │    3  0  0   (20 x 15)
    ──────
      0  1  5  6
         1  5  0   (10 x 15)
    ──────
         0  0  6
```

STAGE 6: To divide decimal numbers by a two-digit whole number using the formal written method of long division (pupils can use jottings here; begin with friendly numbers and no remainders).

```
        2  1 • 0  2
    ┌──────
14  │ 2  9  4 • 2  8
  - │ 2  8  0 • 0  0   (20 x 14)
    ──────
      0  1  4 • 2  8
  - │    1  4 • 0  0   (1 x 14)
    ──────
         0  0 • 2  8
         0  0 • 2  8   (0.02 x 14)
    ──────
         0  0 • 0  8
```

Key Vocabulary:
share, group, divide, divided by, half, 'is equal to', is the same as' , equal groups, unequal groups, remainder, quotient, divisor, dividend